

ARDHI UNIVERSITY



**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
REPORT FOR THE PROPOSED DEVELOPMENT OF NEW ARDHI
UNIVERSITY BUILDINGS ON PLOT NO. 3, BLOCK "L",
OBSERVATIONAL HILL, MAKONGO JUU MTA A, KINONDONI
MUNICIPALITY, DAR ES SALAAM REGION**



April 2024

EXECUTIVE SUMMARY
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INTRODUCTION

Ardhi University (ARU) is a public academic institution established under the Ardhi University Charter, 2007, ARU, has traversed through various transformations from Survey Training Centre (1956 – 1972), Ardhi Institute (1972-1996) to University College of Lands and Architectural Studies (UCLAS), a constituent college of the University of Dar es Salaam (1996 – 2006). ARU is a unique University being the only Institution of its kind in Tanzania and in Africa offering integrated training and conducting research in land, the built environment and other environment related issues under the same roof.

Ardhi University (ARU) is one of the universities which are going to benefit from the Higher Education for Economic Transformation (HEET) project. HEET is a five-year project, which is financed by the World Bank through the Ministry of Education, Science and Technology (MoEST). HEET project aims at promoting higher education as a catalytic force for the new industrial based economy of Tanzania. Thus, the project is designed to revitalize and expand the capacity of universities to contribute to key areas for innovation, economic development, and labor market relevance, by investing in requisite infrastructure for modern and effective teaching and research.

In that regard, Ardhi University (ARU) has received funds from the Ministry of Education Science and Technology. ARU shall set aside land in its main campus for development of Multipurpose Lecture theatres, Workshops for the priority degree programs, Studio, and multipurpose laboratory. The proposed buildings will be equipped with online distance learning facilities for wider reachability and addressing emerging communicable disease challenges such as COVID-19. Thus, through HEET project, ARU will improve teaching environment and equity in education and training, and enhance quality of education and training, hence contributing to the Tanzania economy through generation of quality graduates that are relevant to the labor market requirements. In addition, the proposed project at ARU shall create many employment opportunities throughout the project lifetime. This is in line with The Second Five Year Development Plan 2015/16 – 2020/21 (FYDP II) of the Country that focuses on building an industry-centered economy and reducing unemployment through a multi-sector transformative framework.

As a prerequisite to the construction of new buildings, the project will involve various site excavation activities including the demolition of the buildings currently on site. Building construction and associated activities will inevitably have environmental, social and economic impacts, which need to be identified and mitigation measures put in place for ensuring sustainability of the project. World Bank Environmental and Social Framework specifically Environmental and Social Standards (ESSs) and The Environmental

Management Act of 2004 of Tanzania require project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. 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.

In fulfilment of the above, ARU undertook groundwork and prepared EIA application documents which included Scoping Report and Terms of Reference (TOR) as a first step in the environmental assessment process. The documents were submitted to the Council (NEMC) and the project was registered and allotted Project Reference No. EC/EIA/2022/9073 as well as an approval of Terms of Reference (ToR) for undertaking ESIA study was made. The approval was communicated through a letter of 28/10/2022 with Reference Number HE.145/88/81/01 (Appendix 1). These 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) were observed in the study.

Ardhi University commissioned the NEMC registered Experts (Dr. Nicholas Mwageni and Dr. Restituta Mapinduzi) to conduct Environmental and Social Impact Assessment for the proposed Project. The core ESIA study team was composed of the following experts: Environmental Expert, Environmental Engineer, botanist, Air quality and GIS experts; and Sociologists and Urban Planners.

PROJECT DESCRIPTION

ARU will construct new buildings within the campus to address the immediate and long-term needs. The buildings will be climate smart and friendly to gender including considerations to persons with special needs (e.g., physical, learning impairment, emotional and behavioural). The design will ensure low energy use and integration of solar power supply; low footprint to increase green spaces; and accommodation of rainwater harvesting, storm water and waste management systems. The proposed construction and rehabilitation projects are planned to be implemented concurrently within first two years for various logical reasons. One is to optimize scale of economies in project management. Two is to minimize cumulative environmental and social impacts of the construction projects. Three is to achieve to the earliest increase in quality and enrolment of students within the specified project period of five years. Specifically, the following buildings are envisaged to be in place after the completion of HEET project.

The proposed projects shall be located at Ardhi university campus, Makongo Juu Mtaa, Makongo ward, Kinondoni Municipality, Dar es Salaam Region. Ardhi University is bordered by Makongo Juu to the North, Mlalakuwa Ward (Survey Street) to the East, University of Dar es Salaam to the south and Changanyikeni and Mbuyuni area to the West. The sites for the project are located within the University campus. The Project is accessed through Makongo Road, Ardhi University Campus.

POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

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

- i. Environmental Management Act No. 20 of (2004)
- ii. The Water Supply and Sanitation Act No. 12 of 2009
- iii. Land Act no 4 (1999), CAP 113 R.E. 2019
- 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)

Furthermore, this ESIA study has also complied with World Bank Environmental and Social Standards which are:

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

BASELINE CONDITIONS

The proposed site has Electrical, water supply and telecommunication system. The project area has no large animals, only small reptiles such as lizards were observed. The vegetation types of the project site are composed of 88 species with high diversity plant species of different life forms including climbers, parasitic plants, herb, grass, shrubs and trees. The area is dominated by shrubs which account for 61% of the vegetation types found in the proposed construction area, followed by trees (19%) and others which account for less than ten percent (10%). The shrubs are scattered throughout the proposed construction areas. The presence of many shrubs and tree species indicates that the community is less disturbed by human activities such as poles cutting and fuel wood collection besides being surrounded by human settlements. The vulnerable species identified are *Dalbergia vacciniifolia* and *Thevetia peruviana* while the endangered is *Opuntia* sp. However, these species are allocated near the construction site and not within the construction site.

STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

The main stakeholders include:

- Ministry of Education Science and Technology;
- Tanzania Commission of Universities;
- Ardhi University Management-Developer;
- Ardhi University Academic and Administrative staff members
- Ardhi University students;
- Ardhi University Students' Organisation;
- Non state actors working in Makongo Juu, Mbuyuni and Mlalakuwa;
- Kinondoni Municipal Council (Health officer, Municipal urban planning and environment, Trade officer, Land officer);
- Dar es salaam Water Supply and Sewerage Authority (DAWASA);
- Occupational Safety and Health Authority (OSHA);
- Tanzania Electrical Supply Company (TANESCO)
- Fire and Rescue Force
- Ardhi University students Organization (ARUSO)
- ARU Service providers
- Makongo ward leaders
- Makongo Juu Street leaders
- Mlalakuwa ward leaders
- Mlalakuwa Street leaders
- Mbuyuni Street leaders
- Makongo Juu community members
- Mbuyuni and Mlalakuwa community members

Major issues raised are:

- i. Availability of academic facilities may increase pressure on available social services which are inadequate;
- ii. Increased dust and noise during construction;
- iii. Waste Management problems;
- iv. Local communities should be given priority in terms of employment and service provision during the implementation of the project;
- v. Security matters should be strengthened by the University by constructing a police post;
- vi. There are scarcity of play ground to accommodate the needs of the University local communities
- vii. The existing facilities does not favor the people living with disabilities;
- viii. Nature of Ardhi University areas is slope but buildings look flat, this may increase construction cost so buildings have to follow nature of the landscape in order to reduce construction cost; matching topography with the buildings;
- ix. The proposed project shall put pressure on Sewerage systems; and there should be an adequate storm water management system to avoid social conflicts (difficulties during cleanliness) which may arise due to solid wastes from the university entering the Mlalakuwa River.

ASSESSMENT OF IMPACTS

- a) 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 the use of living natural resources.
- b) The Social risks and impacts assessment done included: (i) threats to human security through crime or violence; (ii) risks that project impacts fall disproportionately on individuals and groups who, because of their particular circumstances may be disadvantaged or vulnerable; and (iii) negative economic and social impacts relating to the involuntary taking of land or restrictions on land use.

Impacts associated with preparatory and demolition phase

Positive social impacts

- i. Job Creation and employment opportunities
- ii. Increased market opportunities and sources of income
- iii. Changes in lifestyle and quality of life
- iv. Increased Revenues to local authorities

Negative social Impacts

- i. Displacement and re-allocation of staff settlements

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

Impacts associated with construction phase

Potential Positive social impacts

- i. Jobs creation
- ii. Income to local suppliers and service providers
- iii. Increased skills and impart knowledge to local communities Improved quality of life and living standard

Potential negative social impacts

- i. Occupational Safety and Health impacts
- ii. Community Health, Safety and Security
- iii. Increased level of crimes
- iv. HIV / AIDS among workers and students since the construction will be conducted while classes are ongoing
- v. Eruption of COVID-19 disease
- vi. GBV / SEA

Negative Impacts on physical environment

Positive environmental impacts

- i. Improved amenities/ landscaping
- ii. Improved health, safety and security in the area
- iii. Improved aesthetic value, and
- iv. Improve easy flow of natural air

Negative environmental impacts

- i. Impairment of air quality due to dust (air pollution)
- ii. Contribution to Climate Changes
- iii. Noise Impacts
- iv. Impacts of vibration
- v. Wastewater Management problems (Water pollution)
- vi. Solid waste management problems (Land pollution)
- vii. Erosion of Exposed Surfaces
- viii. Landscape and visual impacts
- ix. Loss of flora and fauna

Impacts associated with Operation Phase

Potential Positive Social Impacts

- i. Increase of admission of students to ARU
- ii. Increase of revenue to ARU
- iii. Job creation
- iv. Increased commercial and social activities around project locations
- v. Growth of Trade and Increased Investment – growth of retail businesses in DTV Area, Makongo
- vi. Production of skilled labour force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation
- vii. Rise in house rents in Makongo

Negative Social Impacts

- i. Increased incidences of diseases and ill health
- ii. Increased pressure on social services and utilities

Negative Impacts on physical environment

- i. Water pollution
- ii. Increased storm water generation and overflow
- iii. Health and safety risks due to fire hazards
- iv. Increased hazardous wastes generation from laboratory and dispensary
- v. Contribution to Climate Change
- vi. Increased solid waste generation

Impacts associated with Decommissioning Phase

Negative Social impacts

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
Loss of revenue to institutions and the government

MITIGATION MEASURES

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

- a) Anticipate and avoid risks and impacts;
- b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels;
- c) Once risks and impacts have been minimized or reduced, mitigate; and
- d) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.

Many of the mitigation measures put forward are essentially good engineering practice that shall be adhered to during all the project phases.

Potential mitigation measures during construction phase

Negative Social Impacts

- i. Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphic displays;
- ii. Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transportation law and standards;
- iii. Provide more avenues for service providers e.g. cafeteria and restaurants
- iv. Constructions of police stations at Ardhi University and the surrounding communities like Makongo Juu and Mlalakuwa to strengthen security services
- v. Awareness campaigns /Education on HIV, COVID-19 and STDs shall be provided to workers;
- vi. The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.
- vii. ARU will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirement of national law.

Negative Environmental Impacts

- i. Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used;

- ii. Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use;
- iii. Protect stockpiles of friable material subject to wind through wetting;
- iv. Cover loads with friable material during transportation;
- v. Green spaces shall be maximized in project areas
- vi. Vehicles carrying construction materials shall be restricted to work during night time only;
- vii. Impact pile driving shall be avoided where possible in vibration sensitive areas;
- viii. Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site;
- ix. The contractor shall have adequate facilities for handling the construction waste;
- x. Construction will be done as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant;
- xi. Locating parts of the development further away from the general public;
- xii. Clearance of patches of native forest remaining in the neighbourhood of the proposed project shall be avoided;

Potential mitigation measures during the operation phase

Negative Social Impacts

- i. A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever;
- ii. Use of water conservatively by instituting technologies (e.g. self-lock water taps) and awareness raising notices to users, etc.;
- iii. The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.
- iv. ARU will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirement of national law.
- v. Provide more avenues for service providers e.g., cafeteria and restaurants
- vi. Constructions of police stations at Ardhi University and the surrounding communities like Makongo Juu, Mbuyuni and Mlalakuwa in order to strengthen security service;
- vii. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.

Impacts on physical environment

- i. Septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites (Constructed treatment wetland);
- ii. The design of storm water drainage will be given a high priority;
- iii. Adequate number of portable fire extinguishers shall be placed at strategic locations;
- iv. Good housekeeping shall be maintained at all the time;
- v. The design of buildings shall strictly adhere to the Fire Safety Standards;
- vi. To change the consumption behaviour in terms of energy and water

Mitigation Measures During Decommissioning Phase

Social impacts

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

Environmental Impacts

- i. The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work;
- ii. All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles, and ear protectors; and

ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PLAN

The options to minimize or prevent the identified adverse social and environmental impacts as well as a monitoring plan have been suggested in this report and are contained in the ESMP. Many of them are based on good engineering and social practices. The ESMP defines roles and responsibility of different actors of the plan. However, the key actors during construction phase are the contractor and Ardhi University while during the operational phase, Ardhi University will be the key actor in implementation of mitigation measures. The associated environmental costs amount to Tshs one hundred eighty six million five hundred thousand (186,500,000).

ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

There will be four types of monitoring activities: i) baseline monitoring, ii) impact monitoring, compliance monitoring, and mitigation monitoring. The monitoring of environmental and social parameters during the construction phase shall be carried out by the Contractor's safeguard team (i.e., Environmental, social and safety experts), under the supervision of the Consultant's safeguard team. The responsibility for mitigation and monitoring during the operation phase will lie with the ARU Estate Department. Depending on the implementation status and sensitivity of any emerging issues, OSHA and /or NEMC will perform annual EHS reviews in which environmental concerns raised will be reviewed alongside project implementation. The estimated annual costs for carrying out

the proposed environmental monitoring programme amounts to Tshs eighty one million (81,000,000).

DECOMMISSIONING

As decommissioning will take place in the remote future, the specific conditions for mitigation are generally inherently uncertain. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed now with a reasonable degree of certainty. A decommissioning plan that considers environmental issues shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use.

PROJECT COST BENEFIT ANALYSIS

The implementation of the proposed new buildings project at ARU shall have costs to community, government and the environment. For instance, community shall have inherent costs associated with noise, impairment of air quality, and Safety and health risks. However, the introduction of mitigation measures will reduce the anticipated impacts. The government has secured the loan for this project; and there will be costs for mitigating environmental impacts. On the other hand, the proposed new buildings project has both direct and indirect benefits to university, neighbour and the government as well. The benefits of the project are expected in all phases from mobilization, construction, operation to decommissioning phase. 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. However, building construction projects may generate negative benefits though; they are usually minimal compared to the positive benefits. Some of those benefits are non-quantifiable thus cannot be used in the cost-benefit analysis estimations.

SUMMARY AND CONCLUSION

The proposed construction project is planned to be implemented at ARU campus, Makongo mtaa, Makongo ward, Kinondoni Municipality, Dar es Salaam Region. The project has enormous socio-economic benefits to Ardhi University, Mlalakuwa Street, Mbuyuni Street, Makongo Juu Street, Kinondoni Municipality and the Nation at large. The project as such, entails minimal adverse environmental impacts of which adequate mitigation measures have been proposed and incorporated in the project design.

It is, therefore, concluded that the proposed project will entail no significant impacts provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. ARU is committed in implementing all the recommendations given in this ESIA and further carrying out the environmental auditing and monitoring schedules.

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ABR	Anaerobic Biogas Reactor
ARU	Ardhi University
BATNEEC	Best Available Technology Not Entailing Excess Cost
CITES	Convention on International Trade an Endangered Species
CRB	Contractors Registration Board
CNG	Compressed natural gas
DoE	Division of Environment
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental management Plan
ESMP	Environmental and Social Management Plan
ERB	Engineers Registration Board
GOT	Government of Tanzania
HIV	Human Immune Deficiency Virus
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
NACP	National HIV/AIDS Control Programme
NAFORMA	National Forest Resources Monitoring and. Assessment
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non-Governmental Organisation
PLHAS	People Living with HIV/AIDS
STD	Sexually Transmitted Diseases
TANESCO	Tanzania Electricity Supply Company
TCU	Tanzania Commission for Universities
ToR	Terms of Reference
UASB	Up-flow anaerobic sludge blanket
URT	United Republic of Tanzania
UN	United Nation
VAT	Value Added Tax
WHO-GPA	World Health Organization Global Programme on AIDS

CHAPTER ONE

INTRODUCTION

1.1 Background and justification

Ardhi University (ARU) is a public academic institution established under the Ardhi University Charter, 2007, ARU, has traversed through various transformations from Survey Training Centre (1956 – 1972), Ardhi Institute (1972-1996) to University College of Lands and Architectural Studies (UCLAS), a constituent college of the University of Dar es Salaam (1996 – 2006). ARU is a unique University being the only Institution of its kind in Tanzania and in Africa offering integrated training and conducting research in land, the built environment and other environment related issues under the same roof.

Ardhi University (ARU) is one of the universities which are going to benefit from the Higher Education for Economic Transformation (HEET) project. HEET is a five-year project, which is financed by the World Bank through the Ministry of Education, Science and Technology (MoEST). HEET project aims at promoting higher education as a catalytic force for the new industrial based economy of Tanzania. Thus, the project is designed to revitalize and expand the capacity of universities to contribute to key areas for innovation, economic development, and labor market relevance, by investing in requisite infrastructure for modern and effective teaching and research.

In that regard, Ardhi University (ARU) has received funds from the Ministry of Education Science and Technology. ARU shall set aside land in its main campus for development of Multipurpose Lecture theatres, Workshops for the priority degree programs, Studio, and multipurpose laboratory. The proposed buildings will be equipped with online distance learning facilities for wider reachability and addressing emerging communicable disease challenges such as COVID-19. Thus, through HEET project, ARU will improve access and equity in education and training, and enhance quality of education and training, hence contributing to the Tanzania economy through generation of quality graduates that are relevant to the labor market requirements.

As a prerequisite to the construction of new buildings, the project will involve various site excavation activities including the demolition of the buildings currently on site. Building construction and associated activities will inevitably have environmental, social and economic impacts, which need to be identified and mitigation measures put in place for ensuring sustainability of the project. The World Bank Environmental and Social Standards (ESS1) emphasizes the identification and assessment of the environmental and social risks and impacts of the project before its commencement and should continue throughout the project life's circle. Also, the Environmental Management Act of 2004 of Tanzania requires project developers to carry out an Environmental Impact assessment (EIA) prior to project implementation.

The First Schedule of the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, categorizes major urban projects including multistorey buildings as type B1 project (borderline project). Which may or may not require ESIA study and upon screening the Council will guide the course of the study. Likewise, the World Bank's Environmental and Social Standards requires the borrower to identify, assess, and manage

potential environmental and social impacts and risks associated with the project. In view of this, ARU submitted Terms of References (TOR) to World Bank and NEMC for approval. The prepared TOR provided guidance under which the environmental and social assessment for the proposed project was done. The Environmental Management Act, Cap 191 and First Schedule to Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and the World Bank Environmental and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study.

Ardhi University internally commissioned a team of Environmental and Social Experts to conduct Environmental and Social Impact Assessment for the proposed Project. The core ESIA study team is composed of the following experts: Environmental Expert, Environmental Engineer, botanist, Air quality and GIS experts; and Sociologists and Urban Planners.

1.2 Project Rationale

ARU as an academic institution faces a number of challenges including: i) inadequate students enrolment due to limited training and learning space, ii) inadequate students' accommodation, iii) inability to generate new demand driven programmes in line with labour market needs, and iv) limited staff capacity in research and innovation.

These challenges are in line with Programme Development Objective of the HEET project, which is "to increase students' enrolment and improve the quality and labour market relevance of degree programmes in the priority disciplines in Tanzanian public universities while improving the governance and management of the higher education system at institutional and national levels". Thus, through HEET project, ARU will produce sufficient numbers of quality graduates relevant to the labour market demand who will play an active role in supporting the national economy. In addition, the proposed project at ARU shall create many employment opportunities throughout the project lifetime. This is in line with The Second Five Year Development Plan 2015/16 – 2020/21 (FYDP II) of the Country that focuses on building an industry-centered economy and reducing unemployment through a multi-sector transformative framework.

1.3 Objectives of the HEET project

1.3.1 ARU Campus HEET Project Main 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 ARU 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 10,000 students by year 2024/25. This calls for the need to expand its facilities including infrastructures so as to create supportive environment towards achieving its goal.

1.3.2 Specific Objectives for ARU – Main Campus HEET project

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

- (i) To construct multipurpose Lecture theatres, workshops for the priority degree programs, Studio, and multipurpose laboratory;
- (ii) To update curriculum and introduce innovative pedagogical methodologies;
- (iii) To promote applied research and innovation capacity;
- (iv) To building functional linkages with private sector/industry;
- (v) To promote self-generated income; and
- (vi) To building capacity of academic staff and university leadership.

1.4 Need for ESIA Study

Prior to the construction of the proposed project, Environmental and Social Impact Assessment is required by World Bank's ESF and Tanzanian laws and governing in order to protect the environment and lives of people. The ESIA study needs to be conducted so as to understand the environmental and social sensitivities associated with the project implementation phases and to implement mitigation measures in order to avoid adverse impacts during the Project's lifecycle. The development of facilities may have certain Environmental and Social impacts which may be negative or positive. The negative environmental and social impacts need to be avoided as far as possible. The impacts which cannot be avoided need to be mitigated or managed.

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

1.5 Objectives of the EIA Study

The overall objective of carrying out this ESIA was to identify, predict and assess both positive and negative environmental and social impacts associated with the project and propose mitigation measures to minimise the negative impacts and enhance the positive ones. The assessment used data and information on the physical, biological, and socio-economic environment to predict both negative and positive impacts of the project. The Environmental Management (EIA and Audit) (Amendment) Regulations, 2018 and World Bank ESF provides the general objectives for carrying ESIA, among others a list comprises the following:

- i. To ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;
- ii. To anticipate and avoid, minimise or offset the adverse significant biophysical, social and relevant effects of developmental proposal;
- iii. To protect the productivity and capacity of natural systems and ecological processes which maintain their functions;
- iv. To promote development that is sustainable and optimises resources use and management opportunities;
- v. To establish and assess impacts that are likely to affect the environment before a decision is made to authorise the project;

- vi. Propose mitigation and socio-management procedures aimed at managing the proposed mitigation of the identified potential impacts and that will form part of the overall ESMP for the project operations; and
- vii. To enable information exchange, notification and consultations between stakeholders;

ARU undertook this Environmental and Social Impact Assessment in order to address the above objectives.

1.6 Scope of Work

This study entailed the following:-

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

1.7 Methodology

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

1.7.1 Desk study

Desk study involved: identification and review of the country policies and laws which are relevant to the project; collection and review of previous study reports (including design reports) pertaining to the project; collection and review of information and data on the physical, social, economic, cultural as well as archaeological (if present); preliminary identification of key issues to be included in scoping report and the main ESIA study; and preparation for fieldwork, including notification of all stakeholders on the intention to conduct ESIA study as well as seek their co-operation. This was done by making phone calls, writing e-mails, and distribution of letters seeking appointment to the stakeholder.

1.7.2 Fieldwork

The field visits were essential to fully realizing the scope of the project. Several visits were made to the project site, where-by the ESIA team collected specialised data. The visits were made during scoping stage and during detailed ESIA study. All visits were made in July 2021.

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

Measurement of Baseline Air Quality Data

The ESIA team collected and analysed baseline air quality and noise level at the site, and adjacent areas within the University Campus. Five (5) sampling locations were selected based on relative distance to the proposed project sites, and existing multiple sources of air pollution in the campus. The ESIA team considered existing cafeterias, two standby generators and roads vehicle exhausts to be the main sources of air pollution at the University. The locations of the sampling points are presented in Table 1.1

Sampling and analysis methodology for dust, gaseous pollutants and noise levels are presented in the following sections. Apart from the air quality data, some meteorological data of the site which have direct relationship with project implementation were collected once to enable interpretation of air quality data. These include temperature and relative humidity. The collection of data was done during the busiest day and hours (10am to 2pm) so as to predict the level of air quality during the construction phase. Statistical basis was considered but due to variation of activities during the day, the statistical data could mislead the prediction.

Table 1.1: Location of sampling location

Site No.	Site Name	Coordinates
1	Cafeteria	Latitude: -6.765598 Longitude: 39.215858
2	Roadside (along the University Road)	Latitude: -6.767259 Longitude: 39.214446
3	New hostel	Latitude: -6.767259 Longitude: 39.214446
4	Near DAWASA water tank	Latitude: -6.762638 Longitude: 39.218864
5	Near ARU Dispensary	Latitude: -6.766040 Longitude: 39.208965

Measurement of ambient dust levels (PM_{2.5} and PM₁₀)

Dust levels were measured in terms of PM_{2.5} and PM₁₀. Dust levels were measured using a portable device, brand Temtop M2000C. The Elitech Temtop M2000 2nd Generation sensor unit uses a Temtop PM200 particulate sensor, which separates dust particle size in 2.5 ug/m³ and 10 ug/m³ size range. The measurement principle is based on laser scattering

to convert particle number to mass concentrations through its proprietary algorithm. During measurements, the device was mounted at a breathing height of approximately 1.5 meters above the ground, and samples were collected for one hour.

Measurement of Ambient gaseous pollutants

Baseline levels of ambient gaseous pollutants were measured using a FD-4S Portable Multi-Gas Detector. The instrument operates using a heated metal oxide semiconductor. The gas molecules adsorb onto the heated surface where an oxidation-reduction reaction occurs causing a change in the electrical conductivity of the metal oxide. This change is proportional to the concentration of the gas of interest. Parameters measured included: Carbon monoxide (CO) in Parts per Million (PPM), Oxygen (O₂) in %, and Hydrogen sulphide (H₂S) in PPM. At the sites, the equipment was mounted at 1.5m above the ground. Three readings were collected at each sampling point, and the mean value was used as a representative value of that particular point. Results were compared with local and international standards.

Meteorological conditions

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

Collection of biological information

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

The vegetation types were classified basing on their physiognomic characterization. Identification of plant species was conducted directly in the field by botanist aided by various plant identification books includes Flora of Tropical East Africa series and various reports for the coastal forest vegetation especially Frontier Tanzania expeditions.

For those plants which couldn't easily identified in the field, plant specimens were collected and taken to the herbarium of the University of Dar es Salaam for further identification and preservation for future references.

Collection of socio-economic data

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

1.7.3 Public participation

Consultations were done to staff, students, and members of the surrounding communities of the Ardhi University which includes local government authorities and community meetings

in three streets of Makongo Juu, Mlalakuwa and Mbuyuni found in Makongo and Mlalakuwa wards. This study has taken on board, the World Bank Social Standards which include, assessment and Management of Social Risks and Impacts, Labor and Working Conditions, Community Health and Safety, Land Acquisition, Restrictions on Land Use and Involuntary Resettlement, Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities and Cultural Heritage.

The data for this study was obtained through organized public meetings at the university and community level, face-to-face meetings, community meetings, site visits, group discussions, meetings with mtaa/street councils, presentations, and workshops. At the University level the public meeting and focus group discussions were conducted to students from different schools and department that were recruited randomly, the members of academic and administrative blocks (THTU and ARISA), Ardhi University Students' government (ARUSO), face to face meeting with the President and Vice President of ARUSO. Others includes face-to-face meetings and interviews with Ardhi University Vice Chancellor, Deputy Vice Chancellors for Academic and Administrative affairs and service providers within Ardhi University. In addition to that, the study conducted focus group discussion with Public Institutions and Agencies relevant for service provisions at Ardhi University and surrounding communities which include but not limited to TCU, TANESCO, DAWASA, and Fire Army. The study further conducted face-to-face meetings with vulnerable students e.g. those with disabilities/special needs, public meetings with people whom live near or adjacent to Ardhi University and Non-Government organizations. The concerns of each group have been addressed in this EIA report.

1.8 Project impact assessment

The environmental assessment has been undertaken in close interaction with the design team. In this process environmental impacts have been evaluated for various alternatives. Several project alternatives were considered including that of not implementing the project. The fundamental environmental protection strategy and environmental considerations influencing engineering design were incorporated. However, reasonable regard to technological feasibility and economic capability were taken into account. *Inter alia*, the assessment entailed the following:

1.8.1 Project impacts identification

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

1.8.2 Impact Assessment

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

- i. **Prediction:** What will happen to the status of specific receptors as a consequence of this project activities (primarily; what is the magnitude of the impact?);
- ii. **Evaluation of significance:** How significant is the impact to the identified receptors namely, affected communities and the wider environment – land, air and water? What is its relative significance when compared to other impacts?;
- iii. **Residual Impacts:** After mitigation, are the impacts still of concern and/or significant? If yes, the process needs to be repeated at least once before the ‘final’ determination of residual impact significance occurs.

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

1.8.3 Development of Mitigation Measures

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

1.9 Report Structure

- **Chapter one** contains the introduction including the background information of the proposed project, its development objectives, rationale and methodology
- **Chapter two** covers the project description, in which the location and relevant components of the project and their activities are described.
- **Chapter three** analyses policy, legal and administrative framework applicable to building construction projects, which are relevant to Tanzania.
- **Chapter four** describes the baseline information relevant to environmental characteristics covering details concerning the bio-physical environment and socio-economic environment at the project area.
- **Chapter five** covers the consultation exercise at the project area detailing the list of stakeholders consulted and the issues raised.
- **Chapter six** describes the positive and negative environmental impacts of the project that are likely to be generated from the different phases (the planning and designing, construction, operation and maintenance and the demobilization phases).
- **Chapter seven** gives the mitigation measures for the potential negative impact of the project.
- **Chapter eight** presents the Environmental and Social Management Plan (ESMP).
- **Chapter nine** presents the Environmental Monitoring Plan, which contains the proposed institutions to carry out the monitoring activities, the monitoring indicators, time frame and the proposed budget for monitoring.

- **Chapter ten** gives the cost benefit analysis of the project.
- **Chapter eleven** provides the decommissioning plan for the proposed project although the decommissioning is not anticipated in the foreseeable future.
- **Chapter twelve** gives the summary and conclusions of the study.

CHAPTER TWO

2.0 PROJECT DESCRIPTION

2.1 Location and Accessibility

2.1.1 Location

The proposed projects shall be located at Ardhi university campus, Makongo Juu Mtaa, Makongo ward, Kinondoni Municipality, Dar es Salaam Region. Ardhi University is bordered by Makongo Juu to the North, Mlalakuwa Ward (Survey Street) to the East, University of Dar es Salaam to the South and Changanyikeni area to the West. The sites for the project are located within the University campus (Figure 2.1).

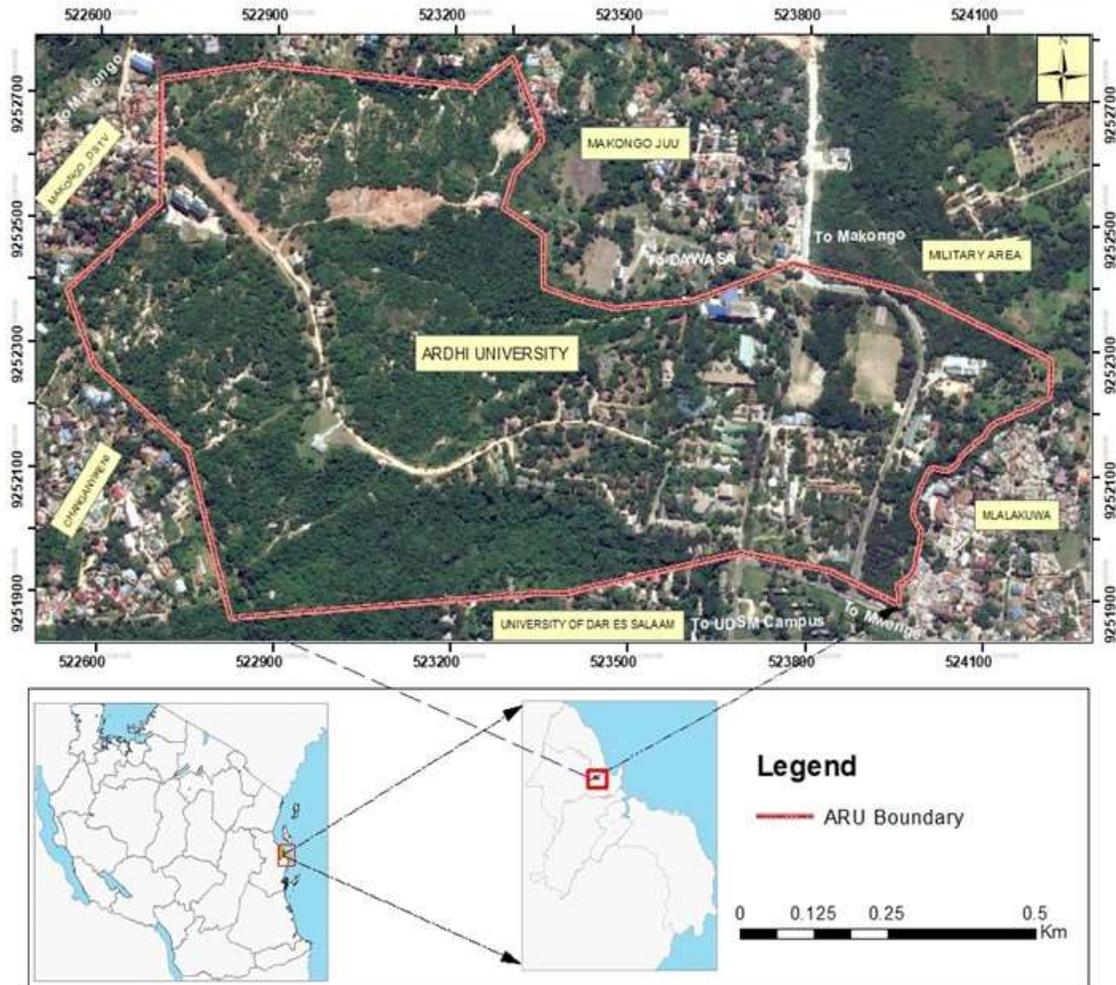


Figure 2.1: A map which shows a case study Area location (Ardhi University)

2.1.2 Accessibility

ARU is located twelve kilometres from Dar es Salaam City Centre. It lies in the North Eastern side of Tanzania, on observation hill along University Road adjacent to University of Dar es Salaam. The University is highly accessible from all parts of Dar es Salaam City and it is within the proximity of several other academic Institutions such as University of Dar es Salaam and Rwegarulila Water Resources Institute (Figure 2.2).

2.1.2 Sites description

ARU landscape is divided into low, medium and high zones. The most built-up area is found in the medium zone where the current academic and administrative activities take place. The least developed area is found at high zone followed by low zone. The proposed construction of new buildings under HEET project will be done at the least developed area. The buildings (studio, workshop, multipurpose classrooms and multipurpose laboratory) will be constructed at the high zone. The location of these sites for the proposed project will decongest the medium zone of ARU taking into consideration that there has been a tremendous increase of students' enrolment rate. The buildings at the high zone will be constructed in a slightly disturbed area. However, the construction of studio building may necessitate the demolition of the old-fashioned staff quarter to blend with the new look.

2.2 Project Components and Design

The site is almost irregular in shape and allows a high-rise development in accordance with Kinondoni Municipal Council redevelopment plan and ARU master plan. The site is in a prime area whereby it links closely with the local public and private transport facilities, which reinforce its sustainable credentials.

2.2.1 Project Components

ARU will construct new buildings within the campus to address the immediate and long-term needs. The proposed construction projects are planned to be implemented concurrently within first two years for various logical reasons. One is to optimize scale of economies in project management. Two is to minimize cumulative environmental and social impacts of the construction projects. Three is to achieve to the earliest increase in quality and enrolment of students within the specified project period of five years. The buildings envisaged to be in place after the completion of HEET project are in Table 2.1.

Table 2.1: Typical project components to be built at ARU campus

Component	Functional space	Total floors area (m²)	Area coverage (m²)	Number of People to be accommodated
Multipurpose Laboratories	Multipurpose Laboratory building is a four storey building (three floors) comprising of Geotechnical survey lab, transportation lab, physics lab, fluid mechanics lab, biotechnology lab, geodesy lab, geomatics lab and GIS and remote sensing lab	2,890	4,967.6	760 students; 22 staff
Studio Building	Studio building is a four storey building (three floors) and a sub-basement floor comprising of studio related classrooms/spaces and other supporting facilities such as; toilets, offices, stairs and ramps.	12,075	12,549.6	780 students; 15 staff
Workshop building	Workshops building is two storeys building (single floor) and a sub-basement floor comprising of multiple workshop spaces such as Carpentry workshops, welding workshops, electrical, plumbing, electronics, GIs & ICT, Survey, electronics, and supporting facilities such as; toilets, lift and stairs.	5,205	7,859.4	492 students; 70 staff
Multipurpose classrooms	Multipurpose Classrooms building is four storeys building (three floors) comprising of lecture rooms and other supporting facilities such as; toilets, lift and stationery spaces	8,093.3	12,946.67	2,680 students; 36 staff

Source: ARU, 2021

2.2.2 Project Design

The buildings shall be developed within a campus setting and requires a number of design provisions to be made to ensure its functionality. The buildings will be climate smart and friendly to gender including considerations to persons with special needs (e.g. physical, learning impairment, emotional and behavioural). The design will ensure low energy use and integration of solar power supply; low footprint to increase green spaces; and accommodation of rainwater harvesting, storm water and waste management systems. The following are the design criteria that have been followed during the design of the buildings.

- Ensure easy flow of clean air
- Presence of fire escape routes in each floor
- Aesthetic values added
- Proper orientation to reduce indoor discomfort and capture natural air as much as possible and minimization of the sun effects
- Easy accessibility of common facilities

2.2.3 Development Conditions

Ardhi University (ARU) is one among esteemed Public Universities in Tanzania. It was established as an independent University, emerging from University College of Lands and Architectural Studies (UCLAS) in 2007. Thus, the intended land use of the site is for institution purposes.

The HEET project is in line with the priority of the fifth phase government on industrialization as reflected in its Five Years Development Plan II (2015/16 – 2020/21) in particular, and Vision 2025 in general, requires higher learning institutions to produce high quality, ready to use skilled labor. ARU ought to expand its physical infrastructure to accommodate this need. Furthermore, the HEET project is in line with 2018 - 2038 Ardhi University Master Plan. The number of storeys and plot ratio of the buildings are within the specified range provided by Kinondoni Municipality. Therefore, the development complies with the proposed number of floors and the proposed land use.

2.3 Manpower and Utility Requirements

ARU shall ensure that workers are deployed in a manner that the opportunities are equitably shared among men and women. Also, extraction of the materials is in response to Environmental and Social Standards, ESS3 (Resource Efficiency and pollution prevention and Management).

2.3.1 Manpower Requirements

The proposed project is expected to temporarily deploy about 150 to 200 people during construction phase. Employment during construction phase will be under contractor and will be in the form of managers, skilled as well as unskilled laborers considering all gender types.

2.3.2 Land ownership and Requirement

The plot number 3 block L at observation hill, Dar es Salaam City is currently owned by Ardhi University. The land was previously under ownership of The University College of Lands and Architectural Studies (UCLAS). The title deed and transfer document has been attached with this report (Appendix II). The area is planned for educational purposes and ancillary purposes thereto, use group C use classes (a) and use group K use classes (b). The land has a total area of 79.78Ha (797,800m²). The proposed new buildings are expected to utilize a maximum of

7.8% of the total plot size.

2.3.4 Electricity

The total connected load will be 33 KV supplied through three phase 220kVA distribution transformer from national electricity grid. However, due to recurrent power cuts from the national grid the proponent might install a 110 kVA generator set for backup.

2.3.5 Water Requirement

The major water source is from DAWASA; water will be used for construction activities and for domestic purpose (flushing of toilets) and cleaning activities during construction and operation phase. The water consumption using construction is estimated to be 3.2 m³/day

2.3.6 Access and Service Roads

The project site will be accessed through feeder roads from University road to the East-West side and Mlalakuwa-Makongo road to North-West side. The project will not require additional onsite access roads to connect existing roads. As there are already a number of access roads of which the proposed project will make use of these. Delivery of construction materials will be scheduled during off peak hours to control traffic and congestion along the mentioned roads.

2.4 Project activities in general

The undertaking involves various phases from the planning phase all the way to the construction and operation phase. Each specific phase has its own activities which are elaborated in the following sections;

2.4.1 Pre -Construction Phase

Activities

This phase entails

- i. **Topographical Survey**- The topographical survey shall be done by Surveyors to establish the boundaries and the ground levels;
- ii. **Geotechnical investigations**- Geotechnical investigation will involve drilling the ground to study the soil profile the underling geological formations.
- iii. **Architectural and Services Designs**- Preparation of Architectural drawings is done by architects to provide drawings which fits the proposed plan;
- iv. **Environmental Impact Assessment (EIA)**- This EIA has been conducted by following the EIA and Audit (Amendment) regulations of 2018;
- v. **Acquisition of various permits/ certificates**-This include getting building permit from relevant authorities.

Duration

The duration of this phase will be Four (4) months.

2.4.2 Construction Phase

Activities

The following are the main activities to be executed on the site during construction phase of the project

- **Earthworks (site clearance)** - This shall be done by means of motor grader. The proponent shall ensure as many indigenous trees as possible are left intact. This will also ensure that the drainage pattern of the site is not interfered with.
- **Demolition Works**- The existing buildings on site shall be manually demolished by using labourers. Equipments such as hammer, shovel, trolleys shall be used. The demolition wastes shall be used for leveling considering that some sites have a gentle slope.
- **Foundations excavation**- Most part of the site is covered with vegetation. The same will be removed and disposed off by a licenced waste handler to pave way for the construction.
- **Material transportation**- Materials shall be extracted to ensure efficient use of resources as stipulated in ESS3. Materials (fine and course aggregates) from quarries will be transported by trucks to the construction site. Water will be brought to the site by tanker trucks from within ARU campus. Other materials like cement, timber and reinforcement bars will be transported by trucks to the construction site.
- **Material Storage**- Materials like aggregates and sand will be stored at the site ready for use. Cement and reinforcement bars will be stored in special storage rooms. Timber will directly be used at the required areas and consequently there will be no stockpiling of timber at the camp sites. Fuel will be stored in drums in secluded areas.
- **Masonry, Concrete works and related activities**- The construction of the building walls, foundations, floors, pavements, drainage systems, perimeter fence and parking area among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mixers.
- **Steel Structure works**- The buildings will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection.
- **Roofing and Sheet metal works**- Roofing activities will include sheet metal cutting, raising the roofing sheets and structural timber to the roof and fastening the roofing materials to the roof.
- **Electrical Work**- Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

- **Plumbing-** Installation of pipe-work for water supply and distribution will be carried out within all units and associated facilities. In addition, pipe-work will be done to connect sewage from the premises to the effluent treatment plant.
- **Landscaping-** To improve the aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping. This will include establishment of flower gardens and lush grass lawns where applicable and will involve replenishment of the topsoil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

Duration

The duration of this phase will be Two (2) years.

Types, Amounts and Sources of Project requirements

Types, amounts and sources of project requirements during the construction phase are shown in Table 2.2.

Table 2.2: Types, amounts and sources of project requirements during the construction phase

Requirements	Type	Source	Quantity (Estimates)	Mode of Transport
Raw Materials	Aggregates	Msolwa	1,700-2,000m ³	Trucks
	Sand	Bagamoyo/Kibaha	5,000-10,000m ³	Trucks
	Cement	Dar es Salaam	2,500-3,000Tons	Trucks
	Water	DAWASA	60 m ³	Trucks
	Reinforcement bars	Dar es Salaam	2,100Tons	Trucks
	Timber	Mafinga	32Tons	Trucks
Manpower	Skilled	Contractor	25	Communal buses
	Unskilled	Makongo area	150	Communal buses
Equipments	Excavator	Contractor	1	Trucks
	Bulldozer	Contractor	1	Trucks
	Motor grader	Contractor	1	Trucks
	Plate compactor	Contractor	1	Trucks
	Trucks	Contractor	5	
	Construction Crane	Contractor	2	Trucks

Source: *Consultant Analysis, 2021*

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the construction phase are shown in Table 2.3: The project shall be implemented in a manner that pollution does not occur as stipulated in ESS3.

Table 2.3: Types, amounts and treatment/disposal of wastes during the construction phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Vegetation	Approximately 2,500m ³ The estimate is based on the total area to be built (62,756.91 m ²)	The logs shall be sold to people to be used as fire wood

Waste	Types	Amount	Treatment/ Disposal
	Remnants of timber.	Estimated to be 2500m ³ The estimate is based on activities expected to generate remnants of timber such as formworks	Shall be sold to recyclers
	Food remains, cardboards and papers	52.5 kg/day (based on generation rate of 0.3kg/day/person and 175 people)	To be collected in the large skip bucket at site ready to be disposed at the designated dumpsite at Pugu dumpsite
Solid Waste (Non-Degradable)	Demolition waste Spoil Soil	1000 m ³ . The estimate is based on the area to be excavated	This soil shall be stock piled along the foundation trenches. The soils shall be used to reinstate site at the end of construction activities
	Scrap metals, drums	5-10 kg	To be Sold to Recyclers
	Tins, glasses and plastics	5-10 kg	To be Sold to Recyclers
Liquid waste	Sewage	3.2 m ³ /day (Based on 175 people, water consumption rate of 40L/capita/day and wastewater discharge factor of 80%, 50% of the workers shall use the Site Toilet)	To be directed to the Septic Tank-Soak away System that is present at the site
	Oils and greases	None	Service and maintenance of vehicles will be done at designated garages

Source: *Consultant Analysis, 2021*

2.4.3 Demobilization phase

Activities

Demobilization of temporary structures will be done for proper restoration of the site. Other activities include rehabilitation of the workshop and stockpile yard, at least to the original condition, clearance of all sorts of wastes including sewage and solid wastes (plastics, wood, metal, papers, etc.). All wastes will be deposited at the designated dumpsite and temporary employment will be terminated.

Duration

Demobilization stage will last for a period of six months.

Types, Amounts and Sources of Project requirements

Types, amounts and sources of project requirements during the demobilization phase are shown in Table 2.4:

Table 2.4: Types, amounts and sources of project requirements during the demobilization phase

Requirements	Type	Source	Amount
Manpower	Skilled	Contractor	5
	Unskilled	Local area (Makongo area)	50
Equipment	Bull dozer	Contractor	2
	Motor grader	Contractor	1
	Plate compactor	Contractor	1
	Tippers	Contractor	1

Source: Consultant Analysis, 2013

Types, Amounts and treatment/disposal of Wastes

The demobilization of the temporary structures will result mainly into solid wastes such as timber, iron sheets and rubbles from demolitions. Timber and metal sheets will be sold to people in the nearby communities for reuse while rubbles will be used for levelling.

2.4.4 Operation phase

Activities

The activities that are expected to be executed during operational phase include

- i. Tenancy/ Occupancy;
- ii. Imparting Knowledge;
- iii. Occupational health and safety management;
- iv. Good housekeeping of the area;
- v. Project Maintenance.

Duration

The duration of this phase will be more than thirty (50) years

Types, Amounts and Sources of Project requirements

Materials shall be acquired as per Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management. Types, amounts and sources of project requirements during the operational phase are shown in Table 2.5.

Table 2.5: Types, amounts and sources of project requirements during the operational phase

Requirements	Type	Source	Quantity	
Water		Main supply	320m ³ /day estimated based on the number of occupants for all buildings (7,609 *60l/c/d*70%). Assuming that 70% of the population will use the structure full time	
Energy	Electricity	<ul style="list-style-type: none"> • TANESCO (National Grid) • Standby generator at the Site 	<ul style="list-style-type: none"> • 1050kwhr per day • 1500kVA 	•

Source: Consultant Analysis, 2021

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the operation phase are shown in Table 2.6:

Table 2.6: Types, amounts and treatment/disposal of wastes during the operation phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Food remains, cardboards and papers	2.8tons/day (based on generation rate of 0.35kg/day/person, campus intended to accommodate 8000 people, worst case scenario)	Collected in waste collection points ready for disposal at the designated dumpsite
Solid Waste (Non-Degradable)	Scrap metals, drums	5-10 kg/day	Sold to Recyclers
	Tins, glass and plastics	5-8 kg/day	Collected in waste collection points ready for disposal at the designated dumpsite, currently at Pugu Kinyamwezi
Liquid waste	Sewage	256m ³ /day (The campus intended to accommodate people, water consumption rate of 60L/capita/day and wastewater discharge factor of 80%) and 50% will use facilities $Q = 0.8 * (60 * 15000) * 0.5$ $= 360,000 \text{ l/day}$	All the liquid wastes from toilets, kitchen, bathrooms etc. will be collected and directed to the Treatment plants – Septic tanks and soak away pit and Upflow Anaerobic Sludge Blanket (UASB) present at the campus
Storm water	Runoff	Based on an average of 40% paved project area and 60% unpaved project area; the estimated runoff (m ³ /year)= $K \times I \times A$ Where by K =Runoff coefficient (0.85 for paved surface and 0.7 for unpaved surface) I= Rainfall Intensity (1100mm) A = Area of the catchment (m ²) $(0.85 * 0.11 * 0.4 * 62,756.91)$ $+(0.7 * 0.11 * 0.6 * 62756.91)$ Thus, the estimated runoff will be 5,246.5 m ³ /year	To be directed to stormwater drainage system present to be constructed Rainwater harvesting

Source: Consultant Analysis, 2021

2.5 Occupational health and safety (OHS)

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

2.5.1 OHS During construction phase

ARU 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 sign boards directing where these services are situated and transport in case of emergency. Appropriate protective gear including, but not limited to helmets, heavy duty gloves, safety vests and boots, shall be provided to site workers and visitors.

Training related to traffic hazard management will be provided to students especially through ARUSO Leaders so that each student will not be affected with traffics during construction. The speed limits for vehicles shall not exceeding the default speed limit (not exceeding 50 km/h), except within a speed zone in which a higher speed is permitted. The speed limit in the shared zone that should not exceed 10 km/h. Signals that a driver shall not turn right or left, or stop or suddenly decrease speed, without giving warning of his or her intentions. Contractors shall make sure that all of these issues are well known to their employed drivers to prevent unnecessary complications and accidents during project execution. However, the entrance and exit points have been provided. The entry point at ARU main gate will be used during the night hours only starting from 10:00pm to 11:00 am to avoid interference with normal university routine. The entry point at ARU –Makongo junction will be used throughout the day hours where only one exit towards Makongo DSTV access will be used throughout.

2.5.2 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.

2.6 PROJECT BOUNDARIES

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

2.6.1 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 ARU buildings. Many institutions and administrative units in Tanzania are of interest;

- Ministry of Education Science and Technology
- Kinondoni Municipal Council
- Tanzania Commission of Universities (TCU)
- Fire and Rescue Force
- Occupational Safety and Health Authority (OSHA)
- DAWASA
- TANESCO
- Makongo Juu ward
- Makongo ward

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

2.6.2 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 sixty months while the operational phase is designed for more than 99 years unless unforeseen event occur.

2.6.3 Spatial boundary

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

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, LEGAL AND INSTITUTIONAL REQUIREMENTS

3.1 Environmental Management Regulation in Tanzania

A clean and safe environment is the constitutional right of every Tanzanian citizen. Regulation on environmental management in the country is mainly vested on two public institutions, the National Environment Management Council (NEMC) and the Division of Environment (DoE) in the office of the Vice President. The NEMC undertakes enforcement, compliance, and review of environmental impact statements whereas the DoE provides the policy formulations and technical back-up and executes the overall mandate for environmental management in the country. The EIA certificate is issued by the minister responsible for environment. There are many policies and pieces of legislation on environmental management in Tanzania, the relevant ones to this project are briefly discussed below.

3.2 Policies Relevant to the Project

3.2.1 The National Environment Policy for mainland (2021)

The National Environment Policy for mainland (NEP 2021) is the main policy document addressing environmental management issues in Tanzania mainland. 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. The National Environmental Policy, 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 like the project under hand are implemented in accordance with the policy. In order to ensure that the project comply with this policy, the team has been commissioned by Ardhi University to conduct EIA for all of its projects to be implemented under HEET project. This is in line with the policy which dictate that the development projects are 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 Land Policy (2019)

The National Land Policy states that, “the overall aim of a National Land Policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad - based social and economic development without upsetting or endangering the ecological balance of the environment”. The National land Policy is relevant to this project because the project will be required to ensure protection of existing cultural heritage and conservation of ecological and socially sensitive areas. The proposed building project is located within the area planned for institutions and as such it is compatible with the land use in the project area as required by the National Land Policy. ARU has developed environmental management plan to curb the likely environmental hazards out of project implementation.

3.2.3 The Construction Policy (2003)

Among the major objectives of the policy, which supports a sustainable block development sector, include the promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as blocks, road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application

of practices, technologies and products which are not harmful to either the environment or human health. This project is in-line with this policy as ultra-modern technology shall be used during construction and its operation. Implementation of the proposed project will as much as possible make use of cost effective and environmentally friendly technologies to minimise wastage of resources specially building materials, water and energy.

3.2.4 The National Gender Policy (2002)

The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies are developed in all sectors and institutions. While the policy aims at establishing strategies to eradicate poverty, it is relevant to the project as it puts emphasis on gender quality and equal opportunity of both men and women to participate in development undertakings and to value the role-played by each member of society. It also requires that women and men are given equal employment opportunities in the project, whenever possible. This project shall ensure that women will be adequately involved at all levels of project planning to implementation.

3.2.5 The Energy Policy (2015)

The policy outlines measures to adopt clean technology and minimize energy losses. The policy states that energy is a prerequisite for the proper function of nearly all sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of development endeavours. The policy seeks to promote energy efficiency in all economic sectors. ARU will promote the objectives of this policy from design perspective of the building to minimize energy uses. Further shall explore the use of clean energy during the project implementation.

3.2.6 The National Water Policy (URT, 2008)

One of the main objective of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in workplaces, promote sound use of water, promotes construction of latrines and their use, encourage maintenance of clean environment; working environment which are conducive to satisfactory work performance. The proponent shall observe this policy during the project implementation.

3.2.7 The National Health Policy (URT, 2003)

The policy emphasizes on the need for increasing community involvement in health development and improved access and equity in health and health services. One of the main objectives of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in workplaces, promote sound use of water, promotes construction of latrines and their use, encourage maintenance of clean environment; working environment which are conducive to satisfactory work performance. The policy is relevant to the project responsible to provide safe environment during project implementation as well as to implement safety measures, regulations and precautions.

3.2.8 The Urban Planning Regulations (Space Standards), 2018

The Urban Planning Space Standards provides guidance on space utilization to achieve harmony and sustainable development. In construction of buildings under HEET project at ARU, this document informed design of the buildings and selection of construction sites. Space standards provide suitable heights for buildings according to their use, guide space to be reserved between one building and another (setbacks), plot coverage and plot ratio. It also guides provision of space to accommodate both motorized and non-motorized transport systems such as roads, parking and footpaths / pedestrian walkways. The HEET project at ARU has taken into consideration the requirements of urban planning space standards in inception and design of buildings to be constructed and will continue taking proper utilization of project area during its implementation.

3.2.9 The Tanzania Education and Training Policy (2014)

The education training policy, 2014 stressed that for improvement of the quality of education in Tanzania there should be a shift from using many textbooks into using single textbook for each subject. 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. In addition, the university fees will be affordable to all people. ARU through HEET will increase teaching and learning infrastructure which at the end will increase enrolment of the students.

3.2.10 The National Mineral Policy (2009)

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

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

3.2.12 The National Women and Gender Development Policy (2000)

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

3.2.13 The National Policy on HIV/AIDS (2001)

The policy provides a framework for leadership and coordination of the National multi-sectoral response to the HIV/AIDS epidemic. One of the major objectives of the policy is to strengthen the role of all the sectors, public, private, NGOs, faith groups, CBOs and other specific groups to ensure that all stake holders are actively involved in HIV/AIDS work and to provide a framework for coordination and collaboration. The policy recognizes that HIV infection shall not be grounds for discrimination in relation to education, employment, health and any other social services. Pre-employment HIV screening shall not be required. For persons already employed, HIV/AIDS screening, whether direct or indirect, shall not be required. HIV infection alone does not limit fitness to work or provide grounds for termination. HIV/AIDS patients shall be entitled to the social welfare benefits like other patients among the employees. HIV/AIDS information and education targeting the behaviour and attitudes of employees and employers alike shall be part of HIV/AIDS intervention in the workplace. Establishment of the proposed project might result into social interactions among workforce and local community therefore the company will adhere to the policy.

3.2.14 The National Research and Development Policy (2010)

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

3.3 Legal Framework

3.3.1 The Environmental Management Act (EMA), 2004

The Environmental Management Act (EMA) No. 20 of 2004 is the principal legislation governing environmental management in the country. The Act provides a legal framework for managing environment in the country. The EMA requires an Environmental and Social Impact Assessment (ESIA) to be carried out for the development of any project which is likely to have a significant impact on the environment. The Act makes it mandatory for any person to comply with the environmental and social impact assessment requirement of the Project which includes environmental screening, scoping, preparation of the Environmental Impact Statement and its review before the decision on environmental clearance is made. The HEET project must conform to all requirements of environmental clearance and safeguards, and they include EIA, Auditing, Monitoring, and implementation of the environmental and social management plans for the project.

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

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

The land Act among other things, determine the ownership of the land where the project will be implemented. The law as amended in 2004 recognizes the role of land in economic and urban development. The law provides for technical procedures for preparing land use plans, detailed schemes and urban development conditions in conformity with land use plan and schemes. The proposed site for the execution of HEET projects at ARU has been planned for institutional purpose.

3.3.3 The Urban Planning Act (2007)

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters. The project will seek planning consent and building permits from relevant authorities

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

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

3.3.5 The Engineers Registration (Amendment) Act, 2008

The Acts regulate the engineering practice in Tanzania by registering engineers and monitoring their conduct. Laws require any foreigner engineer to register with ERB before practicing in the country. Foreign engineers who will be involved in this ARU project shall abide to the law requirements.

3.3.6 The Contractors Registration (Amendment) Act (1997)

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. The proponent shall comply with the law requirements during the recruitment of contractors for ARU project implementation.

3.3.7 The Architects and Quantity Surveyors Act (2010)

Similarly require 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.

3.3.8 The Public Health Act 2009

An Act provide for the promotion, preservation and maintenance of public health with the view to ensuring the provision of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. This Act is relevant to the project especial through Section 66 of the Act state that: *(1) A block or premises shall not be erected without first submitting the plans, sections and specifications of the block site for scrutiny on*

compliance with public health requirements and approval from the Authority. The proposed project will comply with the articles of this Act.

3.3.9 The Fire and Rescue Act, No. 14 of 2007

The Act 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.

3.3.10 The Employment and Labour Relations Act No.6 of 2004

The Act prohibits forced labour and discrimination of any kind in the workplace. It provides employment standards such as contracts with employees, hours of work, remuneration, leave, unfair termination of employment and other incidents of termination. The Act makes provision for core labour rights, to establish basic employment standards, framework for collective bargaining, prevention and settlement of disputes and other related matters. The Act strictly prohibit child labour and discrimination. ARU will ensure that it operates within the requirements of this legislation and will comply with stipulated conditions of the Employment and Labour Relations Act, 2004.

3.3.11 The Workers Compensation Act (No.20), 2008

The Act focuses on the provision for adequate and equitable compensation and rehabilitation for employees who suffer occupational injuries or contract occupational diseases arising out of, and in the course of their employment, and in the case of death to their dependents. The proposed ARU project will operate within the requirements of this legislation and abide by all relevant sections provided by this Act.

3.3.12 The Prevention and Control of HIV/AIDS Act (No.28), 2008

The act among others provides details to promote public awareness on the cause, mode of transmission, consequences, prevention and controls of HIV and AIDS. Further, Sections 6(1) and (2) describe the necessity for private sectors, in collaboration with government, to implement programs and plans geared towards prevention, care of patients and control of HIV and AIDS in their respective area.

Section 19(2) describes the provision of community-based HIV and AIDS prevention, support and care services. The project may involve construction of a workers' camp site, this may lead to the possible interaction between the workers and the local community members, which may lead to the increased transmission of HIV / AIDS to both the workforce and the local communities. In this case ARU project will have to operate within the requirements of this legislation in adherence to the requirements of its respective regulations in addition to HIV/AIDS Policy.

3.3.13 The Standard Act of 2009

The Standards Act has established National Environmental Standards Compendium (NESC) which is a collection of various standards prepared at different times and recognized by EMA 2004. NESC comprises of standards that require compulsory compliance. Compulsory standards are categorized as generic or specific. Specific standards cover those industries with peculiar effects to the environment while other industries without a specific standard for Tolerance Limits of Emissions discharge including water quality, discharge of effluent into

water, air quality, control of noise and vibration pollution, sub-sonic vibrations, soil quality, control of noxious smells, light pollution, and electromagnetic waves and microwaves. It also has the requisite test methods that should be followed when testing for compliance. The test methods included are referred to in at least one of the specification standards appearing under Part 1. The proposed ARU project will be adhered to this Act requirement, during the implementation.

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. ARU 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. The proposed ARU 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 Water Resource 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 has caused or is likely to cause pollution of a water source, shall take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

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

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

Part IV of the Act states obligations of water supply and sanitation authorities to provide water supply and sanitation services, indicates their functions, powers and duties. Consequently, it gives responsibilities for provision of adequate and reliable water supply and sanitation services in urban areas to Urban Water Supply and Sanitation Authorities (WSSA). With respect to their responsibilities to ensure adequate and reliable service provision, the Act gives

power to WSSA to enter any land for the purpose of laying water pipe network and charge fees to facilitate financial obligation necessary for operation and maintenance of the water supply and sanitation networks. The proponent shall use clean water from Dar es Salaam Water Supply and Sanitation Authority.

3.3.18 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.

3.3.19 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.

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

3.2.23 The Child Act, 2010

The legal framework for child labour in Tanzania is contained in the Law of the Child Act (Act No. 21, 2009). The Act sets the minimum age for admission of a child to employment at 14 (Sec. 77.2). It also contains a provision permitting light work for children who are at least 12, where light work is defined as work that is not likely to be harmful to the health or development of the child and does not affect the child's attendance at school or the capacity of the child to

benefit from schoolwork (Sec.77.3). The Act prohibits the engagement of children and children below 18 in hazardous work, posing a danger to health, safety or morals and in “night work” taking place between 8 pm and 6 am (Sec. 82.2). The Law of the Child (Child Employment) Regulations (G.N. No. 196, 2012), which is used to implement the Law of the Child Act (Act No. 21, 2009), contains list of all hazardous activities in which a child shall not be allowed to work, even on a voluntary basis. Section 82 of the Act also protects children from sexual exploitation. A child shall be protected from sexual exploitation and use in prostitution, inducement or coercion to engage in sexual activity and exposure to obscene materials. The project proponent will protect against child labour, especially during the construction period.

3.3 Relevant Plans, Regulations and Guidelines

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 Relevant 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

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

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

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

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

The Plan is a continuation of Government's efforts in achieving the goals set in the National Development Vision 2025 enduring exertion to further improve the standard of living for all Tanzanians. The main objective of the Third Plan is to contribute to realisation of the National Development Vision 2025 goals. These goals include Tanzania becoming a middle-income country status and continue with transformation of becoming an industrial country with a high human development or a high standard of living. Upon reaching its vision, which have the following attributes: peace, stability and unity; good governance; an educated and learning society; and a strong economy that can withstand competition and benefit many people. The FYDP III, therefore, will seek to enable the country to more effectively use her geographical opportunities and resources for production and economic growth, while, ensuring that the outcomes benefit all citizens in line with the Vision's goals of a high quality of life. FYDP III will continue to implement the projects and programmes aimed at opening up economic opportunities, build an industrial economy, strengthen competitiveness in domestic, regional and global markets as well as strengthen human development including the education sector. The proposed project supports this development plan by increasing academic, research and innovation opportunities in various geographical areas of Tanzania including Kinondoni District, Dar es Salaam region where the ARDHI University is found.

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

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

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 EIA.

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

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

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

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

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

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

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

Section 83 of the EMA (2004) stipulates that the Environmental Impact Assessment shall be conducted by experts or firms of experts whose names and qualifications are registered by

NEMC. The NEMC maintain a registry of EA and EIA experts. These regulations also set the code of practice of the experts for which the Environmental Impact Assessment experts for this project subscribe. This study has been carried out by the registered expert by NEMC.

3.5.3 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.

3.5.4 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/Nm³ (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.

3.5.5 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.

3.5.6 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.

3.5.7 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 from making 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. The 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.

3.5.8 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. ARU shall observe the provisions of these regulations and comply if there is any hazardous waste generated.

3.5.9 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, ARU 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.

3.5.10 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, ARU shall comply with all these requirements during the implementation of the project.

3.5.11 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, ARU shall comply with all these requirements during the implementation of the project.

3.6 ARU Project Implementation Team

ARU Main campus Project Implementation Unit (PIU) has been established. It has a total of 27 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 and Health and Safety. E&S team shall be responsible for monitoring the compliance of the contractor in implementing the ESMP and that the E&S team shall be responsible for regular reporting of the progress. The E&S Team will make sure that the project is implemented in compliance with the ESF and the projects ESMP. The E&S team will review and approve the contractor's site specific ESMP (C-ESMP) and the Code of Conduct prior to commencement of physical work. The E&S Team shall be responsible for providing inputs in all ToR and contracts for

procurement of contractors and consultants. It has also developed GRM which is operational as well as developed an ESS Office. There is also a suggestion box. The rest of the PIU members include Coordinator, Deputy Coordinator, infrastructural Development, Capacity building, Curricula development, Finance, ICT, Procurement, M&E, 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 3.1 summarizes responsibilities for each institution involved in ESIA.

Table 3.1: Key Institutions for implementation of the project

Level	Institution	Roles and Responsibility
Financier	World Bank	<ul style="list-style-type: none"> ● Review sub-project screening including risk level categorization; ● Review the ESIA, ESMPs and site specific ESMPs; ● Review quarterly reports by the implementing agencies; ● Monitor compliance with the ESMF; and ● Undertake implementation support missions.
MoEST	NPIT	<p>At the national level, NPIT to oversee key project functions including:</p> <ul style="list-style-type: none"> ● project coordination, ● procurement, ● financial management (FM), ● and M&E.
VPO's Office	NEMC and Division of Environment	<ul style="list-style-type: none"> ● Co-ordinate Environmental Management Policy, Act and guidelines ● Approval of ToR, Review of ESIA ● Environmental monitoring and auditing ● Advises Government on all environmental matters
Kinondoni Municipal Council	District/Ward Functional Departments – Planning, Water, Health, Community Development, Natural Resources, etc.	<ul style="list-style-type: none"> ● Extension Services ● Key stakeholder in project implementation
	Environmental Committees	<ul style="list-style-type: none"> ● Project Monitoring (Watchdog for the environment)
	Ward Development Committee	<ul style="list-style-type: none"> ● Project Monitoring
	Local Stakeholders	<ul style="list-style-type: none"> ● Project Monitoring
Project Proponent - ARU	ARU HEET Project has established a Project Implementation Team (PIT) as stipulated in POM 2021 which states that Each PIU will be headed by a Project	Overall, PIT main task is oversee Project implementation involving development of ToR for consultants and contractors, developing specifications and performing procurement process for equipment and facilities, procurement of consultant and contractors,

Level	Institution	Roles and Responsibility
	<p>Coordinator/Leader and have staff responsible for FM, procurement, environmental and social safeguards, and M&E.</p> <p>However, according to MoEST letter of 2021 14 specialists were required to be appointed to form a PIT. Accordingly at ARU 27 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"> • Coordinator • Deputy Coordinator • Other specialists include: • Environments • Social • Gender • Infrastructure • Capacity building • Curricula (2) • ICT (2) • Communication • Industrial linkage • Procurement • Finance • Monitoring and Evaluation <p>The Environmentalist, Health and Safety, Social and Gender specialists, referred to as ESS Team, are part of the PIU Team.</p> <p>PIU Team has competence in performing the implementation of the project and ESIA duties through ESS Team acquired both through learning and practical experiences.</p> <p>PIU Members have attended several capacity building conducted by MoEST and WB</p>	<p>meeting regularly for assessment of project development, providing specifications for ICT procurement and related facilities, overseeing and implementing capacity development, developing curricula, establishing and working with Industrial Advisory Committee conducting capacity building for its members and undertaking M&E of the project.</p> <p>Roles and responsibilities of ESS Team</p> <ul style="list-style-type: none"> • Capacity building for GRM focal persons and members of the Grievance Redress Integrity includes • Oversee project implementation including mitigation measures through contractors • Ensure environmental compliance by the environmental standards. • Liaise with the DoE and the NEMC on matters involving the environment and all matters with respect to which cooperation or shared responsibility is desirable or required. • Oversee the preparation of and implementation of all ESIA"s required for the project • Monitoring the implementation of HEET Project as per POM and PAD. • Attend meetings and provide guidance in the bid documents developed by PMU to ascertain that the different challenges identified and duly covered from risk for each sub-project/activity • The ESS Team also supports the procurement officer in making sure that the bidding documents clearly cover the health, safety and environmental component with appropriate provisions of the same for the contractors to bid. • The ESS Team coordinates the preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP). • They ensure that contractors have an Environmental Health and Safety Officer (EHS), is familiar with the compliance requirements, including WB EHS guidelines.

Level	Institution	Roles and Responsibility
		<ul style="list-style-type: none"> To review progress reports by the supervision engineer/consultant during civil works and conduct inspection of the sites regularly To make sure the Contractor complies with the WB guidance on Community Health and Safety and Gender-Based Violence
	Design Consultants	<ul style="list-style-type: none"> Understand the sub-project setting and site-specific requirements with discussions with the PIU; Incorporate the issues identified in the ESIA, ESMPS into the project design Provide cost estimates for implementing the design requirements.
	Occupational Safety and Health issues ^[1] _[SEP]	<ul style="list-style-type: none"> Perform hazard identification Hazard assessment and management Risk assessment and management Emergency preparedness plan and Response Risks and crises management Stakeholder engagement and grievance management, including in relation to the worker grievance mechanism, for the social and environmental staff.
	Supervision Engineer/Consultant	<ul style="list-style-type: none"> Assist the PIU to ensure that the necessary environmental, health and safety authorizations and permits have been obtained; Maintain open and direct lines of communication between the PIU and contractor(s) with regard to environmental matters; Review and approve the contractor's site-specific construction ESMPs (CESMP), Health and Safety, Labour Management Plans and Traffic Management Plans together with the PIU; Conduct regular site inspections of all work areas to ensure compliance with CESMPs and E&S specifications for contractors Assist the contractor in finding environmentally responsible solutions to problems; Instruct the contractor(s) to take remedial actions within a specified timeframe, and carry out additional monitoring, if required, according to the contractual requirements and procedures in the event of non-compliances or complaints; Instruct the contractor(s) to stop activities which generate adverse impacts, and/or when the contractor(s) fails to implement the ESMP requirements / remedial actions; ^[1]_[SEP]

Level	Institution	Roles and Responsibility
		<ul style="list-style-type: none"> • Provide training to the contractor on the EHS requirements to be followed; • Monitor the contractor’s environmental awareness training program for all [SEP] personnel working onsite; • In case of any accidents or incidents, immediately notify the PIU and support the [SEP] process of documenting and reporting the case to the WB; • Prepare written reports for the PIU such as weekly report of non-compliance [SEP] issues; summary monthly report covering key issues and findings from supervision activities; and consolidated summary report from contractor’s monthly report.
	Contractor	<ul style="list-style-type: none"> • Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements; • Work within the scope of contractual requirements and other tender conditions; • Prepare CESMPs based on the ESMP in the bidding documents and contracts; • Train workers about EHS (including relevant WBG EHS Guidelines) and the site- specific environmental and social measures to be followed; • The EHS officers of the contractor will participate in the joint site inspections with the PIU and Environmental Supervision Engineer/consultant; • Carry out any corrective actions instructed by the Supervision Engineer/consultant; • In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; • Propose and carry out corrective actions in order to minimize the environmental impacts; • Send weekly reports of non-compliance to the Supervision Engineer/consultant; • Send monthly progress reports to the Supervision Engineer/consultant.

3.8 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) Ardhi University
- ii) National Environmental Management Council (NEMC)
- iii) Contractor;

3.8.1 ARU

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). ARU 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 ARU 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.

3.8.2 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.

3.8.3 The Contractor

The project will be implemented by a Contractor and will be responsible to ARU 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 in 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 a site-specific 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) and Health and Safety Officer who will be the Contractor's focal point for all environmental, social and health and safety matters. The ESO and SSO will be routinely on-site for the duration of the construction works. The 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 ARU 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.

3.9 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 (ESSs) before is cleared for implementation. Table 3.2 shows standards which will be applicable to the construction of ARU new projects. In this section, the capacity of ARU in complying with Environmental and Social Standards is assessed.

Table 3.2: Application of World Bank's Environmental and Social Standards to the proposed project

Environmental and Social Standard(ESS)	Applicability	Requirements
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	YES	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the Borrower's environmental and social framework for the assessment, development and implementation of World Bank financed projects where appropriate.
ESS2: Labor and Working Conditions	YES	Requirement for the Borrower to prepare and adopt labor management procedures. Provisions on the treatment of direct, contracted, community, and primary supply workers, and government civil servants. Requirements on terms and conditions of work, non-discrimination and equal opportunity and workers organizations. 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	Requires an estimate of gross greenhouse gas emissions resulting from project (unless minor), where technically and financially feasible. Requirements on management of wastes, chemical and hazardous materials, and contains provisions to address historical pollution. ESS3 refers to national law and Good International Industry Practice, in the first instance the World Bank Groups' EHSGs.
ESS4: Community Health and Safety	YES	Requirements on infrastructure, taking into account safety and climate change, and applying the concept of universal access, where technically and financially feasible. Requirements on traffic and road safety, including road safety assessments and monitoring. Addresses risks arising from impacts on provisioning and regulating service. Measures to avoid or minimize the risk of water related, communicable, and non-communicable diseases. Requirements to assess risks associated with security personnel, and review and report unlawful and abusive acts to relevant authorities.
ESS5: Land Acquisition,	NO	This standard is not considered relevant as the project will mainly be implemented in areas where communities will not be impacted by resettlement.

Restrictions on Land Use and Involuntary Resettlement		
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	NO	The project is not located inside or near protected areas and sensitive habitats. In case the project will purchase natural resources commodities such as timber, it will be important to establish the source area and to have a mechanism in place to ensure that the Primary Suppliers are not significantly impacting sensitive ecosystem or degrading natural habitats. Thus, there is no identified specie with significance conservation status (i.e. threated or endangered as per IUCN guidelines/CITES List) in the area.
ESS7:Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	NO	This standard is not considered relevant as the project will mainly be implemented in areas where communities that meet the requirements of ESS7 are generally not available in the area.
ESS8: Cultural Heritage	YES	Although the project area is within the existing ARU campus, this ESS may be relevant in case of “chance find” of physical cultural resources during excavation works for new buildings.
ESS9: Financial Intermediaries (FIs)	NO	This ESS is not relevant to the project.
ESS10: Stakeholder Engagement and Information Disclosure	YES	Requires stakeholder engagement throughout the project life cycle, and preparation and implementation of a Stakeholder Engagement Plan (SEP). Requires early identification of stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. Stakeholder engagement to be conducted in a manner proportionate to the nature, scale, risks and impacts of the project, and appropriate to stakeholders’ interests. Specifies what is required for information disclosure and to achieve meaningful consultation.

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

This Environmental and Social Standard is applicable to this project due to its potential adverse social and environmental risks and impacts on site and in the areas of influence. These include impacts on natural environment such as air, water, land, human health and safety. Thus, ARU shall analyze project activities and associated environmental and social risks and impacts during construction and operation phase.

The project has prepared an Environmental and Social Impact Assessment (ESIA). Therefore, the project components have been screened to determine potential adverse impacts and mitigation measures for their planned activities. According to social relation that has started to develop between ARU and the nearby community of Karumo and Kamanga, the social services like playing grounds, churches, mosques and accommodation facilities within and outside the campus to be built ARU can be pressurized due to the increased students' enrolment. Thus, the current social services provision at the nearby communities needs to be rechecked to prevent pressure on local accommodation and rents.

3.9.2 Labor and Working Conditions (ESS2)

The standard recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. ESS2 is applicable to the project given that the project will employ/engage both skilled and non-skilled workers, including through contractors/subcontractors, and primary suppliers, to undertake various activities. In order to comply with the provisions of ESS2, ARU will take worker safety seriously by laying out internal controls and procedures that will protect workers employed or engaged in relation to the project from occupational hazards during all relevant project phases. All works will be done in compliance with relevant environmental and health and safety standards to minimize impact on workers as well as the local area and citizens. The ESIA contains robust procedures for worker safety, requiring plans for accident prevention as well for health and safety of workers and communities, which are also part of contracts for civil works.

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

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

ARU will ensure that workplace sexual harassment of any nature by workers directly hired or project workers engaged through contracts/subcontracts companies shall be prohibited, and those determined to be guilty will be subject to disciplinary action, including summary dismissal.

3.9.3 Resource Efficiency and Pollution Prevention and Management (ESS3)

This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project lifecycle. In order to ensure efficient use of resources, ARU projects will source construction materials from government authorized sources and water from DAWASA throughout the project implementation. ARU has a total area of 79.78Ha (797,800m²) but the developed area consists of 12.8% of the total area. The proposed new buildings are expected to utilize a maximum of 7.8% of the total plot size. This implies that the big portion (79.4%) of the Ardhi University is covered by green spaces. The amount of tons of CO₂ generated per year from main sources like cafeteria, vehicles and generator will be sequestered by the available green spaces. Moreover, the project will utilize the pollution prevention and emergency response plan drafted as part of the ESIA to mitigate any potential source of pollution from the planned activities. The risks identified for strengthening the system for complying with ESS1 are applicable to ESS3.

3.9.4 Community Health and Safety (ESS4)

The ESS requires beneficiary to avoid or minimize safety and health risks and impacts of the project, with particular attention to people who, because of their particular circumstances, may be vulnerable. Implementation of project components has the health and safety risks and impacts on project-affected communities. These risks and impacts could include increased rates of crime, and social conflict and violence, increases in traffic accidents, increased pressure on local accommodation and rents, increased transmission of HIV/STDS, as well as increases in gender-based violence. The project will ensure compliance with national law requirements regarding the COVID-19 situation. ARU shall work closely with street leaders to communicate to local communities' related health and safety risks and preventive measures for accidents associated transportation of materials and other human health issues including covering mitigation measures to GBV risks and prevention of HIV and AIDS during construction.

All works will be done in compliance with relevant environmental and health and safety standards to minimize impact on workers and the local area. During the project's operational phase, waste will be disposed as per instructions from Kinondoni Municipal Council through ARU Estate Department

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

3.9.5 Cultural Heritage (ESS 8)

The ESS enhance conservation of cultural heritage (tangible and intangible cultural heritage). The project activities will not be implemented in areas of known physical cultural resources within the premises of ARU. However, proposed construction activities under component 1 will involve excavations, which may have impacts on physical cultural resources, mainly through chance finds. Procedure for addressing potential chance finds from construction sites, borrow pits and quarries will be followed.

3.9.6 Stakeholder Engagement and Information Disclosure (ESS10)

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

3.10 WORLD BANK GROUP EHS GUIDELINES

The World Bank Group Environmental, Health, and Safety Guidelines ("EHS Guidelines") are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) and contain the performance levels and measures that are normally acceptable to the World Bank Group, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology. The World Bank Group requires borrowers/clients to apply the relevant levels or measures of the EHS Guidelines. In cases when host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent.

The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The EHS guidelines are living documents and are occasionally updated. These documents (EHS guidelines) can be accessed through <https://www.worldbank.org/en/search?q=health+and+safety+guidelines>. This ESIA recommends the proposed construction of ARDHI University to apply these guidelines to ensure all issues regarding environmental, occupational health and safety (OHS) and community health and safety (CHS) requirements are incorporated into the project design and during implementation phases. The links to these guidelines are indicated in Table 3.3.

Table 3.3: Environment, OHS, CHS and Construction and Decommissioning Guidelines

Guideline	Link
Environment Guidelines	https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines
Occupation health and safety guidelines	https://www.ifc.org/wps/wcm/connect/1d19c1ab-3ef8-42d4-bd6b-cb79648af3fe/2%2BOccupational%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES&CVID=nPtgxyx
Community health and safety guidelines	https://www.ifc.org/wps/wcm/connect/eeb82b4a-e9a8-4ad1-9472-f1c766eb67c8/3%2BCommunity%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES&CVID=nPtgxTd
Construction and decommissioning	https://www.ifc.org/wps/wcm/connect/7d708218-2a9e-4fcc-879d-9d5051746e7d/4%2BConstruction%2Band%2BDecommissioning.pdf?MOD=AJPERES&CVID=nPtgy6x

CHAPTER FOUR

BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Introduction

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

4.2 The physical environment

4.2.1 Climate

Generally, the area experiences a tropical type of climate which is characterized by two seasons. The rain season having two peak seasons, the one starts in that starts in March and ends in May of the same year, and the other one starts in November and ends in December. The dry season has one peak season that starts in Mid-January to and ends in February of the same year.

Rainfall

Dar es Salaam has a tropical wet and dry climate. Average annual rainfall is approximately 1,100 mm, of which the lowest rainfall 800mm while the maximum reaches 1,300mm. In normal years the city experiences two rainy seasons, the long rains which start in March through May and the short rains beginning in October to December. However, due to global climate change, the rain pattern in the city is not consistent. Poor distribution and unpredictability of these rains acts as an obstacle for construction activities. In this regard, construction activities are envisaged to be done during dry season.

Temperature and Relative humidity

Temperature fluctuates between day and night as well as from one season to another. The extreme low temperatures for Dar es Salaam are observed during the cool dry season particularly between May and August where temperatures may fall to 25⁰C. On the other hand, high temperatures (31⁰C -35⁰C) can be recorded during the early afternoon hours in October to March. Relative humidity is constant during the wet seasons where it generally remains 86%. During the hot dry season, it may drop as low as 73% in the early afternoon hours. Specifically for the project area temperature and relative humidity recorded during field visit in August 2021 was found to be between 28⁰C to 32⁰C and 52% to 62% respectively therefore poor design of ventilation system in the buildings may result into discomfort to students in the rooms.

Wind speed and direction

The local wind patterns help to guide building designs and orientation on the site to allow cross ventilation and minimize the effects of temperature. The climatic condition of Kinondoni, and specifically ARU Campus is influenced by southwest monsoon winds from April to October and Northwest monsoon winds between November and March. Being located at an observation hill, ARU receives direct winds from Indian Ocean. The average wind speed is 10mph (World weather

Online.com). Together with good vegetation cover at ARU, the University contains good modified (micro) climate, which is relatively cooler. Nevertheless, due to the global climate change, there is significant variation in wind directions, speed and rain patterns which are often not following the regular patterns.

Sun Hours and Potential for Solar Energy

The hot climatic condition as well as availability of sunlight in almost 12 hours per day makes Dar es Salaam City a potential zone for harvesting of solar power which if properly harnessed could provide reliable alternative source of energy at the University. Solar energy may be tapped to reduce the running cost of the University through connecting it to class rooms, labs, lecture theatres, offices, staff houses and a health centre. Photovoltaic generation of electricity through the use of solar panels can be adopted by the University to tap the sun's energy. With solar energy, the University will have reliable and affordable alternative source of energy to cover the gap of power breakdown in Dar es Salaam and other parts of the country, which has been widely affecting the functions of the University. Solar energy is very possible renewable source of energy at ARU, because the campus is situated in the area where the number of sunny days and the direct radiation of the sun (supported by topography) are sufficient to harvest adequate solar energy potentials.

4.2.2 Existing land use

The proposed land use plan generally makes provisions for various land use components namely: academic functions (28.2ha), administrative facilities (2.1 ha), students support facilities (12.3ha), sports facilities (4.1ha), Science park (1ha), community facilities (3ha), staff housing (4.1ha) waste treatment facilities (2.5 ha), main roads (7.1), environmental conservation areas (in steep slopes and valleys) (10.5ha) and investment zone (5ha). The proposed project will be implemented as per land use planning stipulated in ARU master plan 2018-2038..

4.2.3 Existing land cover

Data from satellite image indicate that green spaces at ARU campus occupies a total of 240,254 Square meters, whereby trees space constitute an area of 227,638 square meters while open spaces contain 12,616 square meters. The grey surface (Roads, paved surface, and buildings) covers about 35,126 square meters. This implies that the big portion (87.2%) of the Ardhi University is covered by green spaces. The grey space occupies about 12.8% of the total area at ARU campus, implying that ARU community is surrounded by high evapotranspiration surfaces. This makes the landscape attractive and cool hence altering the surrounding air temperature, the situation that favours students to use outdoor environment during daytime. The electricity consumption of the building is minimized by student tendency of spending the outdoor environment during daytime. The proposed buildings will occupy 7% of the total area at the campus, hence will reduce the green space coverage.

4.2.4 Topography

ARU campus is characterized by gently and undulating surface with disconnected valleys, hills, relatively flat areas and sloppy areas. The current built up area is situated on a flat area while the hilly areas are undeveloped. The topography at ARU portrays the potential for natural storm water drainage and rainwater harvest systems. Infrastructure design may consider utilizing this potential while conserving the environment at the campus. In addition, the presence of valleys imply that storm water produced at the University flows towards these two valleys. They may also guide the

design of water retention ponds, storm water drainage and choice of location to set up waste water treatment plants.

4.2.5 Soil type(s)

Dar es Salaam City consists of two major geological deposits namely sandy loam soils, which is a well-drained and heavy clay waterlogged soils in one hand, and the sandy loam and sandy clay soils in the high areas on the other hand. Nonetheless, there are finer scale variations when it comes to specific areas. Taking into account the geologic specificity issue at local scales, there is a need of detailed geotechnical surveys prior to construction of any of the proposed buildings. Identification of soil types, soil bearing capacity, coefficient of linear extensibility (COLE) and level of erosion should be critically analysed in order to construct appropriate types foundations in specific proposed building structures.

4.2.6 Soil erosion potential

Physical observation revealed that soil erosion is observed in the northwest part of the campus that is currently undeveloped and it lacks the drainage infrastructures. The major types of soil erosion at Ardhi university campus include sheet erosion, rill erosion, gullies erosion and ravines. Usually, the topsoil is removed evenly regarding sheet erosion. As sheet erosion focuses on small channels, may led to rill erosion formations. When the volume is concentrated further, running water erode deeper into the soil, and the rills become larger channels known as gullies. As gullies expand and deepen, they form a large feature of soil erosion which is called ravine. The survey shows that the storm water that flows through the rills turns the waterways into gullies. The observations on the site indicate that a lot of rill erosion are formed on the top of the land leading to the gullies which have already been created.

The establishment of buildings under HEET project may increase soil erosion if effective conservation measures and proper storm water management methods are not adopted. It is probable that the slopes and the erosion will continue to grow, and multiple gullies erosions may merge into one very wide valley which will not influence the other development activities at the campus.

4.2.7 Hydrologic characteristics of Ardhi University campus

Ardhi University is the subset hydrological setup which reside in a bigger hydrology setup of Mlalakuwa River which drains into the Indian Ocean. It contains natural and artificial drainage systems which collect storm water from the catchment and directs the storm water runoff to the nearby river which is river Mlalakuwa. ARU campus contains impervious surfaces (18,909.7m² (roads, roofs, concrete slabs and pavement areas)) and pervious surface (763,959.3 m²) from compacted and smoothed soil. Based on 1,100mm per annum (the average rainfall intensity of Dar es Salaam region) and the runoff coefficient ranging from 0.7 to 0.8, the estimated quantity of storm water generated from pervious surfaces at ARU per year is 252,107m³ while the estimated quantity of storm water generated by impervious surface is 16,445.06 m³ per year (Komanya, 2020). The physiochemical characteristics from streams has been presented in the Appendix III.

4.2.8 Air Quality

Air quality study was done in seven different locations at the site. Results of Air Quality measurements taken at the University Campus are discussed hereunder.

Ambient Dust Levels

The average measured concentration of PM₁₀ levels were found to range between 25.1 µg/m³ to 36.2µg/m³, which is slightly above the WHO standards. The highest levels of concentrations were measured at the cafeteria site, and is associated with emissions from the kitchen stoves. PM_{2.5} on the other ranged between 16.2 µg/m³ to 24.4 µg/m³, and is within the local guidelines (Appendix IVA).

Ambient Gaseous Pollutants levels

The average measured concentrations of CO, CO₂, H₂S and SO₂, from the selected sampling stations are presented in Appendix IVB. All the measured parameters were found to be within stipulated local (TBS) and international guidelines i.e. WHO Ambient Air Quality Guidelines. The observed low pollutants levels reflect the campus environment, where there are no significant sources of air pollution. Existing sources are vehicle exhaust emissions, kitchen stoves, standby generators and office appliances such as printers.

In general, the baseline air quality study has established that the university campus has relatively clean air. Most of measured pollutants were found below respective standards stipulated by International (WHO) and Tanzanian Emission standards.

4.2.9 Noise Levels

Measured noise levels are presented in Appendix IVC. Noise level at the site ranged from 43-69.1 dBA implying that noise level is within the standard (i.e. 85 dBA). Higher noise levels, ranging from 75 to 90 dBA have been measured during near standby generators, which are on only during power cut-offs.

4.2.10 Potential natural disasters risks

The university campus faces natural and technological disaster risks like climate change and climate variability risks, earthquake, tsunami, environmental degradation and ammunition accident. They may occur at the campus in one way or another as the result of the university location, technological failure and the associated factors. The location of university is approximately 7.1 km from the Indian Ocean. Tsunami can travel as far as 10 miles (16km) inland depending on the shape and slope of the land (Oskin, 2013). Hence, in case of tsunami the campus may also be affected as it was reported in April 2020 TMA reported the chance of tsunami jobo to occur although it disappeared without reaching the coastal. Earthquake, Ardhi University is located at the area, which is not prone to large earthquake, but there is occurrence of small-scale earthquake. For instance, on Wednesday 12 of August 2020 the earthquake with 5.9 magnitude occurred and the university experienced the earthquake. Hence, the campus is also at risk of the earthquake. ARU community like other communities surrounding military bases with arms storage facilities is at risk of ammunition accidents. The campus is located near Lugalo military base to the north, which increases vulnerability to ammunition accidents.

4.7 Biological Features

Data from satellite image shows that trees space in Ardhi University covers about 227,638 square meters, Grey surface (Roads, paved surface and buildings) covers about 35,126 square meters and open space have coverage area of 12,616 square meters. The project area has no large animals, only small reptiles such as lizards were observed.

The botanical survey found that, the vegetation of the project site are composed with high diversity plant species of different life forms. The vegetation types of the project site are composed of 88 species with high diversity plant species of different life forms including climbers, parasitic plants, herb, grass, shrubs and trees. The area is dominated by shrubs which account for 61% of the vegetation types found in the proposed construction area, followed by trees (19%) and others which account for less than ten percent (10%). The shrubs are scattered throughout the proposed construction areas. The presence of many shrubs and tree species indicates that the community is less disturbed by human activities such as poles cutting and fuel wood collection besides being surrounded by human settlements.

4.8 Socio-economic profile at ARU and surrounding communities

4.8.1 Structures/Buildings

The University has a number of teaching facilities and supporting facilities scattered within the campus to meet the increasing students' enrolment. Buildings are characterised by single to four-floor buildings. Single storey (low-rise) buildings account for 90% of the housing stock. However, the University has been able to expand the available office spaces for academic and technical staff, lecture rooms, library as well as laboratory and workshop space. Other facilities include cafeteria, dispensary and sports ground. However, the available spaces show critical deficit ranging from 45% for library followed by lecture/studio rooms (35.8%), laboratory and workshops (31.6%) and the offices (8%). Therefore future expansion of the university enrolment should take into consideration expansion of these facilities.

4.8.2 Students statistics

The University has gradually been increasing students' enrolment at different rates (Table 4.1). Recent data shows that during the 2020/21 academic year the University enrolled a total of 4,617 students in which 2,870 were male and 2,047 were female. The students' enrolment is expected to increase to 5,760 by 2024/2025 implying that the estimated cumulative number of students at the completion stage of the buildings in degree-granting programs in priority disciplines will be 13,450. The proposed HEET project will increase learning infrastructures that will cater the demand of increasing students' enrolment.

Table 4.1: Projections for enrolment and number of graduates 2020 to 2025

	Category	Growth Rate	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
1	Total	0.55	1007	1557	2408	3725	5760	8908
1a	Female)	0.56	349	545	850	1326	2070	3230
1b	Undergraduate level	0.53	848	1301	1996	3062	4698	7208
1c	Masters level	0.66	103	171	284	472	783	1300
1d	PhD level	0.48	56	83	123	182	270	400

Source: ARU Strategic Plan

4.8.3 Staff statistics

In terms of staffing, as at 6th February 2021 ARU had total of 463 staff (270 male and 193 female). Academic staff were 257 (169 male and 88 female) and administrative/technical staff were 206

(101 male and 105 female). The academic and administrative/technical members of staff are expected to be 522 and 295 respectively by 2024/25.

4.8.4 Staff housing

Currently, the University has 55 housing units for staff found within and outside the campus. Most of staff stay outside the campus due to shortage of accommodation facilities. Staff accommodation will not be part of this project but rather its implementation will be done by internal university funds.

4.8.5 Students accommodation

The University has hostels on campus with capacity to accommodate 518 both undergraduate and postgraduate students with priority given to female students. The remaining students stay outside the campus.

4.8.6 Gender issues at ARU

In the Tanzanian society, gender inequity is a major problem. To ensure proper handling of gender issues, ARU formulated Gender Policy (2008) and Anti-Sexual Harassment Policy (2015). In addition, ARU has a Gender Dimension Unit, which is responsible for mainstreaming gender issues in all core activities of the University as well as offering guidance and counselling services. Students Gender Club also exists at ARU to empower and create awareness of students on Gender issues. Despite of these interventions, still there is gender inequality and inequity in the academic staff cadre, with majority of those in senior ranks being males. Gender issues are also prevalent to ARU students. On the orientation week for the new enrolled students conducted at ARU from 16th to 20 th November, 2020, ARU Gender Club Chairperson mentioned some gender issues facing students at the university. She stated that Majority of female students at Ardhi University do not involve themselves in vying for various leadership positions during the ARU general election. This is so due to lack of confidence as they believe that the male students are more superior, but also due to discouragement from their friends since it is believed that many positions in the ARU student government are held by male students and females go as various minor appointees. Some more issues mentioned were; sexual harassment, sexual corruption, abusive languages, drug abuse and homosexuality.

ARU Gender policy is currently being revised in-order to pro-actively promote gender equity and mainstreaming by: i) admitting talented students without gender bias, ii) taking affirmative action to increase the number of students among the disadvantaged groups in all priority programmes, iii) ensuring gender balance, equality and equity in University's policies, programmes and regulations relating to teaching, research, consultancy and public services, iv) ensuring equality, diversity and equity in student enrolment, staff recruitment and development, and v) advancing equality in the governance and management structures.

4.9 Road Infrastructure

4.9.1 Road network, car parking and Traffic accident

Ardhi University is located at the junction of two busy road- Makongo juu road and University road. These roads have few and old traffic signs that increases the risk of students, teachers and other road users to traffic accident. Furthermore, as the number of teachers and students increases at the university the campus experiences high influx of vehicles and motor cycles at the campus. ARU is vulnerable to traffic accidents, as the campus has no enough parking area for the cars available, which cause randomly parking of these cars scattering the whole area in the campus.

Because in the last three years, ARU has experienced rapid increase in motor traffic as manifested in motor vehicle accumulation in almost all areas in the campus as the result of randomly parking. The transportation of construction materials will be done at night to avoid the increase of traffics as well as noise. Also, the design will ensure enough car parking lots.

4.9.3 Public transport

As common for most Dar es Salaam city residents who are served by the most common public transport means known as '*Daladala*'. The area has a significant high private car ownership which assist in moving from one point to the other. Several daladala connects this mtaa with other areas of Dar es Salaam. One route along university road starts from Makumbusho to Mwasiliano (SIMU 2000). The other route is from Makumbusho towards Makongo via University Road. All these routes have several bus stops and sheds which help in ensuring that there is a comfortable public transport to students.

4.10 Public utilities

4.10.1 Water sources and supply

Water consumption at ARU goes direct with the growth of population and the activities undertaken within the campus like domestic activities, watering gardens, dispensary, cafeterias, construction activities, cleaning and car washing. An increase in water consumption reflects increase in demand of water at ARU, and the campus only depends on water which is mainly supplied by water authorities (DAWASA). Others sources include streams and wells of which are currently not in use due to pollution level and seasonality. The current water consumption at ARU community is 87,691.25 m³ per year while the current demand is 186,077 m³ per year. Thus, water deficit is 98,386 m³ per year. This is influenced by the developing activities and population growth. Due increase in population and development at the University, ARU must consider the increase of water supply due to an increase in population and development and or finding another alternative of water supply in the campus, like stormwater harvesting which will help to cut the potential water cost in the campus (Komanya, 2020).

4.10.2 Storm water drainage

Currently ARU has the constructed open channels drainage systems located at the southern part of the campus which is the built up or developed area, and these drains receive stormwater from the catchment areas, and direct it to Mlalakuwa river. The current condition of these open drains channels is good. However, there are places which have no drains like the area around the ARU football ground, and behind playtime and ARU post office, which results to water accumulation around and at the football ground during the rain period. The design will accommodate stormwater management system at the site as it will increase more stormwater. However, construction activities will be done during dry season. Also, the drainage system will be constructed to accommodate the envisaged storm water to be generated from the proposed buildings.

4.10.3 Solid and liquid waste management

The University has a waste management system for solid waste and liquid waste. Solid waste is managed by an outsourced contractor. Currently, there are solid waste collection points scattered throughout the university campus. Wastewater is treated in two Upflow Anaerobic Sludge blanket

(UASB) reactors with different capacities found at lower part (3,000 people) and upper part (6,000 people) of the university campus. The proposed new buildings will exert pressure to the existing treatment facilities. Once completed, the proposed new buildings will use both UASB located at the upper part of ARU campus and septic tank and soak away system.

Mlalakuwa area receives electricity supplied by the Tanzania Electricity Supply Company (TANESCO). The area can benefit from 11V and 33V that is close. ARU consumes 178,882.8 metric tonnes of water per year. The existing supply meets the daily requirements. The existing network is gradually expanded to meet the expected population projections. However due to frequent power interruptions, ARU has bought diesel-powered generators for to complement power shortage. The proponent will have alternative source of power so that hostel activities are not interrupted by absence of power. The alternative power supply like solar power and generator needs to be sought when found feasible.

4.10.6 Telecommunication

Residents at ARU like many other city dwellers, enjoy wireless phone communication services through five major providers namely: M/S TTCL, AIRTELL, VODACOM, TIGO, BO, Halotel and ZANTEL. These companies have installed several communication towers in order to boost reception. The Tanzania Telecommunication Company (TTCL) also provides fax and Internet services. This implies that there is no communication barrier to students to be reached by any one.

4.11 Community facilities

4.11.1 Health

There is one public health facility with ARU campus. The nearby health services can be found at Mlalakuwa Health centre and one Referral hospital Lugalo children referral hospital. Residents, Other big public medical services like Muhimbili National Hospital, Mwananyamala are also not very far from ARU area in case of emergencies and other serious cases. The diversity of health services imply that students can get medical treatment within very short time. However, first aid kit will be supplied in the building and the matron/patron will be trained for provision of first aid service.

4.11.2 Common Diseases at ARU campus

Common disease outbreak such as infectious diseases due to microbial contamination from toilet to class doors, wall surface, desk surface, food and direct hands contact. As the result of contamination, the community is exposed to risk of disease such as diarrhoea, typhoid, cholera, infectious hepatitis. Ardhi University as other in the world institutions with large population is at high risk of the spread of third wave COVID 19. In fighting against disease, environmental cleanliness and personal hygiene are the major tools, in doing so the university have assured that collection of solid waste and the cleanliness of toilets are done daily. Ardhi University as other institutions with high population the spread of transmitted diseases are the most challenge problem due to the fact of microbial contamination and personal contacts. It's difficult to prevent the microbial contamination and dermal contacts. In doing so the university introduced the hand washing systems and sanitizers although they were used during the COVID 19 crisis, which was the worldwide challenge. The introduction of new managerial methods to fight against COVID 19. Despite the fact that these two system were introduced due to corona virus but they are useful in

reducing the microbial contamination. In addition, there is presence of condom supply boxes in hostels and toilets for fighting against the sexual transmitted disease such as HIV/AIDS.

4.11.3 Security

The security is the big issues at the university. The survey conducted at ARU revealed that robbery likelihood at the university campus is probable which means it is likely to occur due to the open environment of the university. The percentage of the respondents who perceived to be probable was (44.3%) which means the chance of robbery at the university high. (8.7%) of the respondents perceive the robbery likelihood to be frequent which means they have faced robbery at the university. Also (32.8%) of the respondents consider the likelihood of robbery at the campus to be occasionally which indicates that at some circumstance robbery may occur. About (10.4%) and (3.8%) of the respondents perceive the likelihood of robbery to be remote and improbable which means the respondents sees there is low chance of robbery at the campus due to the presence of the security guards.

4.12 Socio-economic and Cultural profile of the Communities surrounding ARU

The neighbouring environment is a mixed land use and there is interaction with the university. The project is located in an area with an increasing trend development of both apartments and commercial blocks completed and under construction within the vicinity of up to 6 storeys. However there is a gradual transformation to higher skyline depicted by new building developments around the area. The area is within a high level residential area surrounded by medium to high end residential, commercial, and mixed-use and social economic activities such as Bulls Park and Mlimani City Mall. Ardhi University is surrounded by four communities/streets of Mbuyuni, Makongo Juu, Mlalakuwa and University of Dar es Salaam

4.12.1 Population size

The proposed ARU project is envisaged to increase the total current population within and around ARU campus. Table 4.2 shows number population in the three communities/Streets surrounding Ardhi University based on 2012 census

Table 4.2: Population at Mlalakuwa, Mbuyuni and Makongo sub-ward

Names of the community street/Mtaa	Female	Male	Total
Mlalakuwa	9930	9532	19462
Mbuyuni	1487	1750	3237
Makongo Juu	7932	7925	15757

Sources: Local governments' reports from Mtaa Executive Officers of Mbuyuni, Makongo Juu, Mlalakuwa

4.12.2 Social services/ infrastructure

The number of available social services infrastructure (education, health facilities, sources of energy, and sources of water, worshipping centers) in the three communities surrounding Ardhi University are summarized in the following tables:

4.12.2.1 Education facilities in the three communities/Streets surrounding Ardhi University

There are a number of educational facilities around the ARU community which enhance the learning atmosphere at ARU. This means students with families can get education services for their children while studying at ARU. Table 4.3 shows the available education services at ARU.

Table 4.3: Education facilities nearby ARU

Name of the street	Nursery		Primary	Secondary	Colleges	Total
Mlalakuwa	3		-	-	-	3
Mbuyuni	-		-	-	-	-
Makongo Juu	10		6	3	1	20

4.12.2.2 Health facilities in the three communities/Streets surrounding Ardhi University

ARU community has one dispensary (Table 4.4) which serve for ARU community and the neighbouring community. However, there other health services around ARU which guarantees the availability of health services to students.

Table 4.4: Availability of Health facilities within and around ARU

Name of the street/Mtaa	Hospitals	Dispensaries	Pharmacy	Total
Mlalakuwa	1	1	7	9
Makongo Juu	-	3	4	7
Mbuyuni	-	-	1	1

4.12.2.3 Sources of water in the in the three communities/Streets surrounding Ardhi University

The main sources of water around ARU community are Ruvu River supplied by DAWASA. Other sources include borehole and rainwater. The presence of water tanks (Figure 4.23 and Table 4.5) ARU shows that water is intermittently supplied, thus storage tanks are important for that case.

Table 4.5: Water sources within and around ARU

Name of the street/area	Government sources	Private sources	Other sources
Mlalakuwa street	DAWASA (tape water)	2 boreholes	Water supplied and sold through water tankers
Makongo Juu	DAWASA (tape water)	5 boreholes	Water supplied and sold through water tankers
Mbuyuni street	-	4 boreholes	Water supplied and sold through water tankers

4.12.2.4 Worshipping centers in the three communities/Streets surrounding Ardhi University

ARU has no worshipping places. Students use classes and some rooms in existing hostels for worshipping such that it becomes chaos to other students not belonging to the same sect. The presence of worshipping centres around ARU (Table 4.6) accommodates this pressing demand for worshipping centres.

Table 4.6: Availability of Worshiping centres around ARU

Name of the street/Mtaa	Christians	Muslims	Others (Bahai)
Mlalakuwa	13	1	-
Mbuyuni	1	1	-
Makongo Juu	12	4	1
Changanyikeni	4	1	-
Name of the street/Mtaa	Christians	Muslims	Others (Bahai)

CHAPTER FIVE

STAKEHOLDER ENGAGEMENT AND GRIEVANCES RESDRESS MECHANISMS

5.1 Introduction and state of the Art

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

- i. To identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties.
- ii. To assess the level of stakeholder interest and support for the project
- iii. To enable stakeholders' views to be taken into account in project design and environmental and social performance
- iv. To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance
- v. To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.
- vi. To provide project-affected parties with accessible and inclusive means to raise issues and grievances and allow Borrowers to respond to and manage such grievances

5.2. Stakeholder Identification and Analysis

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

- i. Public institutions who have influence on the project- The identified stakeholders under this study were Ministry of Education Science and Technology (MoEST), Tanzania National Electric Supply company (TANESCO), Dar es Salaam Water Supply Authority (DAWASA), Kinondoni Municipal Council (KMC), Tanzania Commission for Universities (TCU), Occupation and Safety Authority (OSHA), Fire and Rescue Army
- ii. Project Affected Communities-Ardhi University Students including vulnerable students and those with disabilities, Ardhi University Students Organisation (ARUSO), Academic and Administrative staffs through their respective organisations (ARISA and THTU respectively), local communities of Mbuyuni, Mlalakuwa and Makongo Juu streets

- iii. Local government authorities of Makongo Juu and Mlalakuwa wards/ street governments of Mbuyuni, Mlalakuwa and Makongo Juu
- iv. Disadvantaged / Vulnerable Individuals: include vulnerable households such and particularly those that has to move to enable project execution and youth as well as students with disabilities
- v. Non-Governmental Organizations working in the area adjacent to Ardhi University;
- vi. Private Sector: These were service providers within and outside the University that provide goods and services to Ardhi University community and local communities of Mbuyuni, Mlalakuwa and Makongo Juu

5.3 Engagement Approach during Preparation Phase

During this period the consultations, presentations and discussion with the above-identified stakeholders were conducted. In the presentations, the team shared with these stakeholders timely, relevant, understandable and accessible information in a culturally appropriately manner free of manipulation, interference, coercion, discrimination and intimidation. During this stage, the team collected the views and opinions on project design, risk, and impact and mitigation measure associated with the Project. The stakeholders' views and concerns are presented in Appendix II. The key issues raised by stakeholders were:

Major issues raised are:

- i. Availability of academic facilities may attract more students, hence increasing the pressure on available social services which are currently inadequate;
- ii. Increased dust and noise pollution during construction phase;
- iii. Increase of Waste Management problems;
- iv. Local communities pleaded to be given priority in terms of employment and service provision during the implementation of the project;
- v. There is a potential of the increase of crime at the campus. Thus, security matters should be strengthened by the University by constructing a police post;
- vi. There are scarcity of play ground to accommodate the needs of the University local communities
- vii. The existing facilities does not favor the people living with disabilities;
- viii. Nature of Ardhi University areas is slopy, This may increase construction cost so buildings have to follow nature of the landscape in order to reduce construction cost; matching topography with the buildings;
- ix. The proposed project shall put pressure on Sewerage systems; and there should be an adequate storm water management system to avoid social conflicts which may arise due to solid wastes from the university entering the Mlalakuwa River.

5.4 Stakeholders Engagement during Implementation

During Project implementation, engagement activities will be undertaken in relation to project activities under Component 1: Transforming Ardhi University with a focus on priority disciplines for Economic growth; Component 2: Strengthening management of the Ardhi University system; and Component 3: Support for Project Coordination and Management. At this stage, the study will conduct a number of structured and formal meetings, focus group discussions, community meetings, one to one interview, distribution of information (pamphlets) and site visits that will involve a number of stakeholders as identified in 5.2 above. The timing for the conducts of the above meetings will be determined by the progress of the project implementation and when seems necessary to invite stakeholders for their comments and observation. However, the sharing of information and progress with stakeholders will be subject to scrutiny with regards to the kind of information to be shared and how the same will be communicated to both stakeholders, PAPs and OIPs. Furthermore, at this stage, the Ardhi University will ensure equal and effective participation from project preparation to implementation stages. To ensure stakeholders' views and concerns are well captured, the SEP will have different methods of collecting information based on their needs i.e. disadvantaged or vulnerable groups (Table 5.1).

Table: 5.1 Summary of the stakeholders' engagement during Implementation.

SN	OBJECTIVE	MESSAGES	MEANS OF COMMUNICATION
PROJECT PREPARATION			
1.	To present the draft SEP (for comment) and final versions of the instruments.	<ul style="list-style-type: none"> • Presentation of the Project and its implementation schedule • Present potential environmental and social impacts reports and its enhancement and mitigation plan. • Describe Grievance Redress Mechanism • Present a list of identified stakeholders and describe an approach their engagement. 	<ul style="list-style-type: none"> • Organized public meetings /Consultations based on Stakeholders needs and circumstances. (GD, one on one meetings etc. • Disclosure on ARU Website • Emailing to respective stakeholders • Email copies of the instruments to Non-State Actors and other institutions. • Sharing of executive summaries in hard copy during meetings • For stakeholders who are illiterate, information will be presented verbally during meetings in local language. • Disclosure of Project documentation in appropriate and accessible manner • The instruments will be disclosed in Swahili language in project offices and hard copies will be accessible to PAPs and OIP.
2.	ESIA / ESMP Preparation and Disclosure	<ul style="list-style-type: none"> • To inform the preparation of the Environmental Statement/ ESMP etc. and present findings when drafted to all the identified stakeholders 	<ul style="list-style-type: none"> • Face to Face Meetings • Community Meetings • Site Visits based on stakeholders needs and circumstances. • FGD, one on one meetings etc. • Disclosure of Project documentation in appropriate and accessible manner • The instruments will be disclosed in Swahili language at the University and in the offices of the identified stakeholders or public meetings

3.	Resettlement Action Plan (RAP) Preparation, disclosure and implementation	<ul style="list-style-type: none"> To inform the PAPs regarding the implementation of HEET project at ARU. Discuss about resettlements and possible mitigation measures. Show them the houses to be affected. Share the University plan on reallocation if they would like to be willingly be resettled. 	<ul style="list-style-type: none"> Face to Face Meetings with Project Affected Persons (PAPs) Site Visits based on stakeholders needs and circumstances. FGD, one on one meetings Disclosure of Project documentation in appropriate and accessible manner The instruments were disclosed in Swahili language at the University and in household of the PAP
CONSTRUCTION PHASE			
2.	Meeting to Alert stakeholders to the start of construction	<ul style="list-style-type: none"> Inform stakeholders on the commencement of construction activities Provide project Information and education on the risks and impacts, GRM, workers code of conduct etc. 	<ul style="list-style-type: none"> Public Meetings Face to Face Meetings Groups Discussions based on stakeholders needs and circumstances. FGD, one on one meetings etc.
	Alert stakeholders of any new activities and Provide updates on project progress (every month)	<ul style="list-style-type: none"> Inform public about any emerging issues; provide information on risks and impacts. GRM, workers code of conduct etc. 	<ul style="list-style-type: none"> Public Announcements Focus Group Discussions Community Meetings Meetings with mtaa Council of Makongo Juu, Mbuyuni and Mlalakuwa
4.	Contact with the Project Coordination Team	<ul style="list-style-type: none"> Provide phone number/WhatsApp account and email for stakeholders to submit questions and give out comments 	<ul style="list-style-type: none"> Meetings with mtaa Council of Makongo Juu, Mbuyuni and Mlalakuwa as well as PAP and OIP
THROUGHOUT THE PROJECT			
5.	Information dissemination	<ul style="list-style-type: none"> General information on ARU HEET implementation 	<ul style="list-style-type: none"> Posting on bulletin boards; Information leaflets

			<ul style="list-style-type: none"> • Outreach activities with students such as presentations, workshops and public meetings. • Sharing on ARU social media and website
	Contact with the Project Coordination Team	<ul style="list-style-type: none"> • Maintain website with contact box, email, social media accounts and phone number for people to submit questions, comments and concerns. 	<ul style="list-style-type: none"> • ARU's Websites • ARU's phone number for HEET activities and concerns will be shared to project sites and all

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

CHAPTER SIX

6.0 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1 Introduction

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

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

6.2 Impact Identification

Impact identification is a process designed to ensure that all potential significant impacts are identified and 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 EIA study, a checklist and matrix methods were used. The checklists, which have been developed from previous experiences, provide lists of potential impacts associated with specific activities. They provide a quick method of identifying the impacts and in such help also practitioners to avoid overlooking some of potential of the impacts associated with a particular activity. The matrix provides a rather systematic way of evaluating the identified impacts.

6.2.1 Impacts associated with preparatory, construction, demolition and operational phase

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

Impacts associated with preparatory and demolition phase

Positive social impacts

- v. Job Creation and employment opportunities
- vi. Increased market opportunities and sources of income
- vii. Changes in lifestyle and quality of life
- viii. Increased Revenues to local authorities

Negative social Impacts

- ii. Displacement and re-allocation of staff settlements

Negative Environmental Impacts

- iv. Exploitation of borrow pits/quarries and other natural resources
- v. Contamination and /impaired quality of receiving body – land and water
- vi. Disadvantages related to the management of solid wastes from demolition activities

Impacts associated with construction phase

Potential Positive social impacts

- iv. Jobs creation
- v. Income to local suppliers and service providers
- vi. Increased skills and impart knowledge to local communities Improved quality of life and living standard

Potential negative social impacts

- vii. Occupational Safety and Health impacts
- viii. Community Health, Safety and Security
- ix. Increased level of crimes
- x. HIV / AIDS among workers and students since the construction will be conducted while classes are ongoing
- xi. Eruption of COVID-19 disease
- xii. GBV / SEA

Negative Impacts on physical environment

Positive environmental impacts

- v. Improved amenities/ landscaping
- vi. Improved health, safety and security in the area
- vii. Improved aesthetic value, and
- viii. Improve easy flow of natural air

Negative environmental impacts

- x. Impairment of air quality due to dust (air pollution)
- xi. Contribution to Climate Changes
- xii. Noise Impacts
- xiii. Impacts of vibration
- xiv. Wastewater Management problems (Water pollution)
- xv. Solid waste management problems (Land pollution)
- xvi. Erosion of Exposed Surfaces
- xvii. Landscape and visual impacts
- xviii. Loss of flora and fauna

Impacts associated with Operation Phase

Potential Positive Social Impacts

- viii. Increase of admission of students to ARU
- ix. Increase of revenue to ARU
- x. Job creation
- xi. Increased commercial and social activities around project locations
- xii. Growth of Trade and Increased Investment – growth of retail businesses in DTV Area, Makongo

- xiii. Production of skilled labour force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation
- xiv. Rise in house rents in Makongo

Negative Social Impacts

- iii. Increased incidences of diseases and ill health
- iv. Increased pressure on social services and utilities

Negative Impacts on physical environment

- vii. Water pollution
- viii. Increased storm water generation and overflow
- ix. Health and safety risks due to fire hazards
- x. Increased hazardous wastes generation from laboratory and dispensary
- xi. Contribution to Climate Change
- xii. Increased solid waste generation

Impacts associated with Decommissioning Phase

Negative Social impacts

Loss of employment and revenues

Negative Environmental Impacts

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

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 6.1). To be able to predict whether impacts are likely to occur as well as their scale, the initial reference or baseline data prior to the project was determined, and the future changes forecasted with or without the proposed project. The impact evaluation was based on experts' knowledge as well as checklists.

The significance of impacts was tested using the following criteria:

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

The impacts were further rated at a scale of “-3” to “+3” through “0” in the following manner;

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

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

6.4 Impact assessment Criteria

Eight criteria were used to assess the significance of the impacts of the project, these include

- **Direct impacts-** Refer to the immediate and observable effects that the project has on the environment. These impacts are often straightforward and can be directly linked to the cause. Direct impacts occur in the short term and are typically immediate or near-immediate results of the project. These impacts can affect various components of the environment, including air, water, soil, climate, and ecosystems.
- **Indirect impacts** – Refer to the secondary or unintended effects that result from project. The effects are not immediately observable. The causes of the impacts are often more complex and may emerge over a longer time scale than direct impacts. The impacts may be the result of a series of interconnected events.
- **Induced impacts-** These are indirect and cascading effects that project activities can have on the environment and society. These effects are often the result of a chain reaction initiated by specific actions. The impacts have more direct link between a project and the subsequent effects and the effects can be more immediate.
- **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.
- **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 16: 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 17: Temporal Rating

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

- **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.

Table 6.3: Impact Correlation Matrix for the proposed construction of ARU buildings

S/N	Impact	Project activities and phase															Impact Rating							
		Construction/Mobilization/Demo bilization phase					Operation Phase					Decommission ing phase					Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Direct Impact	Indirect Impact	Induced impact
Site clearance and demolition	Transportation of materials	Trench excavations and casting of foundation	Construction of the superstructure and installation of services	Landscape activities	Running the Buildings	Liquid waste handling	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary wall	Water provision	Demolition of structures	Removal of solid wastes	Termination of Temporary employment										
1.	Job Creation and employment opportunities	+1	+1	+3	+3	+2	+2	+1	+1	0	+1	+1	0	+2	+1	+1	R	LT	R	✓		✓		
2.	Increased market opportunities and sources of income	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	R	MT	R	✓				✓
3.	Changes in lifestyle and quality of life	+1	+1	+1	+2	0	0	0	0	0	0	0	0	0	0	0	R	MT	R				✓	
4.	Increased Revenues to local authorities				+2		+3	0	0	0	0	0	0	0	0	0	N	MT		✓			✓	
5.	Food Insecurity and inflation of prices on other social services	0	0	0	-2		-2	0	0	0	0	0	0	0	0	0	L	LT	R	✓			✓	
6.	Increased level of crimes	0	0	0	-2		-2	0	0	0	0	0	0	0	0	0	L	LT	R	✓			✓	
7.	Prevalence of Communicable diseases	0	0	0	-2		-2	0	0	0	0	0	0	0	0	0	L	LT	R	✓			✓	

S/N	Impact	Project activities and phase															Impact Rating							
		Construction/Mobilization/Demo bilization phase					Operation Phase					Decommission ing phase					Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Direct Impact	Indirect Impact	Induced impact
Site clearance and demolition	Transportation of materials	Trench excavations and casting of foundation	Construction of the superstructure and installation of services	Landscape activities	Running the Buildings	Liquid waste handling	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary wall	Water provision	Demolition of structures	Removal of solid wastes	Termination of Temporary employment										
8.	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	✓		✓		
9.	Contamination and /impaired quality of receiving body – land and water	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	R	ST	I R			✓		
10.	Disadvantages related to the management of solid wastes from demolition	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L	ST	I R			✓		
11.	Income to local suppliers and service providers	0	0	0	+3		+3	0	0	0	0	0	0	0	0	0	R	LT	R			✓		
12.	Increased skills and impart knowledge to local communities	0	0	0	+2	0	0	0	0	0	0	0	0	0	0	0	R	LT	I R			✓		

S/N	Impact	Project activities and phase															Impact Rating										
		Construction/Mobilization/Demo bilization phase					Operation Phase					Decommissioning phase					Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Direct Impact	Indirect Impact	Induced impact			
		Site clearance and demolition	Transportation of materials	Trench excavations and casting of foundation	Construction of the superstructure and installation of services	Landscape activities	Running the Buildings	Liquid waste handling	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary wall	Water provision	Demolition of structures	Removal of solid wastes	Termination of Temporary employment											
13.	Occupational Safety and Health impacts	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	L	LT	R					✓			
14.	Community Health, Safety and Security	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	L	ST	I R					✓			
15.	Gender discrimination	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	L	ST	I R					✓			
16.	Child labor	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	L	ST	I R					✓			
17.	Impairment of air quality due to dust	-1	-2	-2	-2	-1	0	0	0	0	0	0	0	-2	-1	0	0	0	0	0					✓		
18.	Contribution to Climate Changes	-1	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	I	LT	I R						✓		
19.	Dust and Noise pollution	-2	-2	-2	-2	-1	-1	0	0	0	-1	-1	0	-2	-1	0	L	ST	R					✓			
20.	Waste water management problems	0	0	-1	-3	-1	-3	0	0	0	0	0	0	0	0	0	L	LT	R	✓				✓			
21.	Erosion of Exposed Surfaces	-1	-1	-1	-1	-1	-2	0	0	0	0	0	0	0	0	0	L	ST	R	✓				✓			
22.	Solid waste management problems	-2	0	-2	-3	-2	-3	0	0	0	-1	-2	0	0	0	0	0	ST	R	✓				✓			

S/N	Impact	Project activities and phase															Impact Rating								
		Construction/Mobilization/Demo bilization phase					Operation Phase					Decommissioning phase					Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Direct Impact	Indirect Impact	Induced impact	
Site clearance and demolition	Transportation of materials	Trench excavations and casting of foundation	Construction of the superstructure and installation of services	Landscape activities	Running the Buildings	Liquid waste handling	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary wall	Water provision	Demolition of structures	Removal of solid wastes	Termination of Temporary employment											
23.	Loss of vegetation	-2	0	-1	-2	-1	0	0	0	0	0	0	0	0	0	0	0	L	LT	R			✓		
24.	Construction vibration	-1	-1	-1	-2	-1	0	0	0	0	0	0	0	0	0	0	0	L	ST	I R			✓		
25.	Increased revenue	0	0	0	+1	0	+3	0	0	0	0	0	0	0	0	0	0	N	LT	R	✓			✓	
26.	Availability of adequate academic facilities	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	0	N	LT	R			✓		
27.	Increase of admission of students	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	0	N	LT	R	✓		✓		
28.	Increased commercial and social activities around project locations.	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	0	L	LT	R	✓			✓	
29.	Increased pressure on social services and utilities	0	0	-1	-1	0	-3	-3	-3	-3	-1	-2	-3	0	0	0	0	L	MT	R	✓			✓	
30.	Health and safety risks due to fire hazards	0	0	0	0	0	-2	0	0	-2	0	0	0	0	0	0	0	L	LT	R			✓		

S/N	Impact	Project activities and phase															Impact Rating								
		Construction/Mobilization/Demo bilization phase					Operation Phase					Decommissioning phase					Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Direct Impact	Indirect Impact	Induced impact	
Site clearance and demolition	Transportation of materials	Trench excavations and casting of foundation	Construction of the superstructure and installation of services	Landscape activities	Running the Buildings	Liquid waste handling	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary wall	Water provision	Demolition of structures	Removal of solid wastes	Termination of Temporary employment											
31.	Incidence of Diseases	0	0	0	-2	0	-2	0	0	0	0	0	0	0	0	0	0	L	LT	R	✓		✓		
32.	Water pollution	0	0	0	0	0	-2	-2	-1	0	0	0	0	0	0	0	0	L	LT	R	✓		✓		
33.	Increased storm water generation and overflow	0	0	0	-2		-2	0	0	0	0	0	0	0	0	0	0	L	LT	R				✓	
34.	Loss of employment and revenues	0	0	0	0	0	0	0	0	0	0	0	0	-3	-2			L	LT	I R			✓		
35.	Loss of aesthetic value due to haphazard disposal of demolished waste	0	0	0	0	0	0	0	0	0	0	0	0	-3	-2	0		0	0	0			✓		
36.	Dust and noise pollution from demolishing works	0	0	0	0	0	0	0	0	0	0	0	0	-3	-2			L	ST	I R			✓		
37.	Loss of revenue to institutions and the government	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2		N	LT	I R			✓		

6.5 Potential Environmental and Social Impacts during the Preparatory Phase (Site Selection and Design)

Positive social impacts

6.5.1 Job Creation and employment opportunities

During this phase, about 180 people shall be employed by the contractor to do mobilization works such as construction of campsites, quarrying and material extraction and transportation activities etc. This shall increase the income to all those who can be employed by the contractor. During this phase, it is expected that the project will engage a qualified contractor(s) who will employ both skilled (25 people) and non-skilled labourers (150 people) from within and outside the project area for the preparation of the building sites and camps. In addition to that, there will be an increase of self-employment due to the higher demands and supply of various goods and services for people working in the project. For example, an increase in restaurants, *mama Ntilie* will be obvious to meet the increased number of the people working at this phase. This impact is direct, high, regional and will be long term.

6.5.2 Increased market opportunities and sources of income

The influx of people and particularly skilled and unskilled labourers in the area will provide an opportunity for local people to engage in some sort of business activities that will enable them to get more income compared to the previous time. The project will create a new source of income for both the people within Ardhi University (service providers), communities surrounding the University and those from other areas interest. This impact is indirect, high, regional and will be long term.

6.5.3 Changes in lifestyle and quality of life

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

6.5.4 Increased Revenues to local authorities

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

Negative social Impacts

6.5.5 Food Insecurity and inflation of prices on other social services

The stakeholders that were involved in this study have raised their concerns about shortage of food that may arise at the selection and design stage due to influx of workers causing pressure on available areas/sources of food. It was reported by both community members and mtaa village councils that the development of this project will likely attract many people to come and settle around the University in order to use the available opportunities for income generating activities thus increasing the demand of foods and services. This is likely to cause a lot of chaos and inflation of prices on goods and services including food services. This impact is indirect, moderate, localized and will be long term.

6.5.6 Increased level of crimes

It is expected that the selection and design stage will recruit a considerable number of workers both skilled and non-skilled from the communities around and other from the nearby communities. In addition, the project will attract people from various areas to come and invest on the provisions of good and services. Although this stage is not expected to attract a big number of people, but population increase is expected to some extent and this in turn will stimulate the growth of the trading centres around the project site. Experience and sociological point of view show that where there is a big concentration of people from various backgrounds and behaviour, levels of crimes and changes in norms and behaviour are common. This impact is indirect, moderate, localized and will be long term.

6.5.7 Prevalence of Communicable diseases

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

Negative Environmental Impacts

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

Extractions of water, construction materials from both authorized borrow pits and quarries on government land, communal land and on private-owned land are associated with rampant degradation with no efforts of restoration/re-vegetation. This impact is direct, moderate, localized and will be short term.

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

Main sources of construction waste are cleared vegetation and topsoil (overburden) and domestic waste from quarries. During quarrying activities, various type of wastes will be generated including solid and liquid wastes. The wastes may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies. This impact is direct, minor, localized and will be short term.

6.5.10 Disadvantages related to the management of solid wastes from demolition activities

Some of the buildings which are used as residential houses at the site will need to be demolished to pave the way to construction activities. A lot of demolition waste is expected as a result of demolition of these buildings. 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. Most of the building materials shall be salvaged and recycled. 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 direct, moderate, localized and will be short term.

6.6 Potential environmental and social impacts during construction phase

Positive social impacts

6.6.1 Jobs creation

The construction activities are envisaged to create more employment opportunities to local people. The project components expect to employ many workers from the locality and it is expected that more jobs will be directly connected with construction of the proposed buildings and associated infrastructure. This impact is high, regional and will be medium term.

6.6.2 Income to local suppliers and service providers

The proposed project will need construction materials and other services in respective project region. Materials needed for this project is very large. This is good news to suppliers of building materials as well as those who will provide food and waste collection services in Dar es Salaam. This impact is direct, high, regional and will be long term.

6.6.3 Increased skills and impart knowledge to local communities

As noted in the previous paragraph, the construction phase of the six proposed buildings will provide several opportunities for both skilled and non-skilled labourers. There will potentially be training opportunities or practical learning for local people who will be employed in the project particularly technicians and machine operators during this phase and consequently acquire necessary skills that will be of paramount important in their lives. ARU will construct the state-of-the art buildings. This implies that the construction may deploy the use of equipment and technology which 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 for practical learning by participating in the whole process. This impact is direct, moderate, regional and will be long term.

6.6.4 Improved quality of life and living standard

It is expected that, the increase in employment opportunities both formal and informal will result to the rise of high wages among the population in the areas. This is likely to increase their expenditure and consequently alter their living standard. This will also

have a multiplier effect in the communities that the workers come from, as they will for example be able to pay for school fees as well as buy assets. Apart from that, the influx of people in the area will result to an increased number of people with mixed culture hence easy to alter or influence for the same to undergo some changes. During field studies, it was observed that most people believe that an increase of employment opportunities and the execution of the proposed project activities into the area will automatically lead to an improvement in social services. This impact is indirect, moderate, localized and will be short term.

Potential negative social impacts

6.6.5 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 make it difficult for job sites to remain accident-free. Accidents on site could be caused by defective or collapsing scaffold, electrocutions, falls, falls from ladders, and defective machinery such as forklifts, conveyors, hoists, cranes, malfunctioning tools and other equipment. Accidents can result in serious injuries or death. In case, construction is extensive, the potential significance of the risk to health and public safety will depend on the size of the population and the workers exposed and the degree of exposure. Workers permanently on the site will be exposed to air pollution throughout the construction period. Work accidents during construction work are quite common. This is due to the presence and handling of hazardous equipment and harmful building materials. It is therefore recommended that before the construction activities, there is need for the materials to be well inspected and harmonized to the occupational health and safety standards. This impact is direct, moderate, localized and will be short term.

6.6.6 Community Health, Safety and Security

Due to technological developments and investment in labour saving equipment, the skilled and non-skilled workforce will be needed. The skilled construction workers will be imported to the area of construction and will reside in labour camps. A smaller number of local low-skilled jobs may be envisaged. These will include protection and guarding of the construction companies' properties. Low skilled workers will be hired around the project jurisdiction if necessary.

It is expected that the increased number of workers and higher concentration of residents near construction sites will have negative impact on local communities. Uncontrolled movement of workers will affect residents around the settlements. Due to this, workers must receive training and sign a labour code of conduct. With an increase in construction activities and the possibility of job seekers arriving, it may be more difficult to identify strangers in the community. In addition, the increase in cases of diseases like COVID-19 and HIV/AIDS associated with the entry of a temporary labour force into community could also occur. There may also be negative issues that need to be managed such as increases in local prices, crime, prostitution, or alcohol abuse.

The presence of many workers can give rise to an increase in spread of communicable diseases. Also, construction of the project shall be accompanied by in-migration of job seekers and opportunistic businesses and speculators. This will bring many people in the project areas. This will increase social interactions amongst the construction workers and local communities. This among other factors may produce an inherent increased risk of incidences of sexually transmitted diseases, HIV/AIDS and other contagious diseases taking into consideration that the project will be implemented within university campus.

In addition, during the construction phase risks related to public safety and the construction workers may increase. Increased traffic volume related to construction activities will contribute to increasing road accident risks especially on local roads, which will be used by trucks and construction equipment of the contractors. Construction vehicles and machines will pass through public roads and as such residents of local settlements located along these roads will be exposed to increased risks for accidents. The sources of harmful effects to the public are identified in Table 6.4. This impact is direct, moderate, localized and will be long term.

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

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

6.6.7 Gender based violence

The social cultural relationship in the project may have an implication to gender based violence. Gender-based violence is violence directed against a person because of their gender. Both women and men experience gender-based violence but most of the violence is inflicted on women and girls, by men. Many forms of violence against women are rooted in power inequalities between women and men. This impact is direct, minor, localized and will be short term.

6.6.8 Gender discrimination

The proposed project may cause men treating woman, unfairly because of their sex. This might lead into more project benefits to men than women. Tanzania regulations encourages equal opportunities to men and women. This impact is direct, minor, localized and will be short term.

6.6.9 Child labor

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

employed or engaged in connection with the project. This impact is direct, minor, localized and will be short term.

6.6.10 Food Insecurity

The stakeholders that were involved in this study have raised their concerns about shortage of food that may arise at the selection and design stage due to influx of workers causing pressure on available areas for sources of food. In our focus group discussion with both community members and mtaa village councils, they argued that the development of this project would likely to attract many people to come and settle around the University in order to use the available opportunities for income generating activities thus increase demand of foods and services. This is likely to cause a lot of chaos and inflation of prices on goods and services including food services. This impact is indirect, moderate, localized and will be long term.

6.6.11 Increased level of crimes

It is expected that the construction phase of this project will recruit a considerable number of workers both skilled and non-skilled from the communities around and other from the nearby communities or outside the country. In addition, the project will attract people from various areas to come and invest in the provisions of goods and services. It is highly expected that this stage will attract a big population and this in turn will stimulate the growth of the trading centres around the project site. Experience and sociological point of view show that where there is a big concentration of people from various backgrounds and behaviour, levels of crimes and changes in norms and behaviour are common. This impact is indirect, moderate, localized and will be long term.

Impacts on physical environment

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

Negative Environmental Impacts

6.6.12 Impairment of air quality due to dust

Measurement done in seven locations around the proposed sites indicated that PM_{2.5} and PM₁₀ concentrations were between 16.2µg/m³ and 24.4 µg/m³; and between 24.1µg/m³ and 36.2 µg/m³ respectively. These ranges are below WHO and Tanzania Emission Limits. During the construction phase air quality is expected to decline as a result of an increase in levels of fugitive dust from the construction activities mainly due to vegetation clearance, foundation excavation and movements of heavy machinery. This may cause localized temporary disturbance to workers at construction sites and areas where sand and aggregates will be collected. Respirable particulates are a public health hazard and may otherwise create considerable nuisances to the public and fauna. The overall magnitude of the impact of the project is negative, temporary (only during construction phase) and high in significant taking into consideration that the most (Five) projects will take place outside the current core business area. Potential sources of dust at the site and off site are summarized in Table 6.5. This impact is direct, moderate, localized and will be short term.

Table 6.5: Project activities and Impacts

Activity	Source of production of dust
On-site building work producing dust and gaseous emissions	
Clearance and terracing of the site	Earthworks Initial soil spreading after excavation. The movement of construction traffic and movement of materials Stored materials subjected to wind action
Excavation	The important sources are: <ul style="list-style-type: none"> i. Movement of traffic construction vehicles ii. Handling and storage of waste iii. Excavation and transport of materials and on-site storage
Building Foundations	The important sources are: <ul style="list-style-type: none"> i. Foundation excavation ii. Movement of construction traffic iii. Handling and the storage of waste iv. Excavation and transport of materials and on-site storage
Building Works	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.
Auxiliary work -	
Off-site building work producing dust	
Material transportation	Any movement of traffic on unpaved roads Surface materials brought by the wind
Aggregate mixing unit	Stored materials Filtering and other methods for processing construction materials Handling of materials (loading output) Traffic congestion
Tool maintenance course	Materials on the surface brought by the wind Traffic of construction

6.6.13 Contribution to Climate Changes

The project will contribute to climate change in two ways. Firstly, it will be through generation of Green House Gas emissions (SO_x, NO_x, CO_x, VOCs). Secondly, the project is expected to reduce Carbon dioxide sequestration due to reduction of vegetated area of the campus. The impact is minor, indirect, long term, irreversible and international in nature.

6.6.13.1 Increased Greenhouse gas generation

According to the ESS1, the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the welfare of current and future generations. The construction of the proposed ARU buildings will most likely be associated with greenhouse emissions from cars, equipment, plants etc. Various internal combustion engines will release Greenhouse gases notably carbon-dioxide (CO₂), small quantities of noxious gases such as Nitrogen Oxides (NO_x), Sulphur Oxides (SO_x) and hydrocarbons. The generation and emission rate will depend on equipment type, road

condition, speed of vehicles, quantities of equipment, duration, and prevailing atmospheric conditions, particularly wind and moisture of the air. The main source of emission of atmospheric pollutants will emanate from mobile sources-the exhaust engines (trucks/tipper, wheel loaders). Table 6.6 shows the emission factors of the various construction equipment and vehicles, and approximated emissions.

Table 6.5: Emission of construction equipment and vehicles

S/ N	Type	Quantity	Emission factors (Giunta <i>et al.</i> , 2019)		Total Emission	
			CO g/hp-hr	NO _x g/hp-hr	CO g/day	NO _x g /day
1	Excavator	1	0.75	4.31	0.34	1.90
2	Bulldozer	1	0.94	4.67	0.42	2.09
3	Trucks	5	11.24	15.27	25.12	34.13
4	Motor grader	1	0.75	4.31	0.34	1.90
5	Compactor	1	0.94	4.67	0.42	2.09
6	Crane	2	170	260	340	520

Data collected around project sites indicated that all values are below WHO guidelines and Tanzania Emission Limits. Gaseous emissions are expected to increase due to construction activities, equipment and vehicle movements, hence contributing to climate change which has various global impacts. However, emissions from stationary emission sources is estimated to be far less compared to the mobile source emissions. Thus, the contribution of emissions from stationary source to cumulative emissions by mobiles sources is projected to be negligible. The level of the emissions of the precursory pollutants and the atmospheric pollutants from mobile sources will vary from day to day, according to the type of activity done. However, even if the impact is very limited in time, it does not remain the same depending on the weather conditions. Of this fact the intensity of the impact of the building construction on air pollution especially by mobile emissions is evaluated to be negative, cumulative, global, short term and moderate as there are hundreds of vehicles plying in Dar es Salaam roads which emit same air pollutants. This impact is indirect, moderate, international and will be long term.

6.6.13.2 Reduction of CO₂ Sequestration Potential

The ESS1 recognised CO₂ sequestration potential as one category of the regulating services). Vegetation clearance during construction activities will reduce the CO₂ sequestration process. Destruction of 62,756.91m² (40% impervious and 60% pervious) to pave the way to construction of the proposed new buildings will reduce Carbon dioxide sequestration and hence reduction of global efforts towards climate change mitigation. It is estimated that, a forest can absorb 162 g C/m² to 168 g C/m² annually (Getter *et al.* 2009). Based on the current green space coverage of ARU campus (240,245m²), the total Carbon dioxide sequestered by the vegetated area of the campus ranges between 38.9 to 40.4 tons of Carbon dioxide per year. The proposed project will utilize an estimated area of 62,756.91m² implying a reduction of Carbon dioxide sequestration potential by 4.1 to 4.2 tons per year. Therefore, the proposed project will reduce Carbon dioxide sequestration of ARU per year by 10.4%. This amount of

Carbon dioxide is negligible compared to total Carbon dioxide sequestered by the campus vegetated land. Hence, this impact is direct, minor, international and Long-term.

6.6.14 Increased Noise level at the campus

Measurements done in different locations around the proposed project sites indicated that the daytime noise levels ranged between 43.35 dB (A) and 57.4 dB (A). Tanzania Standard limits (TZS) guidelines require noise emission levels to be less than 55 dBA during the day within residential/institution areas. This implies that the noise level is slightly above the range by 2.4dBA. The proposed project activities will inevitably increase noise level. Noises from vehicles, equipment, construction crew, etc. may rather be significant. Noise beyond some level (70dBA) is itself a nuisance and need to be avoided. Due to an increase in activities and number of operational vehicles, the impacts of noise will cause disturbance to normal university operations especially due to the construction of the proposed studio building. This impact shall not be significant to projects to be implemented at the high zone of the campus as to a great extent are far away from busy campus activities. The impact of the project on noise level generation is indirect, short-term, local and moderate.

6.6.15 Increased vibration

Construction activity can result in varying degrees of ground vibration, depending on equipment and methods employed. Vibration will be produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual construction work. The Construction activities that typically generate the most severe vibrations 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 neighbours and physical damage to properties near the construction site. This impact is direct, moderate, localized and will be short term.

6.6.16 Wastewater Management problems

The types of wastewaters generated during construction activities include sewage, grey water and process water. Sewage effluent will be produced in the sanitary facilities provided and collected on site. Septic waste produced in scattered sites will also pose a problem to human health. This will be particularly severe if the waste is not collected directly and / or is released directly into the environment without any treatment. Grey sewage will pose less of a direct problem to human health but will be produced in large quantities in the camps. Hunting and process water will be generated from batching plants, equipment maintenance centers and ordinary sites. Wastewater discharge in the natural environment can pollute environment and causing unhygienic sanitary conditions and nuisances to the human perceptions. Types and sources of wastewater are shown in Table 6.6. This impact is direct, high, localized and will be long term.

Table 6.6: Types and sources of wastewater

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

6.6.17 Solid waste management problems

Main sources of construction waste are cleared vegetation and topsoil (overburden), scrap metals, remnant of timbers and domestic waste from construction crews. During construction activities, various types of solid wastes will be generated including solid wastes from cafeteria and offices. The wastes may contaminate land or be washed into local 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 direct, high, localized and will be short term.

6.6.18 Erosion of Exposed Surfaces

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

6.6.19 Loss of Landscape and scenic view

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

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

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

6.6.20 Loss of flora (vegetation) and fauna

Much of the natural vegetation in the project area is characterized by bushes and shrubs. There are also natural and manmade forests. Other natural vegetation can only be seen at Observation hill. Overall, the clearance of the plants will have significant impacts on ecology of the site and the nearby surroundings.

The only negative impact anticipated from clearing of vegetation will be opening of the area especially by felling large indigenous trees and this will change the panoramic view of the area. Exposed area because of trees felling is likely to be exposed to the agents of soil erosion especially wind and water. Clearance of vegetation— especially bulldozing to ground level - has tendency to damage local vegetation cover and potentially damage/ loss of habitats and local biodiversity and increase risks to soil erosion. Permanent clearance will be confined only to project site. This impact is direct, moderate, local and will be of long term.

6.7 POTENTIAL IMPACTS DURING THE OPERATION PHASE

Potential Positive Social Impacts

6.7.1 Increase of admission of students to ARU

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 shall provide adequate and conducive space for training, seminars, workshops etc. This impact is direct, high, national and will be long term.

6.7.2 Increase of revenue to ARU

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

6.7.3 Job creation

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

6.7.4 Increased commercial and social activities around project locations

Construction of the proposed project components is anticipated to attract more businesses due to demand of various services and goods required to sustain the

University. The University will also cause growth of the existing businesses around the project location. This impact is indirect, high, local and will be long term.

6.7.5 Growth of Trade and Increased Investment

It is envisaged that the construction of six buildings at Ardhi University and increased enrolments of students will attract several investors from within and outside surrounding communities to invest in meeting the needs of the increased population in the area. This is likely to enhance the development of the centers surrounding Ardhi University to Makongo Juu, Mlalakuwa and Mbuyuni. It is also expected that service providers such as food vendors and general kiosks be established and increase during construction phase to provide services to both skilled and unskilled labourers working in the factory or in sugar cane plantations. This impact is indirect, high, local and will be long term.

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

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

6.7.7 The growth of banking activities in the project area

The growth of population, investment and trading activities in the projects area will attract some banks to open their offices at Ardhi University and the surrounding communities of Makongo Juu, Mlalakuwa and Mbuyuni. Currently, there is only one bank in the area but it is expected that the increase in students' enrolments, employment and income of the people living in the area or working in the proposed projects will consequently result to an increased rotation of funds in the area hence acts as attraction to banking institutions in the area. It is also expected that, both skilled and unskilled employees at ARU will be paid their money through banking system and this play a major role for most of the banks to be attracted to simplify the access of funds to their customers hence the opening of the bank branches seems to be inevitable. This impact is indirect, moderate, national and will be long term.

Negative Social Impacts

6.7.8 Increased incidences of diseases and ill health

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

6.7.9 Increased pressure on social services and utilities

Residences in the project area and surrounding communities do not have sufficient social and infrastructural services provided to them such as in the areas of health, worship areas and water. In view of this, the increased students' enrolments in the

project area will increase pressure on the already limited social infrastructure and may without the taking of steps to alleviate this place a heavy additional burden on the existing service delivery system. Furthermore, the University has the potential to increase pressure on existing utilities such as electricity and water. The demand may strain the existing service delivery system in one way or the other. The increase of population due to employment opportunities and students' enrolment will definitely strain the existing social services. This impact is indirect, high, local and will be medium term.

Impacts on physical environment

6.7.10 Increased water pollution

The current water pollution in the surrounding stream is above TZS standards. Wastewater from ARU is discharged into Mlalakuwa river upon treatment in USAB; however, the river water is being used by local people at Mlalakuwa area for irrigating vegetables. Water pollution will mainly be caused if sanitation systems used during project operation will be inadequate. This is due to the fact the proposed project will cause an increase in enrolment. Onsite sanitation systems always cause groundwater and surface water pollution. Other liquid wastes will include chemicals from laboratories and cleanliness activities and training workshops. Thus, the risk of water degradation is assessed as important, which may have an indirect impact on the surface water too. This impact is direct, moderate, local and will be medium term.

6.7.11 Increased storm water generation and overflow

The proposed project components will generate 5,246.5 m³/year of storm water due to the presence pavements, concrete surfaces and building roofs. The project will contribute 2% of the current storm water generation (268,552m³/year). The structures will tend to compromise the infiltration capacity of the land surface hence causing surface runoff to increase. The impact of storm water generation will be aggravated due to nature of the topography of ARU taking into consideration that most buildings will be done at the top of the observation 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 indirect, moderate, local and will be long term.

6.7.12 Health and safety risks due to fire hazards

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

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

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

6.7.13 Contribution to Climate Change

During the operation phase, the proposed project will have both direct and indirect CO₂ emissions to the atmosphere hence contributing to climate change. Currently, ARU emits greenhouse gases directly through cooking fuel (Charcoal, firewood and natural gas) and waste management. The indirect emissions come from the use of electricity, water, forestry products (Paper and timber) and consumption of food stuffs. Thus, materials consumed at ARU have potential contribution to climate change through CO₂ emissions which cannot be realized by eyes onsite and offsite (Table 6.7). According to the electricity-specific emission factors for grid electricity for Tanzania (0.26675705 kgCO₂/kWh) obtained by dividing total emissions from the generation of electricity within a country and dividing that figure by the total amount of electricity produced by the country; the University campus produces 507,785.4kg of CO₂ annually. Also, estimates from cool farm tool shows that the total emissions from the use of timber, biomass and fossil fuel is 360,014.6 kg CO₂ equivalent while for food products is 3,607,892 kg CO₂ equivalent. Thus, the total ARU emissions per year is 4,475.7 tons of CO₂ equivalent.

The current consumption is expected to change tremendously during the implementation of the proposed project due to population growth (increasing students' enrolment); increase of new human activities; and changes in consumption behaviour where people will use more resources due to technological advancement and the modernization. This impact is direct, moderate, international and will be long term.

Table 6.7: Current emission rates

Consumption type	Quantity consumed per year	Total kg of CO ₂ equivalent per year
Electricity	1,903,550kWh	507,785.4
Charcoal	27.5 tons	163,581.60
Fossil	2,086,500MJ	
Paper	25.875tons	176,433
Timber	6.578 tons	20,600
Food variety	406.5tons	3,607,892
Total		4,475,692

6.8 Impacts during decommissioning phase

Social impacts

6.8.1 Loss of employment and business opportunities

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

Environmental Impacts

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

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

6.8.4 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 direct, high, local and will be long term.

6.9 Cumulative impacts

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

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

6.9.1 Cumulative Socio-Economic Impacts

Positive Cumulative Socio-Economic Impacts

The proposed new classrooms, cafeteria and laboratories e.t.c. are likely to have similar impacts to existing classrooms, cafeteria and laboratories during the operation phase. Thus, the proposed project will increase students' enrolment, revenue collection and enhanced learning environment during the operation phase as follows;

- The cafeteria will enhance availability of safe and reliable food service to staff and students. Apart from that, the project will increase revenue collection by the university, and boost the economy of those operating the cafeteria, hence cumulative economic benefits.
- The laboratories will enhance learning and teaching environmental, and hence more capacitated graduates,

- The hostels will provide safety, easy accessibility to classrooms and reduce negative social interaction with the outside community. The hostels will also enable the university to increase students enrolment

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

Negative Cumulative Socio-Economic Impacts

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

6.9.2 Cumulative Impacts on Bio-physical Environmental

6.9.2.1 Cumulative impacts of liquid and solid waste

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

6.9.2.2 Incremental noise and air pollution

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

6.9.2.3 Greenhouse Gas Emissions and Climate Change

Greenhouse gas emissions has a major influence on climate. Naturally occurring greenhouse gases such as Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O) and Ozone (O₃) 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 using 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 Analysis of Project Alternatives

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

6.10.1 No project alternative

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

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

6.10.2 Alternative Site

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

- The site is within ARU campus (No need to buy a new piece of land);
- The selected area is compatible with the land use proposed by the ARU master plan;
- The site is located on a favourable piece of land; large area with a clear view
- The site is well served with road network and it is easily accessible to public transport; and
- Availability of water and electricity mains supply.

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

- The selected corridor allows integrated management of generated solid and liquid wastes (both onsite and offsite);

- Accessibility to water and energy: to be taped from a main towards the existing new hostel;
- The Multipurpose classrooms were shifted from the original location near the dispensary to a new site close to the multipurpose lab. The aim is to reduce unnecessary movement and save time during study hours.
- Further, siting of the multipurpose classrooms near the dispensary would entail demolition of some of existing classrooms. The demolition activities would generate wastes (rubble and debris) and increase the project costs. The demolition could also result to shortage of lecture rooms, until the new structures are complete.
- Site selection considered areas, which have less vegetation cover, and avoided densely areas. The proposed site is already a disturbed area.

6.10.3 Alternative Energy Sources

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

- **Alternative one - Electricity:** As it is the case in most of developing countries, supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern.
- **Alternative two - Diesel generators:** These utilise fossil fuels, which tend to emit greenhouse gases especially when operated for a long time. As such, diesel generators are used as standby power supply during outages.
- **Alternative three - Compressed Natural Gas (CNG):** The University considered the used of CNG, especially in the laboratories. CNG is the cleanest gas, thus its utilisation would reduce environmental pollution. However, the University is currently not connected to such service.
- **Alternative four - Solar energy:** the last alternative considered was the installation of solar panels to harvest solar energy. It is intended that the solar energy be used for lighting within the buildings. It is also intended to install solar lights in various locations along the streets.

Conclusions: an evaluation of the four alternatives based on capital costs, availability of adequate supply, reliability, and environmental protection revealed that at least three options could be used together. Therefore, it is planned to connect the proposed infrastructure to electricity from the National grid as a basic power supply. Provisions will be made for installing solar panels and connections to CNG in the future. However, since some machines and laboratory equipment requires high voltage, which could not be supplied by solar energy, standby generators will also be provided, especially for the laboratories.

6.10.4 Water supply Alternative

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

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

Alternative two: Groundwater Extraction

Statistics from Dar es Salaam City and within the vicinity of the proposed project area suggest that ground water is another alternative option for water supply and can supplement the water supply at the project site at such times of water shortage and scarcity. It must be noted that before establishing the groundwater as sources of water supply, an investigation in terms of groundwater quantity and quality must be thoroughly carried out and ascertained. Ground water investigation and well drilling have cost implications on the project. Further, based on water quality data from nearby community in Makongo area, utilization of ground water will necessitate investing on water treatment plant/equipment.

Alternative three: Rainwater Harvesting

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

Conclusion: *The University opted to use a combination of two water sources namely piped water supply from DAWASA and rainwater harvesting.*

DAWASA water although relatively expensive, it is of most reliable quality. Therefore, DAWASA water will be used for domestic purposes and in the running of laboratory. DAWASA water will be complimented by rainwater, which will be used for cleaning and gardens maintenance.

6.10.5 Liquid waste Management Alternatives

Five alternatives were considered for liquid waste management, namely stabilization ponds/lagoons; connection to exiting wastewater treatment system (i.e. up-flow anaerobic sludge blanket (UASB) + ABR systems and Biogas reactor +ABR system); constructed treatment wetland; septic tank - soakaway system; and direct discharge to the sewer system.

Alternative one: Use of stabilization ponds/lagoons

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

- i) It requires large space and is incompatible with the ARU masterplan
- ii) The open ponds will attract scavenger birds and animals to feed into the wastewater. The scavengers will create unaesthetically conditions at the site.
- iii) Generation of foul smells from the degradation of wastewater in the lagoons/ponds.

Alternative two: Connection existing wastewater treatment plants

Another alternative consider is connecting to existing waste water treatment plant, consisting of two treatment units. These are;

- i) One Up-flow Anaerobic Sludge Blanket (UASB) + Anaerobic Biogas Reactor (ABR)

- ii) Two Fixed Dom Chinese Biogas Reactors + Anaerobic Biogas Reactor (ABR) System.

The 1st plant have a capacity to service about 6,000 people, while the second one has two units, each with capacity of 1,500 m³. The system allow recovery of energy from the waste, in terms of sludge, biogas and nutrients rich water effluents.

Apart from its adequate capacity, the plant has many other advantages. It is used for research and experiments; and it generates energy (biogas, manure, and nutrient rich effluent water) that could be used at the university, and save costs.

Alternative three: Constructed treatment wetland

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

Alternative 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: analysis of the five alternatives showed that alternatives two and four are the most favourable. The construction of the infrastructure will include construction of onsite septic soakaways systems for immediate use, and later construct a sewer line, to convey wastewater to existing treatment facilities (UASBs).

6.10.6 Solid Waste Management Alternatives

The proposed project will generate a considerable large amount of solid waste (estimated at 525 kg/day) from hostels, stationeries, workshops, laboratories, restaurants and offices. The University considered two alternatives namely;

- i) Collection and transportation to Pugu Kinyamwezi for disposal
- ii) Collection, sorting, resource recovery and transportation of remaining waste to Pugu Kinyamwezi for final disposal

Alternative i: Alternative one will involve transportation of huge amounts of waste to the dumpsite. Since solid waste management is a service and doesn't generate any revenue, such practice will become a burden to the University. The generated amount will require at least one trip per day to Pugu Kinyamwezi, which is about 31km from the university. Therefore, alternative one was abandoned.

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

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

6.10.7 Alternatives building materials

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

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

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

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

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

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

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

Conclusion: A team of Architects and Engineers evaluates these based on criteria such as *strength, weight and durability*, which would make it right for various uses; compatibility with National standards and testing methods that govern the use of

building materials in the construction industry; consideration for structural integrity and cost and aesthetics.

The University opted a combination of two of the construction materials i.e. concrete (for foundations, floors and columns) and Brick/masonry for walling.

6.10.7 Alternatives roofing materials

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

Conclusion: Although roofing tiles scored, more points in terms of whether resistance, longevity and resistance to corrosion, they were found to be more expensive than aluminum roofing (i.e. per square meter). Aluminum roofing sheets scored more points on capital costs, flexibility and less labor intensive during installation. Therefore, the Univ

CHAPTER SEVEN

7.0 IMPACTS MITIGATION AND ENHANCEMENT MEASURES

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

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

- e) Anticipate and avoid risks and impacts;
- f) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels;
- g) Once risks and impacts have been minimized or reduced, mitigate; and
- h) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.

7.1 Mitigation measures during preparatory phase

Social Impacts

7.1.1 Food Insecurity and inflation of prices on other social services

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

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

7.1.2 Increased level of crimes

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

- i. Constructions of police stations at Ardhi University and the surrounding communities like Makongo Juu and Mlalakuwa in order to strengthen security services
- ii. Establish community based security in collaboration with mtaa/ward leaders.
- iii. The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
- iv. The community should be encouraged to participate in security matters by providing information on suspects
- v. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.
- vi. Participatory community security measures (*ulinzi shirikishi*) should be encouraged in the surrounding communities of Mbuyuni, Makongo juu and Mlalakuwa

7.1.3 Prevalence of Communicable diseases

Influx of job speculators from other parts of Tanzania and neighbouring regions will increase interaction, consequently increasing the risk of the spread of communicable diseases. The following measures are recommended to mitigate this impact

- Provide awareness to public on pathways communicable diseases.
- Provide Voluntary Counselling and Testing (VCT) centres for HIV/AIDS at Ardhi University and the surrounding communities.
- Provide more health facilities
- Work close to government and private institutions that deal with the spread of communicable diseases

Environmental mitigation measures

7.1.4 Exploitation of borrow pits/quarries and other natural resources

- i. Exploitation of construction materials will take place from authorized sources only;
- ii. Restoration of the borrow pits/quarries after use constituting of levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (department responsible for natural resources) and local environmental NGOs. If appropriate, the levelled area will be left for natural re-vegetation;

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

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

7.1.6 Solid waste management problems during demolition activities

- i. The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site;
- ii. All materials which can be reused shall be reused;
- iii. Materials that cannot be reused shall be sent to an authorised dumpsite ; and
- iv. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials notably asbestos will be removed in accordance with EMA 2004.

7.2. Potential mitigation measures during construction phase

Negative Social Impacts

7.2.1. Occupational Safety and Health impacts

- viii. Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphic displays;
- ix. Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits,

- maximum loading restrictions and compliance with all Tanzania transportation law and standards;
- x. Awareness campaigns /Education on HIV and STDs shall be provided to workers;
 - xi. Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided;
 - xii. During construction, the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply;
 - xiii. A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce;
 - xiv. Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation should be put in place;
 - xv. Emergency contact details in the event of an accident shall be provided;
 - xvi. Develop and implement an emergency plan including spill response;
 - xvii. Training all contractor staff in emergency planning and spill response; and
 - xviii. Developing a detailed health and safety plan and training all contractor staff on the plan.

7.2.2 Gender based violence

- The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.

7.2.3 Gender discrimination

- This project will ensure that there is involvement of women in project activities.
- The University shall

7.2.4 Child labour

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

7.2.5. Food Insecurity and inflation of prices on other social services

- . The following measures are very vital in minimizing the problem of food insecurity;
- i. Encourage traders to supply food and other products to the project area.

- ii. Sensitization of the surrounding communities in order to make them aware of the employment and hence income generating opportunities with the proposed project.
- iii. Provide more avenues for service providers e.g. cafeteria and restaurants

7.2.6. Increased level of crimes

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

- i. Constructions of police stations at Ardhi University and the surrounding communities like Makongo Juu and Mlalakuwa in order to strengthen security services
- i. Establish community based security in collaboration with mtaa/ward leaders.
- ii. The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
- iii. The community should be encouraged to participate in security matters by providing information on suspects
- iv. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.

Environmental Impacts

7.2.8 Impacts on physical environment

7.2.8.1 Impacts on air quality

Impairment of air quality due to emissions

- xiii. Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used;
- xiv. Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use;
- xv. There will be routine inspection of equipment;
- xvi. Trucks transporting materials shall be fully covered; and,
- xvii. Turn off engines to reduce idling.

Impairment of Air Quality Due to Dust

- i. Protect stockpiles of friable material subject to wind through wetting;
- ii. Cover loads with friable material during transportation;
- iii. Restrict speed on loose surface roads to 30 km/hr during dry or dusty conditions; and,
- iv. Douse with water work sites with loose open soil to reduce dust generation when necessary.

7.2.8.3 Contribution to climate change impacts

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

- iv. Turn off engines to reduce idling; and
- v. Green spaces shall be maximized in project areas

7.2.8.2 Impacts through noise

- i. Vehicles carrying construction materials shall be restricted to work during night time only;
- ii. Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and,
- iii. Construction equipment shall be selected, operated and maintained to minimize noise.

7.2.8.3 Impacts through vibration

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

7.2.9 Wastewater Management problems

- i. Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site;
- ii. Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste; and
- iii. Training on waste management shall be done to all personnel, operators and service providers.

7.2.10 Solid waste management problems

- i. The contractor shall have adequate facilities for handling the construction waste; and
- ii. Topsoil shall be stock piled and used for reclamation or re-vegetation at the site during landscaping.

7.2.11 Erosion of Exposed Surfaces

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

7.2.12 Landscape and visual impacts

- i. 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; and,
- ii. Locating parts of the development further away from the general public.

7.2.13 Loss of flora (vegetation) and fauna

- i. Clearance of patches of native forest remaining in the neighbourhood of the proposed project shall be avoided;
- ii. Close supervision of earthworks shall be observed in order to confine land clearance within the project site;
- iii. The contractor shall be instructed to 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; and,
- iv. Appropriate landscaping programme to help in re-vegetation of part of the project area after construction shall be designed and implemented.

7.3 Potential mitigation measures during the operation phase

Negative Social Impacts

7.3.1 Increased incidences of diseases and ill health

- viii. A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever;
- ix. The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence;
- x. Environmental sanitation systems shall be improved; and,
- xi. Adequate medical services shall be made available at the University dispensary for meeting the population demand.

7.3.2 Increased pressure on social services and utilities

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

7.3.3. Gender based violence

- The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.

7.3.4 Gender discrimination

- This project will ensure that there is involvement of women in project activities.
- ARU shall revise the Gender Policy (2008) and Anti-Sexual Harassment Policy (2015) in-order to pro-actively promote gender equity

7.3.5 Child labour

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

7.3.6. Food Insecurity and inflation of prices on other social services

- . The following measures are very vital in minimizing the problem of food insecurity;
- iv. Encourage traders to supply food and other products to the project area.
 - v. Sensitization of the surrounding communities in order to make them aware of the employment and hence income generating opportunities with the proposed project.
 - vi. Provide more avenues for service providers e.g. cafeteria and restaurants

7.3.7. Increased level of crimes

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

- ii. Constructions of police stations at Ardhi University and the surrounding communities like Makongo Juu, Mbuyuni and Mlalakuwa in order to strengthen security services
- v. Establish community based security in collaboration with mtaa/ward leaders.
- vi. The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
- vii. The community should be encouraged to participate in security matters by providing information on suspects
- viii. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.

Impacts on physical environment

7.3.8. Water pollution

- vii. Septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites(Constructed treatment wetland);
- viii. Minimize oil spillage;

7.3.9. Storm water generation and overflow

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

7.3.10. Health and safety risks due to fire hazards

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

6.3.11 Contribution to Climate Change

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

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

7.4 MITIGATION MEASURES DURING DECOMMISSIONING PHASE

Social impacts

7.4.1 Loss of employment

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

Environmental Impacts

7.4.2 Loss of aesthetics due to haphazard disposal of demolished waste

- iii. 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;
- iv. All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors; and

- v. Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.

7.5. ENHANCEMENT MEASURES FOR POSTIVE PROJECT IMPACTS

Enhancement measures for project positive impacts during preparatory and construction phases

7.5.1 Jobs creation

- i. The contractor shall be encouraged to employ local, unemployed yet willing to work hard manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project;
- ii. Employment should be based on the principle of equal opportunities for all gender;
- iii. Local communities shall be encouraged to produce quality goods and services for the project.
- iv. Employment opportunities to be offered based on merits and known interviewing procedures and grading systems.
- v. Reasonable wages should be paid to both skilled and unskilled labourers to be employed by the project

7.5.2 Income to local suppliers and service providers

- i. Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers; and
- ii. Qualified local vendors/ entrepreneurs should be given priorities to supply different goods and services to the project

7.5.3 Increased skills and impart knowledge to local communities

Contractor shall provide on job skills and training.

7.5.3. Improved quality of life and standard of living

- i. Creating awareness to the workers on employment schemes and work related rights
- ii. Provide awareness to the local communities to use the opportunities available to improve their lives
- iii. Paying workers reasonable wages
- iv. Local suppliers from the community should be given priority
- v. Supporting the local communities to access quality and affordable social services in the project area.

7.5.4. Increased Revenues to local authorities

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

Enhancement measures for project positive impacts during operation phase

7.5.5. Increase of admission of students to universities and colleges

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

7.5.6. Increase of revenue to ARU

- i. Innovate business activities linked with academic activities for enhancing income of the University

7.5.7. Job creation

- i. Employment should be on equal opportunities for all genders.

7.5.8. Increased commercial and social activities at ARU

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

7.5.9. Growth of Trade and Increased Investment around ARU

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

7.5.10. Production of skilled labour force for nation development

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

7.5.11. The growth of banking activities in the project area

- i. Provide good security within the project area and area of influence.
- ii. Create conducive business environment for investment

7.5.12. Increased Revenues to local authorities

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

CHAPTER EIGHT

8.0 ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PLAN

8.1 Impact Management plan

Plans for the implementation of mitigation measures for the proposed project are provided in this Chapter. The Plans indicate institutional responsibilities, time to take the action, monitoring frequency and estimated costs (Table 8.1). The proposed costs are only indicative, should the proposed development proceed with the suggested changes, the developer will estimate actual costs and include them in the overall cost of the project. Based on the EMA, (URT 2004), NEMC is required to Social Impact Management Plan (ESMP).

8.2 Implementation of the Management Plan

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

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

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

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

8.3 Environmental and Social Cost

The principal environmental and social cost includes the cost for implementing the mitigation measures proposed. These costs are indicated in Table 8.1. ARU shall cover all the costs proposed in the ESMP.

Table 8.1: Environmental and Social Impact Management Plan for the proposed establishment of ARU Buildings

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Preparatory phase					
Disturbance to tenants due to reallocation	i. Awareness rising to community within the project core area	Contractor/ ARU	Preparatory phase		500,000
Exploitation of borrow pits/quarries and other natural resources	ii. Exploitation of construction materials will take place from authorized sources only; iii. Restoration of the borrow pits/quarries after use constituting of levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (department responsible for natural resources) and local environmental NGOs. If appropriate, the levelled area will be left for natural re-vegetation;	Contractor/ ARU	Preparatory phase	Daily	5,000,000
Contamination and Impaired Quality of Receiving Body-Land and Water	iv. Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas; v. Introduction of waste disposal bins, warning notices, posted at strategic points; vi. No, on site burial or open burning of solid waste shall be permitted; vii. Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed for recycling, treatment, and/or	Contractor/ ARU	Preparatory phase	Daily	15,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<p>disposal by licensed contractor as appropriate; and</p> <p>viii. Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process.</p>				
solid wastes management during demolition activities	<p>ix. The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site;</p> <p>x. All materials which can be reused shall be reused;</p> <p>xi. Materials that cannot be reused shall be sent to an authorised dumpsite ; and</p> <p>xii. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials notably asbestos will be removed in accordance with EMA 2004.</p>	Contractor/ ARU	Preparatory phase	Daily	5,000,000
Construction Phase					
Impacts on air quality due to emissions	<p>o Equipment shall be maintained in good running condition, no equipment to be used that generates excessive black smoke;</p>	Contractor/ ARU	Construction phase	Daily	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use; ○ There will be routine inspection of equipment; ○ Trucks transporting materials shall be fully covered; and ○ Turn off engines to reduce idling. ○ Protect stockpiles of friable material subject to wind through wetting; ○ Cover loads with of friable material during transportation; ○ Restrict speed on loose surface roads to 30Km/hr during dry or dusty conditions; and ○ Douse with water of roadways and work sites to reduce dust when necessary 				
Impacts through noise and vibrations	<ul style="list-style-type: none"> ○ Vehicles carrying construction materials shall be restricted to work during day time only; ○ Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and 	Contractor/ ARU	Construction phase	Daily	2,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ 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. 				
Wastewater management problems	<ul style="list-style-type: none"> ○ Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site; ○ 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. 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	30,000,000
Solid wastes management problems	<ul style="list-style-type: none"> ○ Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site; ○ 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. 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Erosion of Exposed Surfaces	<ul style="list-style-type: none"> ○ The construction will be as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant; ○ Maintain gravel fill and/or re-vegetate around the structures; ○ 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 ○ Most of construction activities will be done during dry weather. 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	7,000,000
Loss of vegetation	<ul style="list-style-type: none"> ○ Clearance of patches of native forest remaining in the neighbourhood of the proposed project shall be avoided ○ Close supervision of earthworks shall be observed in order to confine land clearance within the project site ○ The contractor shall be instructed to give the uprooted trees to the residents through 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<p>ward/streets governments or any other arrangement may seem convenient provided he does not contravene the Forest Acts 2002.</p> <ul style="list-style-type: none"> ○ Appropriate landscaping programme to help in re-vegetation of part of the project area after construction shall be designed and implemented 				
<p>Visual Impacts / Public Health Hazards from Waste</p>	<ul style="list-style-type: none"> ○ 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. ○ Other measures may include landscape engineering, tree planting and ground modelling. ○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted ○ No, on site burial or open burning of solid waste shall be permitted 	<p>Contractor/ ARU</p>	<p>Construction phase</p>	<p>Quarterly monitoring and Verification Report</p>	<p>5,000,000</p>

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Locating parts of the development further away from viewers 				
<p>Potential Impacts on the human health and safety</p>	<ul style="list-style-type: none"> ○ Awareness campaigns /Education on HIV and STDs shall be provided to workers ○ Appropriate working gear (such as nose, ear mask and clothing) and good construction site management shall be provided. ○ During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. ○ A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce. ○ Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation; ○ Incident recording and reporting protocols shall be in place 	<p>Contractor/ ARU</p>	<p>Construction phase</p>	<p>Quarterly monitoring and number of complaints on health issues</p>	<p>8,000,000</p>

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Emergency contact details in the event of an accident shall be provided ○ Develop and implement an emergency/disaster management plan including spill response ○ The contractor shall prepared and use the Traffic management plan ○ Training all contractor staff in emergency planning and spill response ○ Developing a detailed health and safety management plan and training all contractor staff on the plan 				
Jobs creation	<ul style="list-style-type: none"> ○ The contractor shall be encouraged to employ local, unemployed yet willing to work hard, manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project. ○ Employment should be on equal opportunities for both gender ○ Contractor shall provide on job skills and training ○ Local communities shall be encouraged to produce quality goods and services in at the project site. ○ The contractor shall adhere to Project LMP 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Increase of Wastewater generation	<ul style="list-style-type: none"> ○ Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak away Pit within the site and then finally to the Waste water treatment plant 	Contractor/ ARU	Construction phase	Weekly	9,000,000
Income to Local Suppliers and Service Providers	<ul style="list-style-type: none"> ○ Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers. ○ District council shall institute good revenue collection system 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	1,000,000
Health hazards	<ul style="list-style-type: none"> ○ Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphics programs in schools and communities. ○ Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transpiration law and standards. ○ Noise generating equipments, operational for short periods or during the times which they will cause less disturbances. ○ Awareness campaigns /Education on HIV and STDs shall be provided to workers 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Appropriate working gear (such as nose, ear mask and clothing) and good construction site management shall be provided. ○ During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. ○ A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce. ○ Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation; ○ Incident recording and reporting protocols shall be in place ○ Emergency contact details in the event of an accident shall be provided ○ Develop and implement an emergency plan including spill response 				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Training all contractor staff in emergency planning and spill response ○ Developing a detailed health and safety plan and training all contractor staff on the plan 				
<p>Impact on housing availability due to Influx of temporary workers and associated Occupational Health, safety and compromised security due to social interaction</p>	<ul style="list-style-type: none"> ○ Contractor shall develop housing plan that will be approved by client prior to commencement of construction activities, and the plan shall be continually improved to meet the housing demand over time. ○ Contractor may wish to provide transport to workers who will decide to reside in nearby town ○ Workers shall receive training and sign a labour code of conduct, in order not to create conflicts with the local environment. ○ Develop and implement in-house manual/guard lines on Health and Safety (H&S) ○ Outer boundary fence shall be constructed as part of this construction project and shall be scheduled as one of the first activities during the implementation of the project. ○ Only key construction personnel to be accommodated at the site. ○ Enforcement of site security. ○ Screening of security personnel. 	Contractor/ ARU	Construction phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> Prohibition of alcohol and drugs within the site. 				
Operational Phase					
Stormwater generation and Overflows	<ul style="list-style-type: none"> The design storm water drainage will be given a high priority, with the limitation of gradient (slope) 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 ARU campus The design shall consider enough greeneries in the project site 	ARU	Construction phase	Quarterly monitoring and Verification Report	10,000,000
Jobs creation	<ul style="list-style-type: none"> Employment should be on equal opportunities for both gender 	ARU			
Increased Commercial and Social Activities (Induced Development)	<ul style="list-style-type: none"> Good security within campus area and area of influence Undertakes Strategic Environmental Assessment (SEA) and include in the region investment strategies and plans 	ARU	Construction phase	Quarterly monitoring and Verification Report	4,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Health and Safety Risks Due to Fire Hazards	<ul style="list-style-type: none"> ○ 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 	ARU	Operation phase	Quarterly monitoring and Verification Report	30,000,000
Increased incidences of diseases and ill health	<ul style="list-style-type: none"> ○ A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster; ○ The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence; ○ Environmental sanitation systems shall be improved; and ○ Medical facilities shall be increased at university dispensary so as to meet the population demand. 	ARU			
Increased Pressure on Social Services and Utilities	<ul style="list-style-type: none"> ○ Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc. 	ARU	Operation phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Construction of underground water reserve tank and introducing rainwater harvest system ○ Extraction of underground water resources. ○ Alternative measures like use of solar power, drilling a borehole at site, water recycling shall be explored and implemented if found feasible. For instance, use of energy savers bulbs shall be given high priority ○ Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using natural ventilation system shall be strongly explored during the design process. 				
Total cost of mitigation measure (TZS)					186,500,000

CHAPTER NINE

9.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1 Introduction

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. There are four types of monitoring that are relevant to this 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 implementation methods and techniques.
- **Compliance monitoring:** takes the form of periodic sampling and continuous measurement of relevant parameter levels for checking compliance with standards and thresholds – e.g. for waste discharge, air pollution.
- **Mitigation monitoring** aims to determine the suitability and effectiveness of mitigation programs designed to diminish or compensate for adverse effects of the project.

To ensure that mitigation measures are properly done, monitoring is essential. Table 9.1 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer are to be included in the project cost.

9.2 Health and Safety Monitoring

This shall involve careful observation of health and safety regulations and guidelines.

Construction phase:

- The safeguard personnel of the contractor shall monitor availability and use of safety gears including helmets, coats, shoes, gloves and dust masks to protect them from exposure to various products, etc;
 - The contractor shall hire a health specialist to monitor measures in place for prevention of the transmission of communicative diseases between the local community and construction workers. Monitoring may include conduction of voluntary HIV/AIDS testing and checking availability of free condoms at the construction site.
 - Monitor availability of adequate First Aid facilities and a trained first Aider on site.
- **During the operation phase;**
 - ARU shall monitor availability and adequacy of safety equipment such as fire alarms and fire extinguishers provision in all buildings;

- Monitor functioning of constructed sanitation facilities, and waste management facilities; and
- Monitoring safety environment in the laboratories (safe use of chemicals, use of protective gears while in the lab, storage of chemicals and so forth).

9.3 Cumulative impact monitoring

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; and
- The general culture of the area would change. A more likely result is a formal urban setting with the associated physical infrastructure and amenities.
-

ARU shall monitor landscape and cultural changes with time, in order to devise management mechanism.

9.4 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 analyse the impacts of construction and operation on the environment. Therefore, self-monitoring and reporting techniques will be adopted to carry out monitoring. ARU Management shall be responsible for monitoring of residual impacts. The EIA has proposed monitoring techniques, monitoring frequency and methodology of selected parameters. Monitoring costs have also been provided.

An outline of the monitoring programmes proposed for the construction and operation phases, is presented in Tables 9.1 to 9.3. Monitoring process will enable ARU to understand how environmental performance will change over time and facilitate improvements to the Environmental and social management system.

9.5 Monitoring Responsibility

The monitoring of environmental and social parameters during the construction phase shall be carried out by the Contractor's safeguard team (i.e. Environmental, social and safety experts), under the supervision of the Consultant's safeguard team. They will conduct mitigation monitoring as part of the regular works inspections. The Contractor's Environmental Manager and ARU safeguard team will undertake scheduled site inspection. A monthly Environmental and Social Compliance Report will be produced following each inspection and will incorporate any actions identified during inspections and site meetings. The inspection report will summarize the status of the site's compliance, and include photographic records if appropriate.

The independent firm to be hired by ARU shall have Environmental and Social Specialists to monitor and review on-site implementation of the E&S measures. The specialists shall have qualifications as stipulated in ESMF- Environmental specialist shall have a master degree in Environmental Management or related field with at least five years of experience in Environmental impact assessment of civil works and working as environmental supervision, inspection, monitoring and or coordinator of environmental management plan. He/she shall be registered by NEMC and knowledgeable with World Bank Safeguards Policies. The Social Specialist shall have

a master degree in Sociology, Anthropology or related field with at least five years of experience in managing social impacts including Resettlement planning and implementation, stakeholder engagement, information and education campaigns etc. on civil works site. She/he will be knowledgeable in World Bank Safeguards Policies.

Notwithstanding, the responsibility for mitigation and monitoring during the operation phase will lie with the ARU Estate Department. ARU shall be responsible to produce reports on environmental and social compliance during operation, as part of their annual progress reports and annual EHS monitoring/Audit reports. Depending on the implementation status and sensitivity of any emerging issues, OSHA and /or NEMC will perform annual EHS reviews in which environmental concerns raised will be reviewed alongside project implementation.

Table 9.1: Monitoring programme during the construction phase

Receptor/ Impact	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost (TZS) per year
Noise level	Noise levels measurement (within 500 m)*	Day and night noise levels	Quarterly	Contractor	3,000,000
Air quality	Measurement of ambient gaseous pollutants and dust**	Temperature H ₂ S, SO _x , NO _x and Dust	Quarterly	Contractor	8,000,000
Health and safety	Inspection; Voluntary testing;	-Availability and functionability of H & S facilities; -Functionability of sanitation facilities	Quarterly	Contractor/ Fire/OSHA	16,000,000
	Analyse records of accidents and incidents	Number and types of accidents and incidents	Monthly	Contractor/ ARU	3,000,000
Grievance	-Analyse records of workers and community grievance	Number and types of grievance reported and solved	Monthly	Contractor/ OSHA/ARU	1,000,000
Total					31,000,000

Table 9.2: Monitoring programme during operation phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Underground water	Measurement of ground water quality at direct interference (within 500 m)	Physicochemical and bacteriological parameters (i.e. pH, EC, pathogens, heavy metals)	Semi annual	ARU	5,000,000

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Ground/soil	Quality of wastewater discharges***	Physicochemical and bacteriological parameters (i.e. pH, EC, pathogens, heavy metals)	Physicochemical and bacteriological parameters (i.e. pH, EC, pathogens, heavy metals)	Physicochemical and bacteriological parameters (i.e. pH, EC, pathogens, heavy metals)	
Noise	Noise levels measurement (within 500 m)**	Day and night noise levels	Semi annual	ARU	3,000,000
Community Safety	-Inspection of the emergency and detection systems; -Verification of security system and access to the campus	-Number of accidents and incidents recorded -Functionability, number and location of safety facilities on campus; -Availability of security guards and lighting in proper areas.	Monthly	ARU	5,000,000
Safety in the laboratories	Inspection of lab facilities & equipment; -Verification of expertise of laboratory instructors; -Inspection of the Personal Protected Equipment (PPE) and the safety equipment	Visual inspection and records verifying the condition of the safety equipment (life rafts, life jackets, flares, smoke canisters)	As per the manufactures requirements	ARU	5,000,000

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Community Health	Inspection of available health facility in the dispensary; Inspection of sanitation facilities and waste management facilities; Inspection of hygiene conditions in the cafeteria and dormitories	- Availability and functionability of Health facilities; -Functionability of sanitation facilities; -Availability of clean and safe water; -Availability of waste management facilities;	Monthly	ARU	5,000,000
	Monitoring of Health and Safety implementation by the workforce	Presence of fire safety management system, Environmental free from Safety and ergonomic hazards	Monthly		
Total					23,000,000

Table 9.3: Monitoring programme during decommissioning phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Underground water	Monitoring of ground water quality	Turbidity / Suspended solids Oil and grease	Weekly One month after direct interference	ARU	5,000,000
	Identification and reporting of leakage events**	Number of leakage events caused during the construction	Continuous	ARU	2,000,000

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Restoration of areas impacted by the project	Inspection of Landscape, damaged infrastructure, and waste accumulation	Borrow pits, disposal areas, site facilities, workers' camps, stockpiles areas, working platforms	As per the approved contractors decommissioning plan	ARU	2,000,000
Noise	Noise monitoring at direct interference (within 500 m)**	Day and night noise levels	Weekly	ARU	2,000,000
Health and safety	Health and Safety (H&S) monitoring and audits. -H&S Performance evaluation -Personal Protected Equipment monitoring	Total recordable incidents, lost time incidents and other H&S indicators. Records verifying the conditions of Personal Protected Equipment	Weekly	ARU	5,000,000
	-Inspection of grievance mechanism -Analysis of workers and community grievance trends -Maintaining training records	-Recorder Grievance, accidents and incidents -Training records	Monthly	ARU	5,000,000
Total					22,000,000
<p>Note: * <i>Reference should be made to TZS 845:2005 Air Quality – Specifications</i> **<i>Reference is made to EMDC 6 (1733): Limits for Environmental Noise</i> *** <i>Reference should be made to TZS 860:2005 Limits for municipal and industrial wastewaters</i> All issues regarding to occupational health and safety should be monitored against the requirements of the OSHA Regulation, 2003</p>					

CHAPTER TEN

10. COST BENEFIT ANALYSIS OF THE PROJECT

10.1. INTRODUCTION

This chapter presents the cost benefit analysis (CBA) of the proposed six (6) new building structures (postgraduate research centre, multipurpose laboratory, studio, workshop and multipurpose classrooms) to be built at Ardhi University campus. The estimation of cost benefit analysis reflects 99 years of the project design period. The details are not disclosed since they are still confidential in accordance to the Tanzania Procurement Act that prevents a detailed cost benefits analysis to be undertaken before tendering process. For that case, presented costs in this section are indicative and elementary qualitative description of the costs and benefits. The total operation cost have considered the indicative costs for implementation of mitigation measures as well as the cost of monitoring. However, total cost of the project will be stated later as project tendering are still in process.

10.2. Benefits related to the project

Benefits from the proposed six new building project at the university can be classified as direct benefits and indirect benefits to university, neighbour and the government. However, primary benefits of this project is further classified as direct benefits and indirect benefits. Building construction projects may generate negative benefits though; they are usually minimal compared to the positive benefits. Some of those impacts are non-quantifiable thus cannot be used in the benefit-cost analysis estimations. Generally, the benefits of the project is experienced in all phases from mobilization, construction, operation to decommissioning phase. To mention few, employment opportunities and public benefits will occur during both the construction and the operation phases. Several benefits are associated with the proposed development both at local and national level in terms of revenue generation and the multiplier effects associated with linkages with local and national economy.

Direct benefits: the proposed project will create many job opportunities, good aesthetic view, good environments for students in their studies, entrepreneurial opportunities to the surrounding community as well as increase the number of skilled labourers due to increase in the enrolment and presence of conducive environment for self-studies. Most of the non-quantifiable impacts are directly benefits to the project receptors.

Indirect Benefits: Indirect benefits from a proposed project mainly include increase in government revenue through different sectors like; TANESCO, DAWASA, TRA etc. cultural interactions, infrastructural development, and economic growth. But since the construction project requires inputs from other sectors to produce this output, and the other sectors subsequently require inputs themselves, there will be multiple rounds of interaction among the sectors resulting in additional output from each sector of the economy.

10.2.1 Benefits to ARU

The proposed project have positive impacts to ARU since its benefit is a lifetime process throughout the project life span (99 years). The completion of these projects will be one of the pooling factor for increased number of students' enrolment thus in monetary cost its value has potential to increase annually. ARU financial capacity and sustainability are going to improve by far. Further, the improved financial standing is not only going to promote enrolment but also good governance and efficient running of the University. Teaching, Research and Public Service and its envisioned centre of excellence in knowledge and dissemination to a wide spectrum of beneficiaries at national and regional levels are ones among the benefits. The project will also have several intangible benefits to ARU which include improving the university's image.

10.2. 2 Benefit to the Neighbourhood

The proposed construction of new buildings meant to increase the capacity of ARU in infrastructure. This improvement may lead to the increase in staff requirement that is technical, administrators and academicians. During and after construction phase the project is going to provide additional employment opportunities for people surrounding ARU campus related to operation and maintenance. However, non-skilled labourers will benefit from the daily wages. University will also create business opportunities in vicinity of the campus. Business opportunities will be supporting government initiatives to create employment opportunities for Tanzanians as advocated by the current Government. Notwithstanding that now salaries are yet to be specified, it is envisaged that from employment, workers will get incomes, which will improve quality of their lives and perhaps improve their lifestyles. However, employment opportunities and income from salaries provided will extend beyond the workers and benefits many other people including dependants.

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

- Utilization of locally available resources;
- Revenue to the Government will increase through payment of the various taxes (indirect and direct).
- Contribute to the development of housing and settlements as well as commercial real estate industry in Dar es Salaam region.
- Boosting the infrastructure and economy of the country and Kinodnoni Municipality in particular Makongo ward in which the project is located.

10.2.3 Benefit to the Government

The project will benefit the government in different aspects. These include budget saving due to the relatively decrease in ARU financial dependence on the government. It is anticipated that during the operation phase the project will improve ARU financial capacity and sustainability resulting from project earnings. For that case, the government will have the opportunity to use the share of the budget which was supposed to go to ARU for other government development plans. Further the ability of ARU in contributing towards the realization of National Policies such as Education Reforms through expansion of enrolment of students into various degree programmes is going to increase. The increase in the number of enrolment means the increase in financial capacity of the institution.

However, the government will benefit from the increased number of experts in priority disciplines with different disciplines that will be graduating from ARU. This will create the potential of the government to use internal resources (home country experts) in different future projects rather than contracting foreign experts.

10.3 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 267,500,000 per annum. The estimated costs for mitigation do not include the environmental costs, which could not be accurately calculated. Since some of the impacts will only be realized during construction phase, the costs for these will also be short term, especially if mitigation measures are fully implemented. The construction costs for all the projects are detailed in Bills of Quantities.

10.3.1 Costs to community

The resulting negative environmental and social impacts such as noise, impairment of air quality, and Safety and health risks due to project activities will be absorbed by the surrounding communities. However, the introduction of mitigation measures will reduce the anticipated impacts. Apart from the above, no any community activities will be disrupted. ARU is committed to mitigate the negative social and environmental impacts.

10.3.2 Costs to Government

The Government of the United Republic of Tanzania through the Ministry of Education, Science and Technology (MoEST) has secured fund from World Bank to promote higher education as a catalytic force in the new Tanzanian economy. The project is designed to revitalize the key areas for innovation, economic development, and labour market relevance. Also as already mentioned the Government will directly and indirectly benefit from taxes generated during both phases of the project. Apart from tax generation, the investment will also enhance the economic growth, enhancement of industrialization and businesses.

10.3.3 Environmental Cost

Environmental cost benefit analysis is assessed in terms of the negative and positive impacts. Furthermore, the analysis is considering whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable. The total cost for the mitigation of identified impacts and monitoring will be Tshs. 186,500,000 and 81,000,000 per year, respectively.

10.5 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 ELEVEN

11.0 DECOMMISSIONING

11.1 Introduction

As decommissioning will take place in the remote future, the specific conditions for mitigation are generally inherently uncertain. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty.

A detailed decommissioning plan that takes environmental issues into consideration shall be prepared by the proponent prior to the decommissioning works. Should it occur, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use. Therefore what is presented here is just a Preliminary Decommissioning Plan which merely sheds some light on what shall be done if the need for decommissioning arise.

11.2 Preliminary Decommissioning Plan

This Section provides a brief outline of the works required to demolish the proposed project components on the site incase it happens. This Plan will be used as a reference document that provides the framework to ensure that demolition activities on the site do not adversely affect the health, safety, traffic or the environment of the public and neighbouring properties.

The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site.

11.2.1 Components to be Demolished

The project components to be demolished shall generally be constructed with load bearing masonry walls with steel or timber framed roofs and metal roofs.

11.2.2 Demolition Methods

It is anticipated that the Contractor will prepare a detailed Demolition Plan prior to the commencement of work on site, however, the indicative demolition methods will be as follows:

- The strip out and removal of non-structural elements will be undertaken utilising manual labour and small plant including – bobcats, 3-5t excavators and dingo type loaders.
- The materials will be removed from site using small to medium sized trucks.
- The structures will be demolished using larger plant and equipment including 15-40t hydraulic excavators. These machines will be equipped with rock breakers, pulverisers and the like which would be used in a sequential manner.
- The engineer will be engaged to provide further engineering advice in relation to temporary support or backpropping of the structure during demolition.
- During the demolition process erosion control measures will be established. These will include treatment of dust and potential discharge into stormwater systems.

11.2.3 Materials Handling

Materials handling will be done by mechanical plant (including excavators and wheel loaders) loaded into trucks (bogie tippers and semi trailers). The debris will be hauled offsite to an approved waste facility or recycling centre.

The contractor shall submit a Demolition Waste Management Plan to ARU, which outlines the objectives of:

- Maximisation, reuse and recycling of demolition materials
- Minimisation of waste disposal
- Evidence of implementation for specified arrangements of waste management

Reusable materials will be stored at the site. Recycling and disposal containers will also be accommodated at this location for collection vehicles. Hazardous materials will be treated separately. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials will be removed in accordance with EMA 2004. A final clearance report will be provided by the hygienist which will include the provision of tip dockets from waste centres.

11.2.4 Proposed Sequence

The Contractor will be required to prepare the following documentation prior to the commencement of demolition and/or excavation works:

- Dilapidation Survey
- Construction Waste Management Plan
- Demolition Management Plan

In principle, the demolition process is undertaken in the reverse sequence as construction. Essentially, internal finishes will be stripped out first. Service amenities will then be removed including air conditioning, pipework and conduits. The facades will be removed where necessary and the structure will then be demolished using the larger plants and equipment. It is estimated that it will take 3 months to demolish and clear the site.

11.2.5 Protective Measures

An A Class hoarding will be erected around the perimeter of the construction site prior to the commencement of demolition works. Additionally, wherever the risk arises of material falling into public areas, overhead protection will be provided in the form of a B Class hoarding. Scaffolding will be erected to facades where materials could fall in excess of 4m. The scaffolding will be clad with chainwire and shade cloth to enclose debris and dust onto the site. During the demolition, dust control measures will be used to minimise the spread of dust from the site. The Contractor will have a senior representative on site at all times to ensure compliance with the safety guidelines and agreed work methods.

11.2.6 Traffic Management

The management of construction traffic during the decommissioning phase will be subject to the provision of a detailed traffic management plan. This plan will be prepared by the Contractor for the various stages of demolition. During demolition, all traffic will be held within the site boundaries. The site will remain closed to pedestrian traffic and will be generally manned by security.

11.2.7 Occupational Health and Safety

A detailed OH&S measures will be provided by the Contractor prior to work commencement. A detailed Site Safety Plan will be prepared for the specific project.

11.2.8 Environmental Management Plan

A detailed Environmental Management Plan pertaining to demolition works will be provided by the Contractor prior to the commencement of the work.

11.3 Potential Impacts and Mitigation Measures

11.3.1 Dust and Noise Pollution

The demolition activities for the remained part (foundation structure) shall be accompanied with emission of a lot of dusts since the demolition works are expected to be carried out by conventional method using mechanical breakers and jackhammers. However, alternative methods of demolition including explosive techniques can be used.

Mitigation Measures

- i. Water sprinkling shall be applied to open earth to reduce dust emission;
- ii. Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions;
- iii. The demolition area shall be fenced with iron sheets; this will prevent the dust at the ground to be picked up by the wind;
- iv. Public notifications shall be posted where appropriate especially in nearby residential areas likely to be impacted by dust;
- v. Construction equipment, with noise sinks, shall be used;
- vi. Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and
- vii. Construction equipment shall be selected, operated and maintained to minimize noise.

Costs to Undertake Mitigation Measures: Approximately TShs. 50,000,000

11.3.2 Increased Waste

A lot of demolition waste is expected to be generated as a result of demolition of buildings. These shall include blocks, concrete, reinforcements, pipes, etc. Most of the building materials shall be salvaged and recycled.

Mitigation Measures

- i. All materials which can be reused shall be reused;
- ii. Materials that cannot be reused shall be sent to an authorised dumpsite.

Costs to Undertake Mitigation Measures: Approximately TShs. 10,000,000

11.3.3 Loss of Employment

Many people shall suffer loss of employment if it happens that the buildings have to be decommissioned, including members of staff (academic and administrative Staff), security guards, cleaners, etc.

Mitigation Measures

- i. Prior notice shall be given to all those who are going to be affected;
- ii. Credit and Savings account shall be established; and,
- iii. Proper compensation shall be given to those who deserve it.

Costs to Undertake Mitigation Measures: Approximately TShs. 10,000,000

12.0 SUMMARY AND CONCLUSION

The proposed project is suitably located in an institutional area and is located at a site that is adequately accessible such that all heavy equipment and trucks may reach the site easily. The proposed project will contribute to socio-economic benefits to both ARU and the nation at large. These socio-economic benefits include: Creation of employment opportunities; increase income to the ARU and the Country as whole. On the other hand, the proposed project will entail some adverse environmental impacts of which adequate mitigation measures have been proposed and incorporated in the project design. The environmental impacts identified from this project include but not limited to: Increased noise levels; increased dust levels; waste management problems, storm water generation and safety and health risks.

It is, therefore, concluded that the proposed ARU buildings project will entail no significant impacts provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. ARU will implement all the recommendations given in this ESIA and carry-out the environmental auditing and monitoring schedules.

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APPENDICES

APPENDIX I: Title Deed

TANZANIA Land Form 51

CERTIFICATE OF OCCUPANCY
(Issued under Section 9 of the Land Ordinance)

Date of Issue _____
Title Number **52518**
Land Office Number: **177799.**
Land: **PLOT NO.3 BLOCK 'L' OBSERVATION HILL DAR ES SALAAM CITY.**

Term: **NINETY NINE YEARS.**

At 1.00 PM

LAND REGISTRY
TANZANIA

Stamp Duty Shs. 12,490/-

Senior Asst. Registrar of Titles

TANGANYIKA STAMP DUTY ACT.
Stamp Duty Shs. 12,490/-
Original Receipt No. 1565153
20.3.02

Stamp Duty Officer

THE UNITED REPUBLIC OF TANZANIA

CERTIFICATE OF OCCUPANCY

(Section 9 of the Land Ordinance)

The 20th day of May, One thousand

Two thousand and one hundred and two
TITLE No. 52518

THIS IS TO CERTIFY that THE UNIVERSITY COLLEGE OF LANDS AND ARCHITECTURAL STUDIES OF P.O. BOX 35176 DAR ES SALAAM.

(hereinafter called "the Occupier") is entitled to a Right of Occupancy (hereinafter called "the Right") in and over the land described in the Schedule hereto (hereinafter called "the Land") as joint tenants/as tenants in common in equal shares for a term of Ninety nine years from the First day of January One thousand nine hundred and seventy nine according to the true intent and meaning of the Land Ordinance and subject to the provisions thereof and to any regulations made thereunder and to any enactment in substitution thereof or amendment thereof and to the following special conditions:—

1. The Occupier having paid rent up to the thirtieth day of June, 19 80, shall thereafter pay rent of Shillings Two hundred and thirty five thousand one hundred and twenty (Shs.235,120/=) a year in advance on the first day of July in every year of the term without any deduction PROVIDED that the rent may be revised by the Minister for the time being responsible for Lands (hereinafter called "the Minister") on the first day of July in each of the years or within three years thereafter in each case. / 1989, 1999, 2009, 2019, 2029, 2039, 2049, 2059 and 2069

2. The Occupier shall:—

- (i) Maintain on the land buildings (hereinafter called "the buildings") in permanent materials designed for use in accordance with the conditions of the Right and which conform to the building line (if any) decided by The Kinondoni Municipal Council (hereinafter called "the Authority");
- (ii) At all times during the term of the Right have on the land buildings as approved by the Authority and maintain them in good order and repair to the satisfaction of the Commissioner for Lands (hereinafter called "the Commissioner");
- (iii) Not erect or commence to erect on the land any building except in accordance with building plans and specifications which shall have been first approved by the Authority;

- (iv) Be responsible for the protection of all beacons on the land throughout the term of the Right. Missing beacons will have to be re-established at any time at the Occupier's expenses as assessed by the Commissioner for Surveys and Mapping.

Approval of plans of any building by the Authority shall not imply that the construction of such a building will satisfy the Occupier's obligation under the conditions of the Right and shall not imply waiver or modification of any condition in the Right.

3. (i) The Occupier shall not subdivide the land or assign, sublet or otherwise dispose of or deal with the whole or any part of it or of any building on it without the previous written consent of the Commissioner PROVIDED that the consent of the Commissioner shall not be necessary;

~~to a single sub-letting of the whole of the land where the sub-lease contains conditions sufficient to ensure compliance with the conditions of the Right;~~

to a sub-letting of the whole of the land or of the whole or any part of any building on it where the sub-lease contains conditions sufficient to ensure compliance with the conditions of the Right.

(ii) Occupation or use of the whole or any part of the land or buildings on it by any person other than the Occupier or her employees or agents or contractors or members of the household shall be deemed a dealing with the land or buildings.

4. Except as hereinbefore provided the Commissioner shall have an absolute discretion to give or withhold consent under condition 3.

5. The Occupier shall pay to the Minister on demand made by the Commissioner on his behalf:—

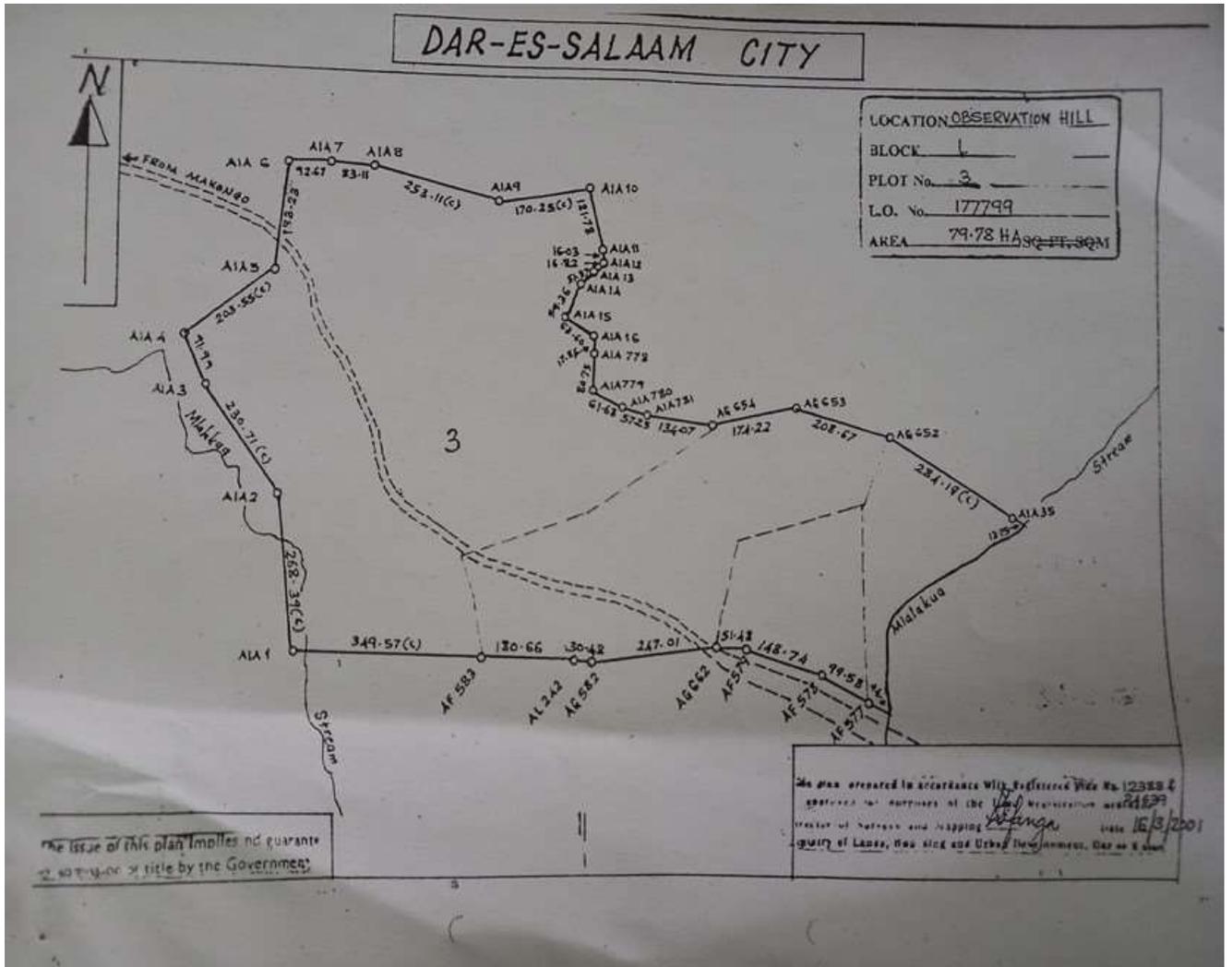
(i) any further fees or stamp duties which may be discovered to be payable by the Occupier in connection with the Right;

(ii) an amount equal to any contribution in lieu of rates which may be payable by Government for the land during the term of the Right;

(iii) such sum as the Commissioner shall assess as a proper share payable for the land of the cost of making up the road or improvement of same upon which the land fronts, abuts or adjoins, whether such demand is made before during or after such making or improvement thereof. This condition does not oblige the Government to make or improve roads.

6. USER: The land and the existing buildings erected thereon shall be maintained and the same shall be used for Educational purposes and for purposes ancillary thereto. Use Group 'C' Use Classes (a); Use Group 'K' Use Classes (b) as defined in the Town and Country Planning (Use Classes) Regulations, 1960 as amended in 1993.

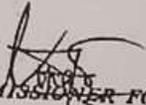
7. The President may revoke the Right for good cause or in Public Interest.



SCHEDULE

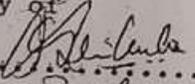
ALL that land known as Plot No.3 Block 'L' Observation Hill Dar es Salaam City containing Seventy nine decimal point seven eight (79.78) Hectares square-foot shown for identification only edged on the plan attached to this Certificate and defined in the registered survey plan numbered 12388 & 24639 deposited at the Office of the Commissioner for Surveys and Mapping at Dar es Salaam.

GIVEN under my hand and seal and by Order of the Minister the day and year first above written.


COMMISSIONER FOR LANDS

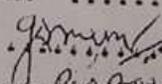
The within-named THE UNIVERSITY COLLEGE OF LANDS AND ARCHITECTURAL STUDIES hereby accept the terms and conditions contained in the foregoing Certificate of Occupancy.

SEALED with the COMMON SEAL of the said THE UNIVERSITY COLLEGE OF LANDS AND ARCHITECTURAL STUDIES and DELIVERED in the presence of us this _____ day of _____ 2001.

Signature: 

Postal Address: P.O. Box 35170

Qualification: Principal

Signature: 

Postal Address: P.O. Box 35170

Qualification: Corporation Secretary

HS

Appendix II: List of Stakeholders consulted, their Views and concerns, the Rate of Interest in the Project and Provided Response

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
<p>Tanzania Commission of Universities</p>	<p>It statutory and regulatory organization that oversees university education in Tanzania. It is the body whose recognition, approval and accreditation is needed before any university can start</p>	<ol style="list-style-type: none"> 1. Second floor laboratories should be shifted to ground floor 2. Geotechnical survey, geodesy and Geomatics laboratories should be on the same floor 3. Laboratory doors area small but also there is no lift for either disabled people or equipment 4. Nature of Ardhi University areas is slope but buildings look flat, this may increase construction cost so buildings have to follow nature of the landscape in order to reduce construction cost; matching topography with the buildings. 5. The laboratory building has three floor and lift which is good but other buildings like laboratory lack lift. 6. Generally buildings should be equipped to reduce noise and sounds (noise pollution) especially classrooms, laboratory, seminar rooms. 7. Most of the workshops are situated in ground floor other facilities should go in other floors 	<p>High</p>	<ol style="list-style-type: none"> 1. Design team shall review it accordingly 2. Design team shall review it accordingly 3. Design team shall review the drawing meet the needs of disabled people 4. Design team shall review all drawings to match the ARU topography 5. Design team shall review it accordingly 6. Design team shall review all drawings to ensure that there is no echo while in use 7. Design team shall review it accordingly 8. Design team shall review the drawing(s) accordingly 9. Design team shall review the drawing to accommodate the lift and lamp 10. Design team shall review all drawings of the workshop

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>considering that equipment have to be stored in the workshops when needed</p> <p>8. Size of the doors and lifts for equipment has to be considered, for example BICO-UDSM size of the door allows a small car to pass.</p> <p>9. Lift and lamp should be added</p> <p>10. The design and concept of workshops are not workshops</p> <p>11. Building construction has to consider access for disabled, installation of sound proof materials and the building to follow the natural terrain.</p> <p>12. Sewerage systems have to be constructed and managed properly</p> <p>13. The university should take into account issues of solid waste management</p> <p>14. Consider the resettlement plan for individuals living in the house</p> <p>15. Soil analysis and investigation should be analyzed before construction</p> <p>16. Vegetation cover should be taken into consideration to n reduce environmental impacts</p>		<p>11. Design team shall re-work on drawings to improve functionality</p> <p>12. ARU has sewerage network which will solve the problem of waste water generation</p> <p>13. The University has private company which deals with day to day environmental cleanliness at ARU campus. Also, solid waste are collected and disposed to Pugu Kinyamwezi dumpsite weekly</p> <p>14. ARU has a plan for allocating staffs residing at staff quarters to other houses within ARU campus</p> <p>15. The Geotechnical report shall address the issue of soil analysis to check the suitability of the soil for respective buildings</p> <p>16. Construction activities will be done in already disturbed area. Also trees and grasses will be</p>

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>17. Construction activities should be assessed so that should not affect University learning activities.</p> <p>18. Buildings to be built nearby the university activities should be constructed during the holiday.</p>		<p>planted to improve the aesthetic view</p> <p>17. ARU management shall cooperate with contractor to develop a plan that ensures that construction activities do not distract universities activities and safety</p> <p>18. ARU shall work closely with contractor in developing the construction plan</p>
<p>Kinondoni Municipal Council</p>	<p>Overall advice on both professional works (land, Planning, environments, social, economics) with regards to the execution of the project at ARU</p>	<ol style="list-style-type: none"> 1. Install the sanitation facilities in all buildings in relation to the number of students to be occupied 2. During operation the proponent should ensure adequate handling and disposal of all hazardous wastes such as chemicals from Laboratories and Health Centre 3. The solid waste contractor should be registered and authorized in the particular Municipal as per EMA 2004 and its amendment of 2018 	<p>LOW</p>	<ol style="list-style-type: none"> 1. Design has in cooperated it 2. ARU has good waste management system to handle hazardous waste (Incinerators) 3. ARU will contact with Kinondoni Municipal Council for guidance but meanwhile the university has its owns waste management system 4. ARU will insist the contractor to dispose wastes at Pugu

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<ol style="list-style-type: none"> 4. The proponent should know where all wastes are disposed by the contractor 5. The contractor should handle back all the receipts to the proponent after disposing wastes at a particular dumpsite 6. There should be an adequate storm water management system in order to avoid social conflicts (difficulties during cleanliness) which may arise due to solid wastes from the university entering the Mlalakuwa River 		<ol style="list-style-type: none"> Kinyamwezi Dump site by handling back the receipt 5. Receipt handling will be part of the agreement between ARU and contractor 6. ARU has a good storm water management system of which will be connected to the system of the proposed new buildings
Occupational Health and Safety Authority (OSHA)	Provide advice and advice on all work related safety measures to the project	<ol style="list-style-type: none"> 1. The proponent should make sure the project is registered under the Workplace Information Management System (WIMS) before pre- construction and construction phases 2. There should be trained First Aiders at all project phases, as well as First Aid Kits with all necessary facilities. 	LOW	<ol style="list-style-type: none"> 1. ARU shall adhere to it as part of compliance to OSHA regulations 2. ARU shall have safety and health management plan for all project phases 3. The contractor shall work with First Aider with up to date certificate 4. This is part of ESIA report

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<ol style="list-style-type: none"> 3. The First Aider should renew the certificate after every 1 year as per OSHA requirement 4. The proponent should conduct Risk Assessment before construction and prepare a Risk Assessment report 5. The proponent should prepare the Occupational Health and Safety Policy both in English and Swahili languages, and it should be posted in an accessible place within a work place 6. Medical examination should be done to all workers before construction and operation phases as well as during operation phase. 7. All workers should be provided with sufficient Personal Protective Equipment (PPEs) during all project phases 8. There should be a trained Safety and Health Representative 9. The proponent should ensure there is sufficient water supply system, 		<ol style="list-style-type: none"> 5. Contractor shall adhere to it as part of safety and health plan 6. Workers shall be tested their fitness as per OSHA regulations 7. PPE are inevitably to be provided due to nature of the construction activities and associated risks 8. This is part of the conditions for contractor to be awarded the tender 9. ARU and contractor shall adhere it for the health and safety of workers 10. Due to nature of risks in construction perimeters, enough signs shall be provided 11. ARU and contractor shall adhere to it so as to avoid the interference of the project budget

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>adequate sanitation facilities and changing (both male and female) at the workplace during construction as well as operation phase.</p> <p>10. There should be safety signs at the project site during construction and operation</p> <p>11. The proponent should maintain compliance to avoid unnecessary penalties</p>		
TANESCO	Oversees the provision, availability and control of power in the project area at ARU and the surrounding communities of Makongo Juu, Mbuyuni and Mlalakuwa	<ol style="list-style-type: none"> 1. The project should consider underground wire systems 2. The project should consider the use of renewable sources of energy 3. The project should consult TANESCO at the earliest stage possible in order to request for extension of services to new buildings and additional supply of electricity, if needed 	LOW	<ol style="list-style-type: none"> 1.ARU will check the feasibility of such an option without compromising the safety 2.This shall be considered due to unpredictable power cut and security reasons in internal road networks especially at night 3.ARU shall adhere to it to minimize inconveniences

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
DAWASA	Oversee utilization, management, development, and availability of water resources in ARU and the surrounding communities of Makongo Juu, Mbuyuni and Mlalakuwa.	<ol style="list-style-type: none"> 1. The proponent should ensure protection of all water supply systems around the project site 2. Water pipe sizes should be relevant to the demand based on the projections made on demand and infrastructures of this particular project 3. Alternatively, the proponent should increase the storage capacity since the current storage capacity yet meets the current demand 4. The proponent should look for alternative water sources 5. The proponent may consult DAWASA-Makongo office for authorized sewage vendors just in case of a need for disposal from only septic tanks since is cheap 	LOW	<ol style="list-style-type: none"> 1. ARU has a good solid and liquid waste management system. Solid wastes are collected and disposed to Pugu Kinyamwezi dumpsite. Liquid waste passes through treatment systems before disposal to environment 2. ARU has already made projections for the future demand 3. ARU is near the main storage storage tanks. It will also increase storage tanks to meet the demand 4. ARU has been looking at the feasibility of harvesting rainwater to ensure enough water availability and reduction of water use costs 5. ARU shall make such an arrangement considering that DAWASA is adjacent to ARU

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
Fire and Rescue Force	Provide overall guidance, advice and management of fire and rescue	<ol style="list-style-type: none"> 1. Two files of all architectural drawings should be submitted at Fire and Rescue Force office for payment and to be reviewed, signed and approved. 2. There should be at least two doors (entrance and exist) in all classrooms and studios, and they should open outward. 3. Laboratories should have wide windows and doors in order to provide enough ventilation, also there should be a ventilation system for sucking air in and out 4. There should be detection, alarming and lighting systems as well as portable fire extinguishers in all buildings 5. For hostels, no cooking activities should be conducted in the rooms otherwise install the kitchen, and it should have a heat detector 6. There should be no grilled windows in hostels 	LOW	<ol style="list-style-type: none"> 1. 1.ARU shall submit service drawings when ready for guidance and approval 2. The design has accommodated such a requirement for safety purposes 3. The design has addressed it considering that laboratories are associated with many risks 4. The design has considered the requirement 5. ARU through the office of warden shall sensitize hostel dwellers not to cook 6. The design shall adhere to it for easy escape in case of fire 7. The design shall accommodate the suppression system 8. Already addressed in the design 9. ARU design team shall ensure such a requirement 10. ARU shall have a plan for that 11. ARU has been working with registred dealers

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<ol style="list-style-type: none"> 7. For the Research Centre, a suppression system should be installed in the server room 8. The entrance doors in the Research Centre should have fire rated of approximately 1 hour 9. In stores, 80cm should be left from ceiling and 1m from the wall 10. The proponent should provide fire awareness training to all workers and students 11. All fire dealers should be registered under Fire and Rescue Force, and all components to be used should have a TBS Stamp 12. The proponent can consult the Fire and Rescue Force office for the best choice of registered fire dealers 		<ol style="list-style-type: none"> 12. ARU shall consult Fire and Rescue Force when needed
<p>Ardhi University Students</p>	<p>Beneficiaries of the changes in access and improvements in ARU</p>	<ol style="list-style-type: none"> 1. Privacy should be considered in both rooms and toilets in the new buildings 2. Malfunctioning of the sewage system should be observed 	<p>HIGH</p>	<ol style="list-style-type: none"> 1. The design shall accommodate the privacy issues 2. ARU through Estate department shall consider it as priority to avoid diseases and other nuisance

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
	learning environment	<ol style="list-style-type: none"> 3. Rooms should be big enough and well ventilated 4. Chairs and shelves in the rooms do not equal the number of students living in 5. There must be enough chairs in rooms as per number of students 6. No fan in the rooms 7. Projectors should be installed in rooms to allow smooth and on time learning 8. Constructions of new playground and worshipping centers should be taken on board 9. Internet sources and cables should be included in the designing of the buildings both in classes, hostels and workshops/studios 10. Microphones should be installed in classes 11. Most of university infrastructures are not friendly to people living with disability 		<ol style="list-style-type: none"> 3. The design shall be done according to standards provided by TCU 4. The increase of hostel shall solve the problem of students congestion in the hostel 5. Allocation of teaching timetable shall consider room capacity 6. Fans will be available but the design of the new buildings shall enough ventilation 7. ARU management shall adhere to it 8. ARU shall use internal sources of fund to ensure the availability of such important services 9. The project has a component for IT infrastructures to enhance learning environment 10. ARU management shall install them especially in big classes 11. The design for the new buildings shall accommodate

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>12. Warden offices should be placed at each hostel</p> <p>13. Noise pollution should be controlled in order not to interfere with smooth learning process</p> <p>14. Crime (theft) should be controlled</p> <p>15. Control the spread of diseases</p> <p>16. Deforestation should be avoided</p> <p>17. Disturbance to workers living in quarters (project areas) should be highly avoided or minimized</p> <p>18. The project execution should not obstruct Ardhi-Makongo road causing disturbances to people using it</p> <p>19. Environmental pollution should be avoid</p> <p>20. Accidents should be controlled to both students and workers in the project areas</p> <p>21. Students may decide to abscond classes and get employed in the project</p> <p>22. The construction site should also be used and treated as study sites</p>		<p>the needs of people with disabilities</p> <p>12. ARU shall adhere it to ensure timely provision of services to students</p> <p>13. Posters insisting silence will be placed everywhere within the campus.</p> <p>14. ARU shall increase the coverage of security guards</p> <p>15. ARU through Dispensary shall be organizing seminars on diseases transmission and control</p> <p>16. Construction activities will be done in already disturbed areas to avoid more vegetation clearance</p> <p>17. ARU management has a plan to allocate the tenants to better and spacious houses within the campus</p> <p>18. Traffic management plan has been developed to avoid such a disturbance</p>

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		for civil engineering, and architecture students		<p>19. ARU has private company which deals with day to day cleanliness at campus. Also, ARU has solid waste and liquid waste management systems which operate well</p> <p>20. Safety and Health Management plan during project phases are in place</p> <p>21. The project has no such arrangement to accommodate the absconded students</p> <p>22. The contractor shall provide a room for students practical training if project activities will be done during Industrial training time</p>
Gender Unit at Ardhi University	Promote gender equality, equity and disadvantaged rights	1. Inclusion of gender analysis and mainstreaming in project implementation	MEDIUM	1. Gender issues will be a key during project implementation so as to leverage the project benefits to all genders
Service Providers Within and	Employment and business opportunities in	1. Sewage systems should be well fixed using modern technology	HIGH	1. ARU has two liquid waste management system

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
Outside The University	all stages of the project	<p>in order to avoid pollution of any kind</p> <ol style="list-style-type: none"> 2. The design of the project should allocate enough service facilities in the new buildings which must include but not limited to shops, restaurants 3. Security system should be strengthened and improved for both students, staffs and service providers 4. The existing service providers should be given priority in working with the contractor of the project 		<ol style="list-style-type: none"> 2. ARU shall encourage people to invest within the campus 3. ARU management shall increase coverage of security system in the campus 4. ARU shall propose the service providers if at all they will provide the best service
ARUSO	Beneficiaries of the changes in access and improvements in ARU learning environment	<ol style="list-style-type: none"> 1. Some important services are missing should be considered in the new buildings like fan, curtains, shelves, chairs, worn out mattress, 2. There must be enough laundry spaces in the in the new buildings 3. Studios and workshop to be constructed must take on board 	HIGH	<ol style="list-style-type: none"> 1. The project has a budget component on furniture for the new buildings but for the current buildings ARU shall use an internal source of fund. 2. The design shall provide such a provision 3. The design has accommodated the requirements of all

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>the needs of different academic programs</p> <ol style="list-style-type: none"> 4. Construction of the new buildings should not interfere provision of health services 5. The playground is not enough to accommodate both students and the surrounding community members 6. The design of the new buildings must include well designed and furnished Vimbweta 7. Religious houses should be built to accommodate the needs of both students, staffs and the surrounding communities 8. Internal roads be improved 9. Internal transport is required 		<p>academic programmes in terms of studios and workshops</p> <ol style="list-style-type: none"> 4. The increase of buildings (students' enrolment) shall go parallel with provision of health services like construction of dispensary using internal funds 5. ARU shall consider the feasibility of increasing playing grounds 6. ARU shall increase such facilities to meet the demand of the growing students' enrolment 7. ARU check the feasibility of establishing worshiping area to meet the demand of ARU community 8. Internal roads shall be improved to blend with the proposed developments 9. ARU shall check the feasibility of allowing internal transport

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
<p>ARU STAFF (Both Academic and Administrative Staff)</p>	<p>Participate in coordination all functions connected with the execution of the project at ARU including environmental and social Issues, procurement,</p>	<ol style="list-style-type: none"> 1. The project needs to reconsider staff accommodation. There is a need to build houses for staff members so as to ensure improvement of the working conditions 2. Dispensary was supposed to be among the six priority projects 3. The project should not impact workers negatively, especially to those who are living in the houses that will be demolished 4. Re-allocating staff during construction is a short term measure, there is a need to have long term plans for staff accommodation 5. Security is a challenge for workers living in the quarters, there is a need to build a fence around the University 6. Air pollution is expected during construction, therefore responsible people have to be keen 	<p>HIGH</p>	<ol style="list-style-type: none"> 1. ARU shall construct staff houses using other sources of funds 2. Dispensary shall be constructed using internal sources of funds 3. ARU management has a plan to allocate tenants to other houses which are better and spacious 4. ARU has designated an area for staff accommodation within the master plan of which will be constructed using other sources of funds 5. ARU shall secure fund from other sources for construction of fence but meanwhile the coverage of security has been increased. 6. ARU management /contractor shall work together to ensure that air pollution is managed throughout project lifetime 7. The plan is in place to avoid on going academic and administrative activities during construction activities.

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>7. There should be no interference with provision of social services during construction e.g water, electricity, roads etc.</p> <p>8. Employees living in project sites have to be re-allocated earlier on to avoid disturbances (at least three months before)</p> <p>9. There should be expansion of the size (width) of internal roads</p> <p>10. Play grounds should be constructed around new hostel areas</p> <p>11. Street lights have to be fixed</p> <p>12. Police post has to be constructed</p> <p>13. Religious buildings be constructed</p> <p>14. Internal transportation services be available</p> <p>15. Re-allocation of staff members should not affect monthly deductions (rent)</p>		<p>8. ARU management shall allocate the tenants before the commencement of the project activities</p> <p>9. ARU will inevitably ensure the availability of an internal road network</p> <p>10. ARU management shall consider its feasibility to meet the demand of the growing population</p> <p>11. ARU management shall fix street lights to ensure security and safety of students and during night hours</p> <p>12. ARU shall consider it as important security requirement</p> <p>13. ARU management shall analyse the feasibility of setting up religious buildings</p> <p>14. ARU management shall analyse the feasibility of increasing mobility through provision of transportation within SRU campus</p>

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>16. Shopping centers be considered in the designing of the new buildings</p> <p>17. Re-allocation costs for staffs should be taken care of by the employer (project)</p>		<p>15. The accommodation policy will apply to tenants</p> <p>16. People will be encouraged to invest within the campus upon proper guidance</p> <p>17. Since the allocation will be done within the campus, ARU management will harmoniously cooperate with tenants</p>
ARU Tenants	Residents in the ARU houses to be demolished as a result of projects implementation	<p>1. The project should consider to improve staff accommodation at ARU in terms of number of rooms.</p> <p>2. The current housing units are very small (one room) and not sufficient for big families.</p> <p>3. The University should provide alternative houses for staff who have submitted requests to the management.</p> <p>4. In reallocation of houses, it is necessary to consider existing social ties among the tenants to enhance relationship built for years.</p>	HIGH	<p>1. ARU management has a plan to improve staff accommodation within the campus</p> <p>2. Tenants are going to be provided with new staff houses which more spacious than he current one</p> <p>3. The requests are in good order and those who request change of accommodation are the one who will be given new accommodation during HEET project implementation</p> <p>4. ARU management has prepared the allocation plan that takes into account the social ties</p>

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>5. The proposed reallocation should not be outside ARU campus. Any proposal outside ARU will not be tenant's choice as it is going to increase the cost of living due to transport costs that one will need to incur by travelling from new area to ARU. But within the campus, the tenants will continue living within the same line of expenditure.</p> <p>6. The proposed houses for reallocation should be bigger than the ones they reside.</p> <p>7. The rental fee of the new houses should be affordable to tenants.</p> <p>8. Tenants who are servicing loans through their salaries, and cannot be deducted anything more from their salaries should be considered to be given a house too. The University should negotiate with the staff</p>		<p>5. The allocation will be done within ARU campus as there are enough houses to accommodate the staffs whose houses will be demolished during HEET project implementation.</p> <p>6. The houses to be allocated are spacious compared to the one they reside</p> <p>7. The rental fees shall be according to ARU staff accommodation policy; however, ARU management may consider it for short time</p> <p>8. ARU management shall ensure that all tenants whose houses will be demolished are provided accommodation</p> <p>9. Tenants shall be given better houses compared to what they reside</p>

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<p>and agree on the modality of payment outside their salaries.</p> <p>9. The new houses should be in better condition than the existing ones.</p>		
<p>Local Government Members and Community Members of Mbuyuni, Makongo Juu And Mlalakuwa</p>	<p>Potential beneficiaries of Project components. Participation required in the Project including development of EIAs/ESMPs etc.</p>	<ol style="list-style-type: none"> 1. That the new projects should use modern technology for controlling wastes and not rely on the traditional and widely used method of septic tank 2. The communities around the University should be allowed to use pathways/roads that cuts across the University at all times of the project 3. Local communities should be given priority in terms of employment and service provision during the implementation of the project 4. The contractor should be encouraged to use local supplies surrounding the University 	<p>MEDIUM</p>	<ol style="list-style-type: none"> 1. ARU has liquid waste recovery center within the campus and it performs very well 2. ARU management shall consider it without compromising security and safety of ARU community 3. The contractor shall be insisted to employ local community especially for non-skilled force 4. ARU shall advice the contractor to use local supplies without compromising the quality 5. ARU shall consider the presence of police post in future 6. ARU shall cooperate with local government to enhance the security of ARU community and surrounding community at large

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
		<ol style="list-style-type: none"> 5. Security matters should be strengthened by the University by constructing a police post 6. The University should cooperate with local authorities to implement participatory security systems 7. The University was advised to clear bushes as a means of strengthening security during the implementation of the project 8. There must be a mechanisms to be established between the University and surrounding local communities for feedback and information sharing about the project 9. The University should construct play grounds and allow local communities to use the same in order to strengthen social relationship between the two 		<ol style="list-style-type: none"> 7. Clearance of bushes will only be done within the project area to avoid acceleration of erosion 8. ARU shall do that when need arises 9. Playing grounds shall be considered by ARU management after analysing its feasibility

Authority/Stakeholders Consulted	Role of the stakeholder	Issues Raised	Rate of Interest	Response Section on issues raised
Non-state actors (ngos, cbos, fbos)	Providing information to inform environmental and social plans, baseline information and representation of various groups at local level.	1. There must be a mechanisms to be established between the University and surrounding local communities for feedback and information sharing about the project	HIGH	1. ARU management shall do that when need arises
Private sector	Employment opportunities associated with project	19. Local suppliers and business people should be given priority in working with the project	HIGH	1. ARU management shall open the room to all people who are willing to invest within the campus and the screening criteria shall be set; and there be a fair and transparent selection procedure

Appendix III: Water quality status from different streams at ARU

S/N	PARAMETER	Units	Mlalalkuwa a Bridge up stream	Mlalaku wa stream estate	Mlalakuwa stream down stream at garden	Effluent from UASB
1	pH		8.14	8.19	8.42	8.06
2	Turbidity	NTU	89	123	129	45
3	Colour	Hazen°	284	317	279	203
4	Salinity	µS/cm	0.273	0.278	0.286	0.272
5	Electric conductivity	mg/l	486	56	572	466
6	Total Dissolved solids	mg/l	273	278	286	272
7	Ammonia Nitrogen	mg/l	32.44	56.31	65.43	59.0
8	Iron	mg/l	0.52	0.61	0.792	0.017
9	Manganese	mg/l	<0.01	<0.01	<0.01	<0.01
10	Phosphate	mg/l	16.0	22.	26.0	20.5
11	Nitrate nitrogen	mg/l	0.23	0.40	0.70	0.20
12	Grease &oil	mg/l	<1.0	<.1.0	<1.0	<1.0
13	Chemical oxygen demand	mg/l	94	118	134	76
14	Biological oxygen demand	mg/l	34	39	53	31
15	Total suspended solids	mg/l	90.0	130	138	60
18	Total coliform	Count/100 ml	4*10 ⁶	5*10 ⁶	7*10 ⁶	2*10 ⁶

Appendix IV: Air quality and Noise measurement Data

Appendix IVa: The recorded PM 2.5 and PM 10 concentrations levels

Location	Site and GPS Coordinates	Temperature (°C)	Dust µg/m ³ (for 15mins)		
			PM _{2.5}	PM ₁₀	TSP
Cafeteria	Latitude:-6.765598 Longitude: 39.215858	28	24.4	36.2	2034
Roadside (along the University Road)	Latitude: -6.767259 Longitude: 39.214446	28	21	29	1674
New hostel	Latitude: -6.767259 Longitude: 39.214446	32	16.2	25.1	1222
Near DAWASA water tank	Latitude: -6.762638 Longitude: 39.218864	30	23.4	31.8	2561
Near Dispensary	Latitude: -6.766040 Longitude: 39.208965	32	16.2	24.1	1501
Local standard: TZS 837 Parts 1, 2 and 3 (EMR , 2007) [µg/Nm ³]			n.m	60-90	
International Standard WHO: [2005] [µg/Nm ³]			25	50	

Source: Field Results, 18th August 2021

Appendix IVB: Average values of measured parameters compared with local and/or international standards

UNITS	Measured Parameters				
	CO ₂	CO	O ₂	SO ₂	H ₂ S
	ppm	mg/m ³	%	ppm	mg/m ³
Cafeteria	919	0	21	1.2	0
Roadside (along the University Road)	420	0	24.9	0.5	0
New hostel	412	0	21.8	0	0
Near DAWASA water tank	400	0	20.9	0	0
Near Dispensary	418	0	21.6	0	0
Local standard: TZS 837 (EMR , 2007) [µg/Nm ³]	-	100 mg/Nm ³ for 15 minutes	0.21	0.5 mg/Nm ³ for 10 minutes	n.m
International Standard WHO: [2005] [µg/Nm ³]	-	n.m	0.21	500 for 10 minutes	n.m

Source: Field Results, 18th August 2021

Appendix IVc:Noise Levels

Location	Site and GPS Coordinates	Average Noise, dB	Temperature (°C)	Humidity %
Cafeteria	Latitude:-6.765598 Longitude: 39.215858	52.2	28	65
Roadside (along the University Road)	Latitude: -6.767259 Longitude: 39.214446	69.1	28	62
New hostel	Latitude: -6.767259 Longitude: 39.214446	43.35	32	52
Near DAWASA water tank	Latitude: -6.762638 Longitude: 39.218864	57.4	30	54
Near Dispensary	Latitude: -6.766040 Longitude: 39.208965	49.87	32	53
Standard		55		85

Source: Consultant Analysis, 18th August 2021