ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED ESTABLISHMENT OF UDSM – KAGERA CAMPUS ON PLOT NO. 02, 07, 08 & 10, BLOCK "A", ITAHWA AND KANGABUSHARO VILLAGES, KARABAGAINE WARD, BUKOBA DISTRICT, KAGERA REGION

PROJECT PROPONENT:

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EXECUTIVE SUMMARY

INTRODUCTION

The University of Dar es Salaam (UDSM), being the oldest higher learning institution in Tanzania, was established in 1961 with the aim of, among others, improving people's living standards by stimulating growth and increased productivity in critical productive sectors of the economy through research and supply of qualified human workforce. The Government and other support institutions, including development partners, have, over the years, invested at the University precisely in the desire to enable it not only to create and propagate the highest possible levels of knowledge but also to inculcate the knowledge and skills so created into the learners under their charge. The use of knowledge and skills created industrialisation agenda by the University could dramatically contribute to the current national industrialization agenda, which is aimed at creating new economic activities such as increasing farm productivity, identifying new markets for farm products, creating new enterprises based on traditional craft industries and diversification of rural economies.

The University of Dar es Salaam has also aligned its strategic objectives with the National Five Year Development Plan (FYDP)-III for 2021/22-2025/26, which aims at transforming the economy with the view to continue to build a Competitive and Industrial Economy for Human Development to achieve the objectives of the Vision 2025 with the following qualities: improving the living conditions of Tanzanians; the existence of peace, security and unity; good governance and the rule of law; the existence of an educated and learning society; and building a strong and competitive economy.

In pursuing recognition and excellence in its core functions of research, teaching and learning, and integrating engagement with society and communities into these, the University of Dar es Salaam (UDSM) is implementing a Higher Education for Economic Transformation (HEET) project under the support of the Government of Tanzania through World Bank. Under the HEET project (P166415), the University of Dar es Salaam (UDSM) has received financial support from the World Bank (WB) through the Ministry of Education, Science and Technology (MoEST) to establish a campus in the Kagera region.

The project will involve site clearance and excavation activities as a prerequisite to constructing new buildings. Building construction and associated activities will inevitably have environmental, social, and economic impacts, which need to be identified, and mitigation measures should be put in place to ensure the sustainability of the project. The World Bank Environmental and Social Standards, especially ESS1 and the Environmental Management Act of 2004 of Tanzania-Third Schedule to Environmental Management Act, Cap 191 and First Schedule to Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, requires project proponents/developers to carry out an Environmental and Social Impact Assessment (EIA) prior to project implementation.

PROJECT DESCRIPTION

The proposed projects shall be located on plot No. 2, 7, 9 and 10 in Block 'A", Itahwa and Kangabusharo villages, Karabagaine ward, Bukoba District, Kagera Region, Tanzania. The project covers a vast area of 315 acres (on four interlinked plots). It will be situated on four plots, two extensively bordered by streams and wetlands. The new UDSM campus is approximately 10 kilometres southwest of the centre of Bukoba District.

The proposed project area is human-modified, with open grassland, scattered bushes, exotic trees (pine woodlot), and patches of indigenous tree species. Several passable roads traverse the project area throughout the year, and an electrical transmission line (33kV) crosses plot number 2. Also, the site is surrounded by streams and wetlands, serving as a year-round water source for the villagers. There are social services available close to the site, including Itahwa Primary School, Kwauso Secondary School, and a newly constructed dispensary. The topography of the site is characterised by an undulating plain sloping gently downward from South to North and then towards the Western side of the site.

BASELINE CONDITIONS

The project area in Bukoba district, Lake Victoria basin, has a tropical rainforest climate with two rainy seasons and an annual rainfall of about 1,938.5 mm. Altitude ranges from 700 m to 1200 m, affecting temperature. High humidity, averaging 68.83%, varies monthly. High humidity can weaken concrete structures and promote microbial growth, influencing building design. The area is drained by two streams, Rwamrumba and Kilele, flowing into Lake Victoria, with water quality issues. The campus site features a wet zone during the rainy season, needing proper drainage for about 1650 sqm of waterlogged area. The Campus habitat can be categorised as mixed, reflecting open grasslands, scattered bushes, exotic trees like pine woodlots, and patches of indigenous tree species. Notably, a significant portion of the campus is covered with grasses and features exotic plant species.

The ambient dust levels in the project area (Bukoba district) showed PM2.5 and PM10 concentrations below Tanzania and WHO standards. Gaseous pollutants NOx, SOx, and CO were below detectable limits, indicating good air quality. Noise levels were within permissible limits, mainly from intermittent sources like wind and passing vehicles. Climate change impacts in Tanzania include rising temperatures and rainfall variability, which influence water levels in major water bodies in the area. The country has negligible GHG emissions, mainly from Land Use, Land-Use Change, and Forestry (LULUCF). Climate change affects various sectors, including energy, transport, water, and trade, posing significant challenges to disaster management and vulnerable populations.

The proposed project site in Bukoba District exhibits diverse land cover characteristics, including rocky outcrops, soil-covered areas, springs, streams, and various vegetation types. An existing road network connects nearby villages, and electricity infrastructure is already in place. The site features dense shrubbery, which will require clearing and levelling for construction. In terms of land development, the proposed UDSM Kagera Campus is expected to stimulate growth in the region, especially in trading centres.

The topography is diverse, with varying elevations from 1151 to 1352 metres above sea level (m.a.s.l). Natural valleys on the site present opportunities for stormwater drainage and rainwater harvesting systems. Soil composition primarily consists of sandy soils originating from quartzite rock weathering, with deeper layers suitable for construction. However, soil erosion, particularly rill erosion, poses a concern, and soil conservation measures are essential to mitigate risks.

The geological features in Bukoba District are influenced by the East African Rift System, with exposed Precambrian rock formations, including quartzite, in higher elevated regions. Potential natural disasters, such as earthquakes, have occurred in the region, emphasizing the need for earthquake preparedness and mitigation measures in project planning. The ESIA study plays a crucial role in assessing and addressing these environmental factors to ensure the safety and sustainability of the proposed UDSM Kagera Campus.

POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

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

i. Environmental Management Act No. 20 of (2004)
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. Occupational 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)

This ESIA study has also complied with the following tools:

i. World Bank's new Environmental and Social Framework (ESF);
ii. The World Bank Environmental and Social Safeguarding Policy for Investment; and
iii. WB relevant Environmental and Social Standards.

This ESIA study has applied five relevant standards out of 10 Environmental and Social Standards (ESSs), which are:

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

STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

The main stakeholders include:

i. Kagera regional office (RAS, Environment, Natural Resources), Bukoba District Secretariat,
ii. Bukoba District Council (DED, Environment, Agriculture, Natural Resources, Community Development Officer, Land Planners, Engineers),
iii. Ministry of Education Science and Technology (MoEST))
iv. Occupation and Safety Authority (OSHA) - Bukoba Office and
v. Tanzania Fire and Rescue Force-Kagera Region
vi. The Bukoba Police Office
vii. Tanzania Building Agency (TBA)
viii. Bukoba Water Supply Authority under the Lake Victoria Basin Water Board (LVBWB),
ix. Tanzania National Electric Supply Company (TANESCO),
x. The Tanzania National Roads Agency (TANROADS) and Tanzania Rural and Urban Roads Agency (TARURA),
xi. Kwauso Secondary School
xii. Bukoba water supply and sanitation Authority (BUWASA)
xiii. The Itahwa villagers
xiv. Kangabusharo villagers
xv. Ibaraizibu villagers
xvi. Karabagaine ward

Key issues for the proposed UDSM Kagera Campus project include assessing its compatibility with the Bukoba Master Plan, managing construction-related dust, noise, and emissions, preparing for an influx of people, planning for stormwater drainage, and addressing liquid waste management. Additionally, there is a concern about the potential risk of sexually transmitted diseases and HIV/AIDS due to an influx of people from various areas. Safety measures, including health awareness and health facilities, road safety and fire-fighting systems, are vital in ensuring the health and safety of workers during construction and operation. Lastly, the project aims to provide employment opportunities for the local community.

ASSESSMENT OF IMPACTS

Environmental risks and impacts assessment done included: (i) those defined by the WB Environmental Health and Safety Guidelines, EHSGs; (ii) those related to community safety; (iii) those related to climate change (iv) any material threat to the protection, conservation, maintenance and restoration of natural habitats and biodiversity; and (v) those related to ecosystem services and the use of living natural resources; and (vi) those related to the design of the physical facilities. 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 the project

Impacts associated with the mobilization and construction phase

i Generation and Accumulation of Solid Waste at the Site;
ii Creation of Noise Pollution/Auditory Nuisance;
iii Dust Emission and Air Quality Degradation;
iv Soil Erosion and Land Degradation;
v Fire outbreak and Other Related Environmental Disaster;
vi Contamination for poor management of liquid waste;
vii Health and Safety of workers, and
viii Employment and other Socio-economic benefit;

Impacts Associated with Operation Phase

i Employment opportunities;
ii Increased skills and impart knowledge to local communities
iii Population increases and increased pressure on social services
iv Child labour and incidence of GBV/SEA/SH
v Increased transmission of STDs, COVID, etc.
vi Increase in the level of crimes and conflicts
vii Change in social values and ethics
viii Increase of academic facilities in Kagera
ix Increase in revenue to the government;
x Increased solid and liquid waste;
xi Increased Effluent waste and Surface/Storm Runoff Generation;
xii Increased Risk to Safety and Health;

xiii Increased traffic jams;

xiv Fire risk.

xv Increased commercial and social activities around project locations

Impacts Associated with the Decommissioning Phase

i Employment Opportunities;

ii Livelihoods and Economic Loss;

iii Solid Waste Generation;

iv Excessive Noise and Vibration pollution;

v Dust and Exhaust Emissions;

vi Occupational /Public Health and Safety Hazards;

vii Displacement of patients, tenants and workers;

viii Accidental spills and

ix Abandoned Structures

MITIGATION MEASURES

The design of the mitigation measures for the identified Environmental and Social impacts applied the following mitigation hierarchy 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 proposed are essentially good engineering practices that should be adhered to throughout all project phases.

Potential mitigation measures during the construction phase

Negative Social Impacts

i. Institute good site practices, including preventing public access to the construction site by securing equipment and demarcating, excavating, and 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 laws and standards;
iii. Provide more avenues for service providers, e.g. cafeterias and restaurants
iv. Constructions of police stations at the campus
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 a 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. UDSM will regularly monitor project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law.

Negative Environmental Impacts

i. Equipment shall be maintained in good running condition, and equipment which generates 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 adequately treated using the Septic soak-away system, Up-flow anaerobic sludge blanket (UASB), and wetland system. Only effluents complying with TZS Standards will be discharged into the receiving water body.
ix. The contractor shall have adequate facilities for handling the construction waste;
x. Construction will be done as per the engineering design and procedure, in which a maximum requirement of compaction strength is achieved during the construction. That is the maximum dry density (MDD) specified in the design manual by the 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 for 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 a 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. UDSM will regularly monitor project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law.
v. Provide more avenues for service providers, e.g., cafeterias and restaurants.
vi. Constructions of outpost police stations at UDSM Kagera Campus to strengthen security service;
vii. The cooperation of local people together will help to lessen criminal incidents and maintain the security of people and their properties.

Impacts on the physical environment

i. Septic –soakaway system, UASB and wetland shall be designed in such a way waste treatment is achieved by 100% before disposal to the receiving water body;
ii. The design of stormwater 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

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

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 a base material for new construction work;
ii. All the necessary health and safety measures will be implemented, including the provision of personal protective equipment such as safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors;

ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PLAN

The Impact Management Plan for the proposed project is focused on implementing mitigation measures. The plan includes details such as institutional responsibilities, action timelines, monitoring frequencies, and estimated costs. During the construction phase, the contractor will implement the Environmental and Social Management Plan (ESMP) under the supervision of UDSM Management. The UDSM Estate Department will ensure that UDSM staff and students are aware of the project's implementation and oversee the contractor's

compliance with the ESMP. UDSM Management will take charge of ESMP implementation during the operation phase and prepare a decommissioning plan when needed. The environmental and social costs, primarily associated with mitigation measures, are to be covered by UDSM, as indicated in Table 8.1.

The Health and Safety Management Plan focuses on implementing and improving safety according to OHSAS standards. Responsibilities include management's commitment to safety, supervisor oversight, and employee awareness. Training and coordination are key, with assembly points during emergencies and rescue plans. Firefighting measures are in place, and work resumes only after an "all clear" signal.

ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

The monitoring program for the proposed UDSM Kagera Campus project involves four types of monitoring: baseline, impact/effect, compliance, and mitigation monitoring. It aims to track various environmental and social parameters during the construction, operation, and decommissioning phases. This includes monitoring noise levels, air quality, health and safety compliance, groundwater quality, community safety, and more. Different responsibilities are assigned for each phase, with the contractor's safeguard team handling construction phase monitoring, the UDSM Estate Department overseeing operation phase monitoring, and the UDSM itself responsible for decommissioning phase monitoring. The program ensures adherence to health and safety regulations, assesses cumulative impacts and monitors key environmental and social parameters to facilitate improvements in the project's environmental and social management system. Estimated costs for monitoring activities are provided, and the responsibility for covering these costs is specified, with some costs to be included in the project budget.

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 the environmental impacts of decommissioning works cannot be proposed with a reasonable degree of certainty at the moment. The developer shall prepare a decommissioning plan that considers environmental issues before the decommissioning works. Should it be done, decommissioning may entail a change of use (functional changes) or demolition triggered by the change of land use.

PROJECT COST-BENEFIT ANALYSIS

The implementation of the proposed new buildings project at UDSM will have costs for the community, government, and the environment. For instance, communities may have inherent noise-related costs, air quality impairment, 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 direct and indirect benefits for the

university, neighbours, and the government. The benefits of the project are experienced in all phases, from mobilization, construction, and operation to the decommissioning phase. Several benefits are associated with the proposed development at the local and national levels regarding revenue generation and the multiplier effects associated with linkages with the local and national economies. However, building construction projects may generate negative benefits, which are usually minimal compared to the positive ones. Some of those benefits are non-quantifiable and thus cannot be used in the cost-benefit analysis estimations.

SUMMARY AND CONCLUSION

The proposed project will contribute to socio-economic benefits for both UDSM and the nation. Socio-economic benefits include the creation of employment opportunities and increased income for UDSM and the country as a whole. On the other hand, the proposed project will entail some adverse environmental impacts, for which adequate mitigation measures have been proposed and incorporated into the project design. The environmental impacts identified from this project include but are not limited to increased noise levels, increased dust levels, waste management problems, storm water generation and safety and health risks.

Therefore, it is concluded that the proposed UDSM 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. UDSM will implement all the recommendations given in this ESIA and carry out the environmental auditing and monitoring schedules.

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ACKNOWLEDGEMENTS

University of Dar es Salaam wishes to thank all the people who contributed to the preparation of this Environmental and Social Impact Assessment report. In particular, UDSM would like to thank the Local Government Authority in Bukoba District and Kagera Region at large for their support, advice and guidance on the proposed project. The University also wishes to thank all government ministries, agencies, utility providers and private institutions in Bukoba District and Kagera Region who provided input during the preparation of this report. Without the support of these institutions, much of the information that is presented in this report would not have been gathered.

Further, the University acknowledges the work done by the ESIA team, which comprised of registered experts Dr. Nicholaus Mwageni (ESIA Team Leader); Mr. Emmanuel Hanai (Environmental Expert), Professor Joel Norbert (Water resources Engineer) and Dr. Noah Makula Pauline (Environmental and Social Expert); and non-registered experts who is Mr. William Mremi (Hydro and Environmental Geologist). The ESIA team was backed by other teams of experts consisting of Planners, Surveyors, Engineers, and Quantity Surveyors.

ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BATNEEC	Best Available Technology Not Entailing Excessive Cost
CRB	Contractors Registration Board
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
GHGs	Green House Gases
GOT	Government of Tanzania
HIV	Human Immunodeficiency Virus
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
LULUCF	Land Use Land use –change and Forestry
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non-Governmental Organisation
RHA	Risk Hazard Assessment
STD	Sexually Transmitted Diseases
TANESCO	Tanzania Electricity Supply Company
TCU	Tanzania Commission for Universities
ToR	Terms of Reference
UASB	Up-flow anaerobic sludge blanket
UDSM	University of Dar es Salaam
URT	United Republic of Tanzania
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The University of Dar es Salaam (UDSM), being the oldest higher learning institution in Tanzania, was established in 1961 with the aim of, among others, improving people's living standards by stimulating growth and increased productivity in critical productive sectors of the economy through research and supply of qualified human workforce. The Government and other support institutions, including development partners, have, over the years, invested at the University precisely in the desire to enable it not only to create and propagate the highest possible levels of knowledge but also to inculcate the knowledge and skills so created into the learners under their charge. The use of knowledge and skills created by the University could contribute significantly to the current national industrialization agenda, which is aimed at creating new economic activities such as increasing farm productivity, identifying new markets for farm products, creating new enterprises based on traditional craft industries and diversification of rural economies.

The UDSM has set its strategic objectives in alignment with the National Five-Year Development Plan (FYDP)-III for 2021/22-2025/26. This plan aims to transform the economy and foster a competitive and industrial economy for human development while working towards the Vision 2025 goals. These objectives include improving the living conditions of Tanzanians, promoting peace, security, and unity, upholding good governance and the rule of law, cultivating an educated and learning society, and building a strong and competitive economy.

UDSM is committed to achieving recognition and excellence in its core functions of research, teaching, learning, and community engagement. To further this goal, UDSM is actively implementing the Higher Education for Economic Transformation (HEET) project, with support from the Tanzanian Government and the World Bank. This ambitious five-year project is aimed at promoting higher education as a driving force behind Tanzania's new industrial-based economy. Under the HEET project (P166415), the World Bank, in collaboration with MoEST, is providing vital financial assistance to establish a campus in the Kagera region. This strategic initiative is part of the broader vision of the UDSM to expand its influence and make significant contributions to the socio-economic development of the region.

HEET's main objective is to revitalize and expand the capacity of universities, including UDSM, to play a pivotal role in innovation, economic development, and the relevance of the labour market. To achieve this, the project focuses on investing in modern and effective teaching and research infrastructure, providing universities with the tools and resources to make meaningful advancements in various sectors. By leveraging the opportunities presented

by the HEET project, the (UDSM) aims to strengthen its role as a catalyst for the country's economic transformation. Through research, education, and community engagement, UDSM is actively contributing to the growth and prosperity of Tanzania's new industrial era. This concerted effort enhances the UDSM reputation and aligns with the national sustainable development and prosperity agenda.

The Kagera campus project scope encompasses the construction of various essential facilities, including the administration block, lecture rooms, an undergraduate students' hostel block, a students' cafeteria block, a dispensary, and associated infrastructure such as roads, external fence, water distribution network, sewage network, power distribution network, and fibre optic network. The proposed UDSM Kagera campus will be situated in Karabagaine ward within Bukoba District Council (Bukoba DC) and will cover a vast area of 315 acres. The total investment cost for this project is estimated to be TZS 3,000,000,000 (3 billion TZS).

The proposed project involves the construction of new buildings, necessitating various site excavation activities. Recognizing the potential environmental, social, and economic impacts associated with construction, it is crucial to identify and implement appropriate mitigation measures to ensure the project's sustainability. To comply with the World Bank Environmental and Social Standards (specifically ESS1) and Tanzania's Environmental Management Act of 2004, project developers must conduct an Environmental and Social Impact Assessment (ESIA) before commencing the project.

UDSM has assembled a team of qualified environmental experts to conduct this detailed ESIA study to fulfil this requirement. The study aims to identify potential impacts, propose effective mitigation strategies, and promote sustainable development for the proposed project. This ESIA report plays a critical role in obtaining the necessary approvals from relevant authorities, ensuring that the project proceeds in an environmentally and socially responsible manner.

1.2 Project Rationale

UDSM is well-positioned to capitalize on the opportunities presented by the National Five-Year Development Plan (FYDP III) for 2021/22-2025/26 and the national Higher Education for Economic Transformation (HEET) project for 2021/22-2025/26. These strategic frameworks provide a conducive environment for UDSM to expand its Training and Learning Infrastructure and increase student enrolment.

UDSM has developed a comprehensive Corporate Strategic Plan 2014-2023, which is centred on seven key goals. These goals are directly in line with the University's vision for 2061, aiming to position itself as a prominent Centre of Intellectual Wealth, leading Tanzania and Africa towards sustainable and inclusive development. The University emphasizes the significance of establishing new campuses in up-country regions as part of its strategic alignment. This strategic move aims to strengthen training and learning infrastructure and effectively address the increasing demand for quality education.

By proactively aligning with national policies and visionary plans, the University of Dar es Salaam seeks to play a pivotal role in nurturing intellectual growth and contributing significantly to the advancement of Tanzania and Africa as a whole. Through this approach, the University is poised to drive positive socio-economic transformation and support the long-term sustainable development of the nation and the continent.

Through the implementation of the HEET project, UDSM aims to produce a steady supply of high-quality graduates who possess the skills and knowledge required to thrive in the dynamic labour market. These graduates will play a crucial role in driving economic development and supporting the nation's growth objectives. Moreover, the proposed project at UDSM will boost educational opportunities and create numerous employment prospects throughout its duration. By harnessing these opportunities, the University seeks to contribute significantly to the socio-economic advancement of Tanzania.

1.3 Project Objectives

1.3.1 **Objectives of the HEET Project**

As per the HEET Project Appraisal Document (PAD, 2021), the project's primary aim is to enhance the learning environment, align the labour market with priority programmes at beneficiary higher education institutions, and improve the management of the higher education system. This aligns well with the UDSM Vision 2060 and its strategic plan.

Before beginning the proposed project, World Bank regulations and Tanzanian laws require an Environmental and Social Impact Assessment study. The study must comply with the World Bank Environmental and Social Framework and Tanzania's National Environmental Management Act (Cap. 191) and its subsequent Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulation of 2018.

The project beneficiary must comply with the World Bank Environmental and Social Framework (ESF) and Standards, as well as the Environmental Impact Assessment and Audit Regulations (GN) No. 474 of 2018, to prepare the ESIA report. The report covers the project's nature, location, processes, materials, by-products, and disposal. It assesses the project's environmental and socio-economic impact on the local community and the nation.

1.4 Need for ESIA Study

The primary purpose of this ESIA study was to proactively assess and analyse all the potential environmental, social, and economic consequences of the proposed construction project before its actual implementation. The study has taken a comprehensive approach to addressing various social, economic, and environmental aspects related to the project, resulting in the formulation of a well-structured mitigation plan to prevent or minimize any adverse impacts.

Throughout the ESIA study, the consultant diligently collected detailed data on the physical, biological, and socio-cultural elements of the project area. This valuable information was then utilized to make informed predictions about the potential impacts of the proposed activities and to devise appropriate mitigation measures. Additionally, the study has integrated monitoring programs to effectively track and analyse any changes that may occur after the construction and utilization of the buildings.

1.5 Objective of the ESIA Study

The EIA study comprehensively covers all environmental and social aspects related to the establishment of the UDSM Kagera Campus. This EIA study was conducted in line with the World Bank Environmental and Social Frameworks and Standards and the National Environmental Impact Assessment and Audit (Amendment) Regulations 2018, which were formulated to enforce the Environmental Management Act No. 20 of 2004. It is essential to note that the Environmental Management Act mandates the mandatory conduction of ESIA for development projects undertaken in Tanzania. Given that the proposed project falls under category 'A', it necessitates the mandatory EIA study.

1.6 Scope of Work

This study entailed the following: -

i. Provide a detailed description of the project, including its location, design, components, and planned activities.
ii. Review policies, legislation, standards, and regulations governing international, regional, and local environmental matters to ensure compliance and promote sustainability.
iii. Collect, evaluate, and present baseline data on the environmental and social characteristics of the project area to understand the existing conditions and potential impacts.
iv. Conduct consultations with government agencies, local communities, and private sector entities near the project area to gather valuable insights and foster collaboration.
v. Assess and quantify potential environmental impacts resulting from the buildings' development, with a focus on the project's zone of influence.
vi. Explore and describe alternative approaches considered during project development to identify the most viable and sustainable path forward.
vii. Develop a comprehensive Environmental Management Plan (EMP) outlining actions and responsibilities for mitigating impacts and monitoring environmental performance.
viii. Promote responsible environmental practices throughout the project's implementation and operation to safeguard the environment and support sustainable development.

1.7 Approach and Methodology of the ESIA Study

The ESIA study being a multidisciplinary endeavour required the collaboration of a team of experts, with key roles filled by an ESIA Expert (Team Leader), Environmental Engineer, Hydrologist, Environmental expert, Botanist, Air Quality and GIS experts, Geologist and Sociologist. This diverse team worked collectively to identify key stakeholders and potential social and environmental impacts, both positive and negative. Throughout the study, the following methodologies were employed:

1.7.1 Desk Study

During the desk study phase of this ESIA work, a multidisciplinary team of experts conducted an in-depth analysis by reviewing and identifying relevant Tanzania policies and laws related to the proposed construction of the UDSM Kagera campus. Existing reports, including design studies, geotechnical surveys and project documents, were gathered and carefully examined to gain insights into the project's context and potential implications.

Extensive data on the physical, social, economic, cultural, and archaeological aspects of the project area were collected and thoroughly assessed. The team worked diligently to identify key issues that needed to be addressed in both the scoping report and the main ESIA study, ensuring a comprehensive and systematic approach to the assessment.

Various measures were taken in preparation for the fieldwork, including proactive communication with stakeholders. Phone calls, emails, and official letters were employed to notify stakeholders of the impending ESIA study and request their cooperation and valuable input.

The desk study laid a solid foundation for the forthcoming fieldwork and assessments, ensuring that the ESIA report would be well-informed, compliant with regulatory requirements, and geared towards promoting sustainable project development.

1.7.2 Fieldwork

The field visits played a pivotal role in understanding the project scope and potential impacts. In July 2023, the ESIA team visited the Kagera Region (Bukoba) to gather essential physical and socio-economic data crucial for the assessment.

The primary objective of the fieldwork was to acquire detailed information and data on the physical, biological, and socio-economic aspects of the project site and its surrounding areas. By collecting thorough data during the scoping phase, the study team assessed whether additional and more detailed information on environmental conditions was required and identified potential sources for obtaining such data.

The field visits were instrumental in defining the scope of the ESIA, ensuring that all relevant factors and potential impacts were thoroughly evaluated. By physically visiting the

site and its surroundings, the ESIA team could directly observe and record key information, enabling them to make accurate and informed assessments.

During the fieldwork, extensive interactions were held with local communities, local authorities and relevant stakeholders to gain insight into their perspectives and concerns. This participatory approach allowed the study team to incorporate local knowledge and considerations into the assessment, ensuring a holistic understanding of the project's potential impact.

Measurement of Baseline Air Quality Data

The ESIA team conducted a comprehensive collection and analysis of baseline air quality and noise levels at the proposed construction area of UDSM Kagera Campus and adjacent areas within the University Campus. To ensure a representative assessment, the team strategically selected Four (4) sampling locations based on the plots of the project area.

For the assessment of air quality, the team employed rigorous sampling and analysis methodologies for ambient air quality and noise levels. The sampling process was meticulously conducted to capture comprehensive data that accurately reflected the prevailing environmental conditions.

To ensure the reliability of the collected data, the sampling activities were conducted during the busiest day and hours (from 10 am to 2 pm). This specific timeframe was chosen to assess potential air quality conditions during the construction phase, which is expected to be the busiest period with maximum operational activities. While statistical data analysis is commonly used for such assessments, it was recognized that the variation in activities throughout the day could lead to misleading predictions. Therefore, the ESIA team opted for direct observations during peak operational hours to better understand air quality conditions.

By meticulously conducting air quality and noise level assessments and considering relevant meteorological parameters, the ESIA team aimed to provide comprehensive and reliable data to inform decision-making processes. The findings from these analyses will be instrumental in developing appropriate mitigation measures to ensure the project's compliance with environmental standards and promote sustainable development within the University Campus.

Measurement of ambient dust levels (PM2.5 and PM10)

Dust levels were measured in terms of $PM_{2.5}$ and PM_{10} using a portable device, the Temtop M2000C. During measurements, the device was mounted at a breathing height of approximately 1.5 meters above the ground, and samples were collected.

Measurement of Ambient gaseous pollutants

Baseline levels of ambient pollutant gases were measured using a FD-4S Portable Multi-Gas Detector. Parameters measured included carbon monoxide (CO) in parts per million (ppm), NOx, SOx and Oxygen (O_2) in %. At the sites, the equipment was mounted 1.5m above the ground. Three readings were collected at each sampling point, and the mean value was used to represent that particular point. Results were compared with local and international standards.

Collection of biological information

The survey conducted for the ESIA study utilized a qualitative approach, primarily relying on field observations. The team used a car for transportation to cover the proposed project site. However, in areas where the car could not access, an ocular survey was carried out on foot to ensure comprehensive coverage. Vegetation types were classified based on their physiognomic characteristics. Expert botanists conducted direct plant species identification in the field, employing various plant identification books such as the Flora of Tropical East Africa series and reports specific to coastal forest vegetation, particularly those from Frontier Tanzania expeditions.

In cases where certain plant species were challenging to identify on-site, plant specimens were collected and carefully pressed. These specimens were then taken to the herbarium of the University of Dar es Salaam for further identification and preservation, facilitating future references and research.

To identify any plant species falling under the categories and appendices of the CITES list (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and the IUCN (International Union for Conservation of Nature) Red List of Threatened Plant Species, the ESIA team referred to existing documents. This ensured that special attention was given to endangered or threatened plant species within the study area.

To document the findings visually, a digital camera was employed to photograph significant plants and vegetation types, providing further illustrative support for the study. Also, GPS technology was utilised to mark and record various important points accurately during the survey. By employing a thorough and comprehensive approach to vegetation assessment, the ESIA study aimed to identify any potential environmental impacts on the existing flora and contribute to preserving and conserving important plant species within the project site's development.

Water samples collection

During the ESIA field visit, the team collected water samples from five specific locations, as detailed. Small streams were observed flowing in various places within and outside the proposed project site. To ensure a comprehensive understanding of the water quality, the

selection of these sampling locations took into consideration the unique distribution of these streams, covering both downstream and upstream areas.

The primary objective of these water sampling locations was to obtain a comprehensive overview of the water quality in and around the proposed project site. By considering the specific distribution of these streams, the team aimed to establish a reliable baseline of the water quality, providing valuable insights into the environmental conditions of the site and its surrounding areas.

Subsequently, the collected water samples were carefully analysed at the accredited Bukoba District Laboratory. This laboratory possesses the necessary expertise and facilities to conduct accurate and reliable water quality analyses. The analyses of these samples aimed to identify any potential contaminants and provide a comprehensive understanding of the existing water quality conditions in the study area. The water analysis results are appended in Appendix III.

Soil samples collection

This ESIA study made effective use of the soil results obtained from a comprehensive geotechnical study conducted by qualified engineers in March 2023. Soil samples were collected at 13 locations, where boreholes were strategically utilized to access soil samples for a thorough soil investigation.

The team of engineers carefully selected the soil sampling points using satellite imagery to facilitate accurate analysis and classification for construction purposes. The collected soil samples underwent rigorous analysis at the University of Dar es Salaam College of Engineering.

The soil analysis results provided crucial insights into soil physical properties, classification, and bearing capacity, all of which are pivotal considerations for the successful execution of the proposed project.

Collection of socio-economic data

Primary and secondary data collection methods were employed during the ESIA study. Primary data was acquired through on-site observations, focus group discussions, village meetings and semi-structured interviews conducted with relevant and targeted stakeholders, as elaborated in the preceding section. On the other hand, secondary data was gathered from diverse and pertinent sources, encompassing educational institutions, official records, and various non-official documents. This comprehensive approach ensured a thorough and well-rounded data collection, facilitating an in-depth analysis of the environmental and social aspects of the proposed UDSM Kagera Campus project.

1.7.3 Public participation

The ESIA study recognized the significance of stakeholders involvement and consultation throughout the project life cycle. The stakeholder identification process was conducted through a rigorous and ongoing brainstorming exercise, ensuring the inclusion of all relevant individuals, groups, or institutions that could be impacted by the project or influence its direction. This comprehensive approach aimed to encompass those with vested interests in the project's outcomes.

The study identified and consulted various stakeholders, spanning from community members, local authorities, district and regional stakeholders, policy and decision-makers. Multiple levels of consultation were conducted to gather diverse perspectives and valuable insights. To collect data and information during these consultations, checklists and open-ended discussions were utilized, enabling a thorough understanding of stakeholders' concerns, needs, and expectations.

The ESIA study sought to foster inclusivity, transparency, and responsiveness in the project's planning and implementation by actively engaging with stakeholders at different levels and employing various data collection methods. The valuable inputs gathered from stakeholders played a pivotal role in formulating appropriate mitigation measures and ensuring the proposed project aligns with the needs and aspirations of the communities it serves. The following were the identified stakeholders in this study.

i. Public institutions have an influence on the project. The identified stakeholders in this study were:
    - ❖ Kagera regional office (RAS, Environment, Natural Resources),
    - ❖ Bukoba District Secretariat,
    - ❖ Bukoba District Council (DED, Environment, Agriculture, Natural Resources, Community Development Officer, Land Planners, Engineers),
    - ❖ Ministry of Education Science and Technology (MoEST))
    - ❖ Occupation and Safety Authority (OSHA) - Bukoba Office and
    - ❖ Tanzania Fire and Rescue Force-Kagera Region
    - ❖ The Bukoba Police Office
    - ❖ Tanzania Building Agency (TBA)

ii. Service providers, including:
    - ❖ Bukoba Water Supply Authority under the Lake Victoria Basin Water Board (LVBWB),
    - ❖ Tanzania National Electric Supply Company (TANESCO),
    - ❖ The Tanzania National Roads Agency (TANROADS) and Tanzania Rural and Urban Roads Agency (TARURA),
    - ❖ Kwauso Secondary School
    - ❖ Bukoba water supply and sanitation Authority (BUWASA)

iii. Project Affected Communities-
- ❖ The Itahwa villagers
- ❖ Kangabusharo villagers
- ❖ Ibaraizibu villagers
- ❖ Karabagaine ward

1.8 Project impact assessment

The environmental and social impact assessment was conducted in collaboration with the design team. Throughout this process, careful evaluation of environmental impacts was carried out for various project alternatives. Multiple options were thoroughly considered, including the possibility of not implementing the project.

The assessment incorporated a fundamental strategy for environmental protection, and environmental considerations significantly influenced the engineering design. Nonetheless, technological feasibility and economic capacity were also given due consideration. The assessment covered a wide range of aspects, including but not limited to the following:

1.8.1 Project impacts identification

During the ESIA process, a detailed analysis of the potential impacts of the project was conducted, considering the existing social and environmental conditions in the area. This involved superimposing the project elements onto the current landscape to identify areas of concern. The checklist method was used to identify key impacts, including noise pollution and waste management issues.

The environmental impact matrix method was applied to assess the significance of various impacts. Throughout the study, we operated on the premise that the project would be designed, constructed, and operated with the highest regard for safety and environmental considerations, using state-of-the-art engineering practices and adhering to the principle of Best Available Technology Not Entailing Excessive Cost (BATNEEC).

A comprehensive Environmental and Social Management Plan (ESMP) was developed to address the identified impacts. This plan outlines a well-structured schedule for implementing mitigation measures to minimize adverse effects and enhance the overall sustainability of the project. By following the guidelines set forth in the ESMP, the project can move forward with due diligence and consideration for both the environment and the local community.

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 on 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

Throughout the ESIA process, our primary focus was identifying any adverse and significant impacts from the proposed project and determining whether they could be managed through design controls. When it was evident that certain impacts could not be adequately addressed through design, we proceeded to develop mitigation measures following the Mitigation Hierarchy. Our approach involved first attempting to avoid or prevent the impacts altogether, followed by efforts to minimize or reduce them. Additionally, we explored opportunities to enhance potential beneficial impacts wherever possible. For any remaining significant or moderate residual impacts, we carefully devised appropriate mitigation measures to ensure that the project could move forward responsibly and in alignment with sustainable development principles.

1.8.4 Environmental Management Plan (EMP)

The developed comprehensive EMP outlines the implementation of mitigation measures, identifies responsible parties, sets up monitoring protocols, and ensures compliance with environmental regulations.

1.9 Report Structure

The report is presented in accordance with the format given in Section 18 (1 and 2) of the Environmental Impact Assessment and Audit Regulations, 2005. This report is structured in the following style:-

i) Executive Summary
ii) Table of Contents
iii) Acknowledgement
iv) List of Acronyms

1. Introduction

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

References

Appendices

CHAPTER TWO

2.0 PROJECT DESCRIPTION

2.1 Location and Accessibility

2.1.1 Location

The UDSM Kagera Campus is located in the northern part of Tanzania within the Bukoba district of the Kagera region (Figure 2.1). Encompassing a vast expanse of 315 acres spread across four interconnected plots, the campus extends over the Itahwa and Kangabusharo villages within the Karabagaine ward. Surrounding the campus are the neighbouring springs and villages: Ibaraizibu, Itahwa, and Kangabusharo. Two of the plots are bordered extensively by streams and wetlands. The new UDSM campus is situated approximately 10 kilometres southwest of the Bukoba District Centre. The reference coordinates for the four plots are as follows:

Plot 7: 1.370731°S, 31.752213°E
Plot 2: 1.367037°S, 31.751761°E
Plot 10: 1.362752°S, 31.746888°E
Plots 8 and 9: 1.371424°S, 31.740314°E

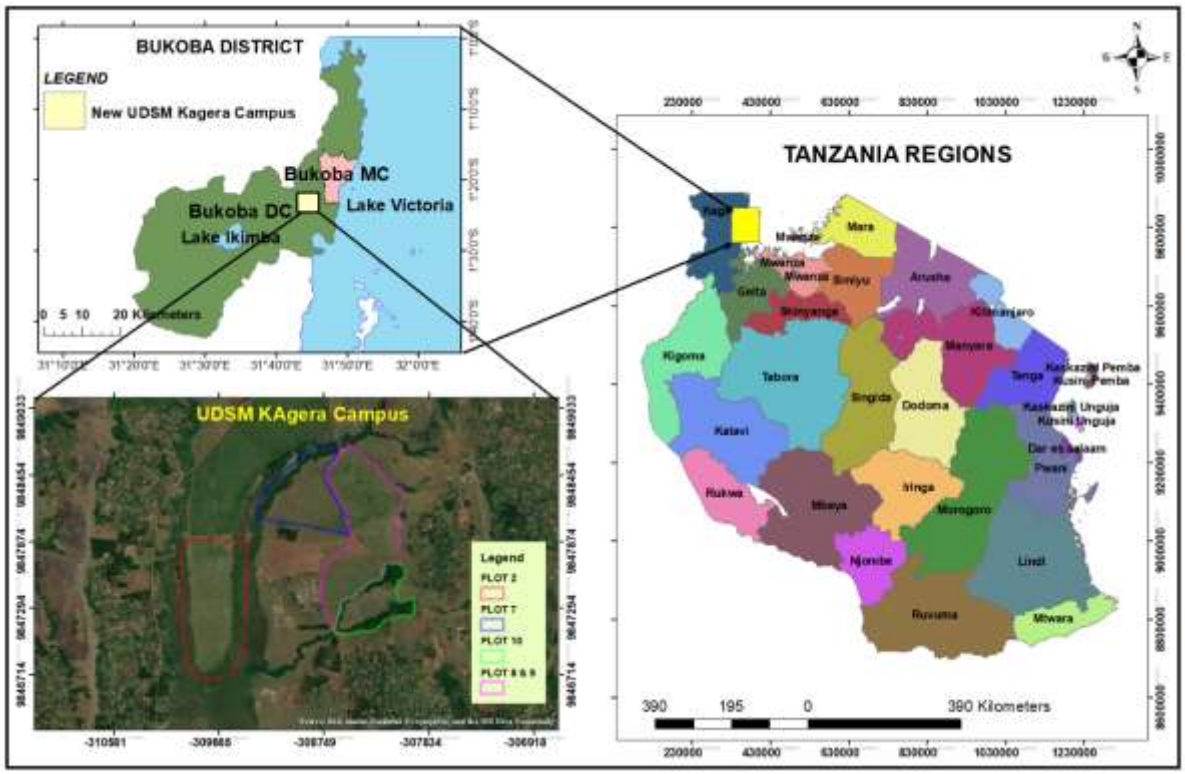

Figure 2.1 A Map showing the proposed site location. Source: Consultant analysis, 2023

2.1.2 Accessibility

The campus is conveniently accessible from Bukoba District town centre and Muleba district in either direction. The site is approximately 10 kilometres to the southwest of Bukoba town and around 8 kilometres in the northeast junction from Katerero junction. The roads leading to the site from the highway are accessible (Maugulu-Mwogo unpaved regional road), but they are gravel and suitable mainly for cars or motorcycles. Adequate transportation options are available for commuting to the campus.

2.1.3 Sites description

The proposed project area is human-modified with an open grassland, scattered bushes, exotic trees (pine woodlot), and patches of indigenous tree species. The proposed UDSM Kagera Campus site covers an area of 315 acres (1.27476 square kilometres), which is contributed by two villages (Itahwa and Kangabusharo). The site is surrounded by the Itahwa village settlement on the eastern and northern part, the Ibaraizibu village on the southern side, and the Kangabusharo village on the west. The area has remained untouched by human activities, with exposed bedrock visible in most elevated areas. The site is bordered by Kwauso Secondary School and an avocado farm, with village lands on other boundaries of the four plots. Its topography is an undulating plain sloping gently from North East to South West.

Several passable roads traverse the project area throughout the year, and an electrical transmission line (33kV) crosses plot number 2 (Figure 2.2). The site is also surrounded by streams and wetlands, serving as a year-round water source for the villagers. Social services are close to the site, including Itahwa Primary School, Kwauso Secondary School, and a newly constructed Dispensary in Itahwa village.

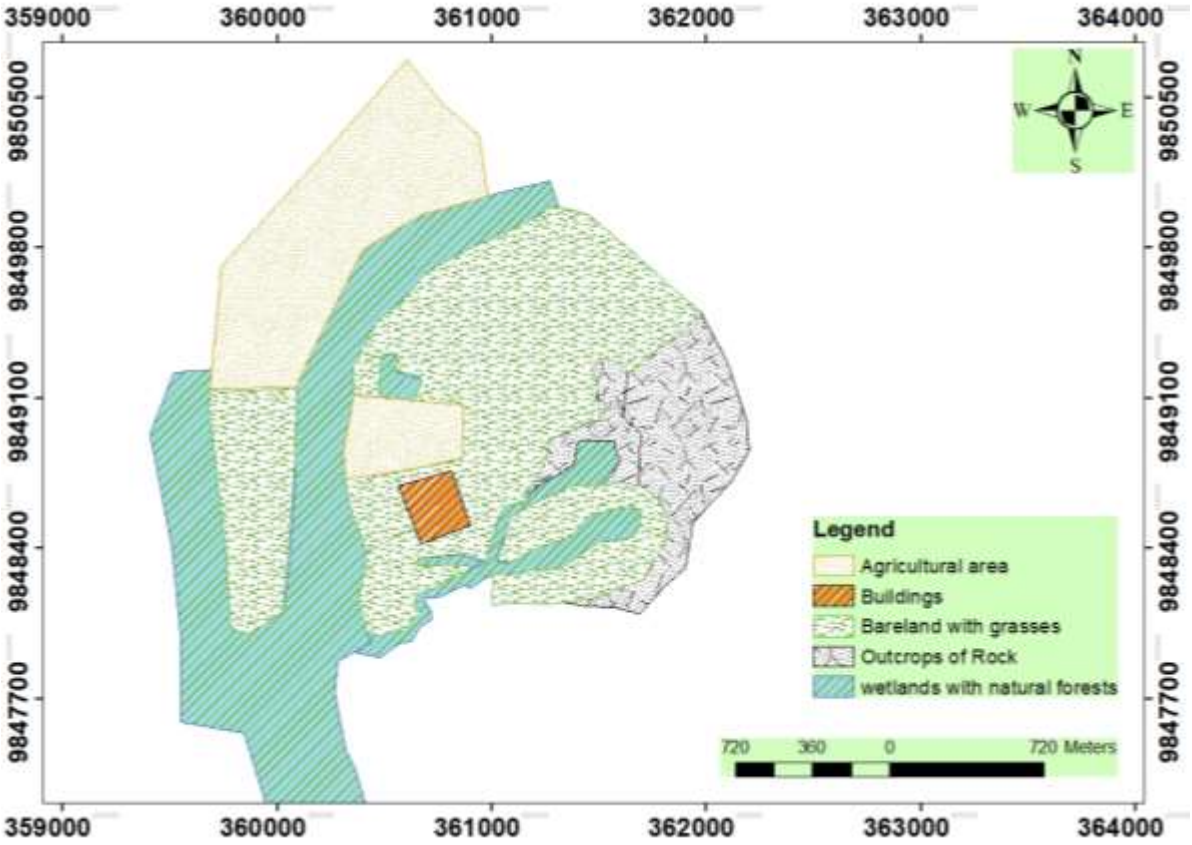

Figure 2.2 Existing features at the proposed project site. Source: Consultant field observation, July 2023

2.2 Land Ownership and Use

The project proponent owns the land with a permanent right of occupancy plot no. 02, 07, 08 & 10, Block "A", Itahwa and Kangabusharo villages, Karabagaine ward, Bukoba District, Kagera region title registration No. 4426, 47674, and 4424 as shown in **APPENDIX 1**. The designated project area primarily serves to erect buildings intended for the new UDSM campus in the Kagera region. According to the city plan, the neighbouring vicinity is earmarked for residential complexes and community amenities, including hospitals, primary and secondary schools, markets, etc.

2.3 Project description

The UDSM Kagera Campus project is an ambitious endeavour to establish essential facilities for higher education and sustainable development in the region. The construction phase includes an administration block, lecture rooms, a hostel, a cafeteria, and a dispensary. Infrastructure development encompasses roads, fencing, water, sewage, power, and fibre optic networks. The 315-acre campus prioritizes academic and recreational activities. Undergoing an Environmental and Social Impact Assessment (ESIA), the project proactively addresses potential issues, ensuring ecological responsibility. The TZS 3 billion investment signifies its impact on education, research, and community development in Bukoba. The ESIA guides

mitigation, stakeholder engagement, and an Environmental and Social Management Plan, aiming to set standards for sustainable educational institutions.

2.3.1 Project Components

Once completed, the proposed project will be a fully functional campus that will accommodate various amenities. The project shall consist of administration buildings, staff accommodation, VIP accommodation, a conference facility, a commercial zone, a College of Engineering and Technology, centres, a College of Natural and Applied Science, a dispensary, a recreational area, a chapel, a mosque, Estate, College of Business Studies, student accommodation, student centre, cafeteria and stationaries, lecture rooms to accommodate 1,720 students at a time, workshops and laboratories.

Also, there will be a fenced wall, security systems, parking lots for staff, students and visitors, a fire fighting system, a power room, toilets, a generator, water storage tanks, storm water drainage systems and garbage collection points. Table 2.1 presents the components of the project.

Table 2.1 Main components of the proposed Buildings

Project components	**Functions**	**Capacity**	**Circulation area**	**Total area (SQM)**
Administration block	Two (2) storey buildings with Offices, pantry, storage, toilets, library, examination room, departmental library, photocopy and printing room, meeting room, staff offices, parking area,	Reception – 1, Nursing room – 3, Waiting area – 10, Admission office – 4, Lecture rooms – 280, Staff office – 90 Break rooms – 24, Computer lab – 72, Lecture theatre – 440, Meeting room – 27 Toilets – 72, Urinals – 20 Parking – 48	2,170.6 sqm	
Dispensary	Office, toilets, reception, drug store, pantry, immunization room, triage, janitor's room, nurse station, consultation rooms (2), dressing room, injection room, sample collection room, observation room, ablution area.	Ladies changing room: 6 Gent's changing room: 6 Doctor's lounge: 3, Consultation room 1: 2 Consultation room 2: 2 Nurse station: 3, Mother and child: 3, Resting room: 1, Kitchenette: 2, Washroom: 4, Testing room: 4, Genitor: 2, Laboratory store: 1, Laboratory: 7, Pharmacy: 3 Waiting area: 10, Dressing room: 4, Office: 2, Reception: 3	69.79 sqm	
Hostel (Male)	Two (2) storey buildings with janitor's office, store, sleeping rooms, courtyard and parking	Cubicle rooms: 4 Disabled cubicle rooms: 2 Washrooms: 16 Warden office: 3 Parking: 30 Cars	356.95 sqm	

Project components	**Functions**	**Capacity**	**Circulation area**	**Total area (SQM)**
Hostel (Female)	Two (2) storey buildings with janitor's office, store, sleeping rooms, courtyard and parking	Cubicle rooms: 4 Disabled cubicle rooms: 2 Washrooms: 16 Warden office: 3 Parking: 30 Cars	356.95 sqm	
Waterworks	A system of five vertical flow-constructed wetlands, utilizing filter media composed of gravel, aggregate, and sand, is integrated with native microphytes available in the vicinity. This system is designed to treat effluents that are free of solids, which are channelled downstream via a solid-free sewer line. The initial retention and treatment of solids are managed by septic tank systems installed within each respective building.	68.25 m^3/day	1500 m^2	2500 m^2
Cafeteria		Bank and ATM – 6 Shop – 4 Mini super market – 8 Office – 2 Changing rooms – 4 Cooking area – 8 Dining area – 186 Guard post - 1 Toilets – 14		

Source: UDSM, 2023

2.3.2 Project Design

The UDSM Kagera Campus project prioritizes risk management by considering factors like wind, sunlight, temperature, rain, earthquakes, and environmental elements in its design. A thorough Risk Hazard Assessment (RHA) was conducted during the preparatory phase, encompassing geotechnical investigations, topographical surveys, and environmental and social impact assessments. Climate change risks were integrated, along with disaster risk management strategies. The design also focuses on gender, occupational health, and safety, ensuring inclusive and secure spaces. These measures underscore UDSM commitment to a sustainable and secure campus, aligning with modern construction practices and setting new benchmarks in educational infrastructure. Climate Change risks mitigation and adaptation in the Project Design.

To address the challenges posed by climate change, such as heat waves, droughts, floods, and water scarcity, the UDSM Kagera campus design will incorporate strategies to promote energy efficiency, rainwater harvesting, effective storm water management systems, optimal natural ventilation, and abundant natural lighting. Also, the design will prioritize the integration of ample green spaces to enhance the campus's sustainability and resilience against climate impacts;

- ***Park and open space:*** A park and public open spaces are planned to maximize the tree canopy cover and shade provided by trees in the area and provide more ecosystem services. In the open spaces, native plants have been recommended to add the benefit of being useful for storm water treatment and infiltration in the valley located in the central part of the site.
- ***Greenery walkways:*** The design maximizes pedestrian movement and minimises motorized transport within the site in order to reduce air emissions (greenhouse gases (GHGs)) and maximize carbon sequestration. Walkways are provided to restrict free movement that causes vegetation destruction in the site, and reducing land cover important for carbon sequestration. Trees are proposed to be planted along the vehicular access road and footpaths to improve landscape and reduce effects of sun radiation during the day.
- ***Botanical garden:*** The zoning of different land uses at the proposed site was guided by inner roads, which act as veins dispersing from the artery and provide vistas of the hills on the eastern part and crossing the botanical garden, which acts as the heart of the whole site. The botanical garden which includes the green belt and conservation area, the constraints areas, and the University Park is the breathing space for the whole site and an urban filter in terms of urban climate. Botanic garden is found at the middle of the site in the valley that links the site with the wetland along Lake Victoria in the north-west part of the site. Further, the botanic garden will allow cross ventilation and other sanitary waste treatment.
- ***Green areas:*** Green areas are distributed in every zone/ block to allow fresh air to cross into the buildings. Due to the topographical nature and natural vegetation cover, the green belt and conservation zone intend to preserve the ecosystem and control land degradation and enhance mountainous scenery in the eastern part of the site. Vegetation including artificial forests will reduce soil erosion in sloping plains and all areas prone to soil erosion.
- **The building with low energy use**; Provisions for adequate openings for cross ventilation that will ensure easy flow of clean air and reduce energy use (thus reducing emissions);

provisions for motion sensors in public areas, to enable auto switch ON/OFF of lights; installation of *presence sensors* in offices, classrooms, laboratories and workshop areas; proper orientation to reduce indoor discomfort and capture natural air as much as possible and minimization of the sun effects (installation of fins; and provisions for solar lights along the pathways for sun shading); maximizing the potential of utilization of renewable energy options such as solar and wind; Utilization of biogas from the wastewater treatment plant for cooking; buildings to be oriented and constructed to take advantage of natural lighting and cross ventilation as a means of minimizing energy consumption during operation;

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

2.3.3 Disaster Risk Management

The UDSM Kagera Campus will incorporate a robust disaster risk management strategy, including fire prevention measures, fire fighting facilities, and efficient waste management systems. Two well-designed access roads will enhance safety for pedestrians and vehicles, avoiding steep slopes and unstable grounds. Buildings will have sturdy foundations, reinforced structures, and adherence to seismic building codes. Safety measures such as designated safe areas, earthquake drills, and early warning systems will be implemented for swift and prepared responses to potential seismic events. Thorough staff and security personnel training will enhance the campus's overall crisis management capability.

2.3.4 Gender inclusivity and special needs

The University buildings shall be developed to be smart and friendly to gender, including considerations of persons with special needs (e.g., physical, learning impairment, emotional and behavioural). These include provisions for lamps, toilets, etc.

2.3.5 Occupational health, safety, and security

OHS During the pre-construction phase.

During the demolition phase, the contractor will prioritize the safety of personnel by providing necessary protective equipment. Comprehensive training on hazard recognition and management will be given to workers, ensuring their well-being. For new buildings accessible to the public, UDSM will conduct a thorough risk assessment, considering operational accidents and natural hazards. The commitment to inclusivity and accessibility will be reflected in the universal design of new structures, promoting safe and comfortable access for all individuals, irrespective of their

abilities. Through these measures, UDSM underscores its dedication to creating a secure and accessible environment during both the demolition and construction phases.

OHS During the construction phase

In the construction phase, qualified professionals will design and execute structural elements, ensuring adherence to industry standards and building codes. Designs will be reviewed and approved by competent authorities for compliance with safety regulations. UDSM, supported by the supervision consultant, will provide workers regular occupational health and safety training, including information on health risks like cholera, HIV/AIDS, COVID-19, and dust impacts. The contractor will equip and maintain personal protective equipment, first-aid stations, and signboards. Adequate protective gear will be provided to site workers and visitors, along with hazard management training, emphasizing specific risks such as working at height, ergonomic concerns, slips and falls, dust exposure, and moving machinery.

OHS During the operation phase

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

OHS during the decommissioning phase

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

2.4 Development Conditions

The proposed project is intricately aligned with the sixth phase government emphasis on industrialization and the broader Vision 2025 goals. In this context, higher learning institutions like UDSM play a pivotal role in producing skilled labour that meets the demands of a burgeoning industrial landscape. Recognizing this imperative, UDSM is compelled to expand its physical infrastructure to cater to the need for high-quality, job-ready graduates.

UDSM strategic objectives harmoniously resonate with the National Five-Year Development Plan (FYDP)-III for 2021/22-2025/26, which strives to transform the economy into a competitive and industrialized entity for comprehensive human development, aligned with the overarching Vision 2025 targets. Two key factors underpin the establishment of the UDSM Kagera campus. Firstly, it addresses the imperative for UDSM to extend its educational services to regions beyond the central hub. Secondly, it responds to the mandates and requisites of the HEET project, which stipulate the establishment and operation of the campus within a specified timeframe - aiming for operational readiness by June 2025.

2.5 Manpower and Utility Requirements

2.5.1 Manpower Requirements

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

2.5.2 Energy Provisions

The Kagera region of TANESCO benefits from a dependable and consistent electric supply sourced from neighbouring Uganda. This power supply is transmitted through a robust 132-kilovolt (KV) infrastructure, which provides the necessary electricity to support the operations and activities of the university effectively. The interconnection between TANESCO Kagera and the Ugandan power grid has proven to be a reliable source of energy, contributing to the seamless functioning of various facilities and services within the region, including the upcoming University of Dar es Salaam (UDSM) Kagera campus.

The availability of this substantial electric supply from Uganda plays a pivotal role in ensuring that the campus operates efficiently and without interruption. It not only meets the energy demands of the University but also aligns with the broader strategic goals of promoting sustainable development, education accessibility, and socio-economic progress in the Kagera region. This reliable source of power underscores the commitment to creating an environment conducive to learning, research, and community engagement, thereby contributing to the overall growth and development of the region.

2.5.3 Water Requirement

BUWASA fully supports the UDSM Kagera Campus project and plans to collaborate soon. The strategic location in Karabagaine ward ensures water availability, with BUWASA responsible for the pipeline to the campus upon UDSM water connection application. BUWASA covers bringing clean water, while UDSM installs the campus water supply infrastructure. Potential water resources include spring water, borehole groundwater, and nearby streams, meeting diverse needs. In Bukoba Town, BUWASA offers desludging and wastewater transport services, advising UDSM on proper wastewater management. This collaborative approach emphasizes responsible water resource management within the campus infrastructure.

2.5.4 Access and Service Roads

The campus is conveniently accessible from both Bukoba District town centre and Muleba district in either direction. The site is approximately 10 kilometres to the southwest of Bukoba town and around 8 kilometres in the Northeast direction from Katerero junction. The roads leading to the site from the highway are accessible (Maugulu-Mwogo unpaved regional road), but they are rough and suitable mainly for cars or motorcycles. Adequate transportation options are available for commuting to the campus.

2.6 Project activities in general

The project involves multiple phases, from planning to construction and operation, each with specific activities and waste fractions. Waste types vary based on implementation phases, detailing waste generation, storage, pollution prevention options, and necessary treatment and disposal infrastructure. The process includes gathering information on project activities, prioritizing based on potential risks, identifying waste reduction, reuse, and recycling options, and proposing procedures for onsite waste management.

2.6.1 Pre -Construction Phase

Activities in this phase entail

1. **Topographical Survey**: A meticulous topographical survey is being conducted by experienced Surveyors to precisely define the campus boundaries and accurately establish ground levels. This survey is vital for understanding the terrain and spatial layout of the proposed site.
2. **Geotechnical Investigations:** In-depth geotechnical investigations are being carried out, involving soil drilling to analyse the soil profile and underlying geological formations. This information is crucial for designing stable foundations and structures that can withstand various ground conditions.
3. **Geological Study**: Given the seismic risk in the Kagera Region, a thorough geological study is being conducted to comprehend the geological composition beneath the designated land. This study is essential for designing earthquake-resilient structures.

4. **Architectural and Services Designs:** Experienced architects are working on the architectural drawings and designs to ensure that the proposed structures align with the campus's vision and requirements. This process encompasses both functional and aesthetic considerations.
5. **Environmental Impact Assessment (EIA):** The EIA process is being diligently undertaken in accordance with the EIA and Audit (Amendment) regulations of 2018. This assessment aims to comprehensively evaluate the potential environmental impact of the campus's construction and operation and identify appropriate mitigation measures.
6. **Acquisition of various permits/certificates:** This includes getting building permits from relevant authorities.

Duration

The duration of this phase will be Six (6) months.

2.6.2 Demolition Phase

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

- Demolition Works: Labourers will manually demolish the existing buildings on site using equipment such as hammers, shovels, and trolleys. The demolition waste will be used for levelling, considering that some sites have a gentle slope.

Duration

The duration of this phase will be Three (3) months.

Types, Amounts and Sources of Project Requirements

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

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

Requirements	Type	Source	Quantity (Estimates)	Mode of Transport
Manpower	Skilled	Contractor	1	Communal buses
	Unskilled	Itahwa Kangabusharo Ibaraizibu	5	Communal buses

Requirements	Type	Source	Quantity (Estimates)	Mode of Transport
Water	Clean water for domestic use: (drinking and sanitation services)	BUWASA or Borehole Drilling at the Campus	0.36 m^3/day (Based on the estimation that 6 workers will demand 60l/day)	BUWASA water supply scheme. or Borehole drilling
Equipment	Excavator	Contractor	1	
	Bulldozer	Contractor	1	
	Motor grader	Contractor	1	
	Trucks	Contractor	1	

Source: *Consultant Analysis, 2023*

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the demolition phase are shown in Table 2.3.

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

Waste	Types	Amount	Treatment/ Disposal
Demolition Waste	Demolished wastes; bricks, roofing materials, steel and wooden materials	According to Wang et al., (2004) 40% - 60% of the demolition waste can be recycled the remaining part (50%) becomes waste. The estimate is based on: ✓ The total floor area of the current buildings to be demolished (60 m^2) Floor wastes = 50%*60m^2*0.25m(thickness)*7 houses = 52.5 m^3 ✓ Walling wastes is estimated to be 50%*5(width)*6(Length)*0.15(Thickness of the brick) *7 houses = 15.75 m^3 ✓ Roofing wastes 50%*60m^2*0.2m(thickness)*7 houses = 42 m^3 Total demolition waste= 52.5+15.75+42= 110.25 m^3	The demolished wooden materials shall be sold to people to be used as firewood, steel and iron sheets (roofing materials) shall be sold to recyclers while demolished bricks shall be used for filling during construction phase.

Waste	Types	Amount	Treatment/ Disposal
	Food remains,	35.4 kg/day (based on generation rate of 0.3kg/day/ person and 118 people)	To be collected in the large skip bucket at the site ready to be disposed of at the designated dumpsite at Ibondo area
Solid Waste (Degradable)	Tins, glasses and plastics	2-6 kg	To be Sold to Recyclers
	Sewage	0.17 m^3/day (Based on 6 people, water consumption rate of 40L/capita/day and wastewater discharge factor of 80%, 90% of the workers shall use the Site Toilet)	To be directed to the Septic Tank-Soakaway System to be constructed at the site and finally to UASB
Liquid waste	Oils and greases	None	Service and maintenance of vehicles will be done at designated garages

Source: *Consultant Analysis, 2023*

2.6.3 Construction Phase

During the construction phase of the project, a series of vital activities will be carried out on the site to ensure the successful realization of the UDSM Kagera Campus:

1. **Earthworks (Site Clearance):** Using motor graders, the site clearance will be undertaken, prioritizing the preservation of indigenous trees and maintaining the natural drainage pattern.
2. **Foundations Excavation**: Vegetation covering most of the site will be cleared and responsibly disposed of by licensed waste handlers to facilitate construction and foundation excavation.
3. **Material Transportation**: Essential materials such as aggregates, cement, timber, and reinforcement bars will be transported to the site using trucks. Water for construction purposes will also be transported by tanker trucks from within the proposed campus.

4. **Material Storage**: Aggregates and sand will be stored on-site for easy access. Special storage rooms will house cement and reinforcement bars. Timber will be directly utilized as needed, and fuel will be stored in secure drums.
5. **Masonry, Concrete Works, and Related Activities:** Extensive masonry work will take place, involving stone shaping, concrete mixing, plastering, slab and foundation construction, and building wall erection. Machinery such as concrete mixers will complement labour-intensive tasks.
6. **Steel Structure Works**: Structural stability will be ensured using structural steel. This process will include cutting, welding, and erecting steel components.
7. **Roofing and Sheet Metal Works**: Roofing activities encompass cutting and securing roofing sheets, along with raising structural timber to the roof for installation.
8. **Electrical Work:** Installation of electrical components like cables, lighting fixtures, and sockets will take place, alongside activities like welding and metal cutting.
9. **Plumbing:** Comprehensive pipe-work installations for water supply and sewage distribution will be carried out within units and associated facilities. Sewage connections will link to the effluent treatment plant.
10. **Landscaping:** Aesthetic enhancements to the site will be made through landscaping, including the establishment of flower gardens and grass lawns. Local plant species, preferably indigenous ones, will be chosen for landscaping to harmonize with the environment.

These activities collectively illustrate the meticulous planning and execution necessary for the successful construction of the UDSM Kagera Campus, ensuring both functional and environmental considerations are met.

Duration

The duration of this phase will be One (1) year.

Types, Amounts and Sources of Project requirements

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

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

Requirements	Type	Source	Quantity (Estimates)	Mode of Transport
Raw Materials	Aggregates	Kyaka/Mleba	1,700-2,000m3	Trucks
	Sand	Kyaka/Mleba	5,000-10,000m3	Trucks
	Cement	Dar es Salaam/Tanga	2,500-3,000Tons	Trucks
	Water	BUWASA	60 m3 for construction activity and 10.5 m3/day for domestic use (if 175 people will demand 60l/day)	Trucks or a borehole can be drilled to tap groundwater
	Reinforcement bars	Dar es Salaam	2,100Tons	Trucks
	Timber	Bukoba	32Tons	Trucks
Manpower	Skilled	Contractor	25	Communal buses
	Unskilled	Itahwa, Kangabusharo/Bukoba	150	communal buses
Equipment	Excavator	Contractor	1	
	Bulldozer	Contractor	1	
	Motor grader	Contractor	1	
	Plate compactor	Contractor	1	
	Trucks	Contractor	5	
	Construction Crane	Contractor	2	

Source: Consultant Analysis, 2023

Types, Amounts and treatment/disposal of Wastes.

Table 2.5 Types, amounts and treatment/disposal of wastes during the construction phase

Waste	Types	Treatment/ Disposal
Solid Waste (Degradable)	Vegetation	The logs shall be given to people to be used as firewood
	Remnants of timber.	Shall be sold to recyclers
	Food remains, cardboards and papers	To be collected in the large containers at site ready to be disposed of at the designated dumpsite
Solid Waste (Non-Degradable)	Demolition of waste Spoil Soil	This soil shall be stockpiled along the foundation trenches. The soils shall be used to reinstate the site at the end of construction activities.
	Scrap metals, drums	To be Sold to Recyclers
	Tins, glasses and plastics	To be Sold to Recyclers
Liquid waste	Sewage	To be directed to temporal toilet
	Oils and greases	Service and maintenance of vehicles will be done at designated garages.

Source: *Consultant Analysis, 2023*

2.6.4 Demobilization phase

To ensure the proper restoration of the site, the demobilisation of temporary structures will be meticulously carried out. Activities encompass rehabilitating the workshop and stockpile yard to their original condition. Thorough waste clearance will be conducted, involving the removal of sewage and various types of solid wastes like plastics, wood, metal, and papers. All waste materials will be carefully deposited at the designated dumpsite. Furthermore, the conclusion of temporary employment engagements will be administered. These measures underscore the commitment to environmental preservation and site integrity in the aftermath of project activities.

Duration

Demobilization stage will last for two (2) months.

Types, Amounts and Sources of Project Requirements

Types, amounts and sources of project requirements during the demobilization phase are shown in Table 2.6:

Table 2.6 Types, amounts and sources of project requirements during the demobilization phase

Requirement	Type	Source	Amount
Manpower	Skilled	Contractor	5
	Unskilled	Local area (Itahwa, Kangabusharo and Ibaraizibu area)	50
Water	Domestic water use (drinking and sanitation hygiene)	BUWASA	3.3 m^3/day. Assuming the phase will have 55 workers, each demanding 60 l/day
Equipment	Bulldozer	Contractor	2
	Motor grader	Contractor	1
	Plate compactor	Contractor	1
	Tippers	Contractor	1

Source: Consultant Analysis, 2023

Types, Amounts and treatment/disposal of Wastes

Solid waste materials such as timber, iron sheets, and debris resulting from demolitions will be generated upon demobilising the temporary structures. To promote sustainability, the salvageable timber and metal sheets will be sold to nearby communities for reuse, while the rubble will be repurposed for levelling purposes. This approach aligns with our commitment to responsible waste management and resource optimization.

2.6.5 Operation phase

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

i. Occupancy;
ii. Healthy service provision
iii. Imparting Knowledge (Education);
iv. Occupational health and safety management;
v. Good housekeeping of the area;
vi. Project Maintenance.

Duration

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

Types, Amounts and Sources of Project Requirements

Types, amounts and sources of project requirements during the operational phase are shown in Table 2.7.

Table 2.7 Types, amounts and sources of project requirements during the operational phase

Requirements	Type	Source	Quantity
Water		Main supply	126m3/day is estimated based on the number of occupants for all buildings (3,000 *60l/c/d*70%). If 70% of the population will use water
Energy	Electricity	· TANESCO (National Grid) · Standby generator at the Site	· 1050 kWh per day · 1500kVA
Human Resources		Skilled and unskilled people	200

Source: Consultant Analysis, 2023

Types, Amounts and treatment/disposal of Wastes.
Types, amounts and treatment/disposal of wastes during the operation phase are shown in Table 2.8.

Table 2.8 Types, amounts and treatment/disposal of wastes during the operation phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Food remains, cardboards and papers	1.05tons/day (based on a generation rate of 0.35kg/day/ person, campus intended to accommodate 3,000 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
Liquid waste	Sewage	24m3/day (The campus is intended to accommodate people, with a water consumption rate of 60L/capita/day and wastewater discharge factor of 80%), and 50% will use facilities. Q= 0.8*(60*3,000) *0.5 =288,000 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 Up flow Anaerobic Sludge Blanket (UASB) to be built on site.
Electronic wastes	Worn out computers, telephones and other non-functioning electronics	The assumption is that 1 person may generate 5kg of E-waste annually; therefore E-wastes generated will be: 3,000*5= 15,000 kg/year	Sorting of wastes will be done onsite to allow recycling of electronic wastes since these wastes contain important materials such as copper, etc. sorted recyclable e-waste will be sold to recyclers.

Source: Consultant Analysis, 2023

2.6.6 Decommissioning phase

Two scenarios that can happen in the future:

i. Major rehabilitation and/or upgrading, which could involve dismantling and erection of new structures at the project grounds; or

ii. Development of a completely new project at a new site.

The decommissioning plan that takes environmental issues into consideration shall be prepared by a proponent prior to decommissioning of the project.

2.7 Project Boundaries

Identification of boundaries within which the EIA study is undertaken is an important component of the environmental and social assessment study. This ESIA study considers three types of boundaries: institutional, temporal, and spatial.

2.7.1 Institutional boundaries

Institutional boundaries refer to those institutions and sectoral boundaries in which the project lies or is mandated. These can be determined from political boundaries, Acts, regulations, institutional mandates, and administrative structures. The proposed development is about constructing new UDSM buildings in Karabagaine ward, Itahwa and Kangabusharo villages in Bukoba District Council. Many institutions and administrative units in Tanzania are of interest:

- Ministry of Education Science and Technology
- Bukoba Municipal Council
- Tanzania Commission of Universities (TCU)
- Fire and Rescue Force
- Occupational Safety and Health Authority (OSHA)
- Bukoba Urban Water Supply and Sewerage Authority (BUWASA)
- TANESCO Bukoba
- Karabagaine ward
- Itahwa, Ibaraizibu and Kangabusharo village
- Police Office Bukoba District
- The Tanzania National Roads Agency (TANROAD)
- KWAUSO Secondary School and Itahwa Primary School
- Tanzania Building Agency (TBA)
- Bukoba District Disaster Unit

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

2.7.2 Temporal boundaries

Temporal boundaries pertain to the duration and reversibility of effects. For instance, while the construction phase of the affordable housing project might bring about short-term impacts like noise from machinery, these effects will dissipate once construction concludes. However, the presence of the constructed buildings on the site could have far-reaching implications that continue until decommissioning takes place. The construction period is expected to last for a maximum of sixty months, while the operational phase is designed to extend for over 99 years, barring any unforeseen events. Consideration is also given to the project's conclusion, involving site restoration and the decommissioning of the water supply system.

2.7.3 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 impact, 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 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 impacts are expected to be within this boundary.

CHAPTER THREE

3.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Introduction

The framework of environmental management in Tanzania is structured through the National Environmental Policy and Environmental Management Act. The leading public institutions mandated for environmental management are the National Environment Management Council (NEMC) and the Division of Environment (DoE) under the Vice President's Office. The DoE addresses policy formulations and national technical back-up on all international undertakings. In contrast, the NEMC is responsible for law enforcement, implementation, compliance, and monitoring and executes environmental management on the ground countrywide. Several many other policies and laws are relevant to the proposed establishment of UDSM Kagera Campus as mentioned hereunder.

3.2 Policies relevant to the project

3.2.1 The National Environmental Policy (2021)

The National Environment Policy for mainland (2021) that has recently been updated is the main policy document addressing environmental management issues in Tanzania mainland. The policy covers various sectors, including climate change, land and human settlements; forestry; water and sanitation; health; transport; energy; industry; wetlands; agriculture; livestock; fisheries; wildlife; tourism; and mining. The policy integrates other sectors that the environmental law covers. The policy requires EIA for all development projects likely to have significant environmental impacts. The establishment of UDSM Kagera Campus is thus subject to the EIA process to ensure compliance with environmental management in accordance with this policy requirement. The EIA aims to provide sound management of environmental safeguards throughout project implementation.

3.2.2 The National Land Policy (1995)

The National Land Policy aims to promote and ensure a secure land tenure system, to encourage the optimal and sustainable use of land resources, and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment". The project focuses on ensuring the protection of existing cultural heritage and the conservation of ecological and socially sensitive areas. The proposed project is located within the planned area for institutions and is compatible with the planned land use in Bukoba District as required by the National Land Policy. The UDSM, in collaboration with the financier (World Bank and the Ministry of Education, Science and Technology, will ensure proper disposal of wastes, especially

within the project sites. The implementation of the project will ensure that the provisions of this Policy are complied with.

3.2.3 The Construction Industry Policy (2003)

The objective of this policy, among others, is to support a sustainable block development sector, including 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 will ensure compliance with this policy by applying modern technologies during construction, such as cost-effective and environmentally friendly technologies, to minimise the wastage of resources, especially building materials, water and energy.

3.2.4 The National Gender Policy (2002)

The gender policy provides guidelines that ensure gender issues and strategies are considered and integrated into developed aspects in all sectors and institutions. UDSM has a gender policy to ensure gender issues are mainstreamed into the university. It comprises the key strategies for mainstreaming gender issues within the University as part of the implementation of the National Gender Policy. This project will emphasise gender equality and equal opportunity for both men and women to participate in development undertakings, including higher learning, and to value the role played by each member of society. This calls for equal employment opportunities for women and men during the implementation of this project.

3.2.5 The Energy Policy (1992)

The policy advocates the adoption of renewable energy options and emphasises the use of environmentally friendly energy sources that aim to reduce emissions from energy sources. In compliance with the provisions and requirements of this policy, this project intends to integrate renewable energy sources such as solar power as part of the energy source that was found feasible.

3.2.6 The National Water Policy (URT, 2002)

The main objective of the water policy is to develop a comprehensive framework for the sustainable management of water resources. The policy emphasises efforts in the protection of water sources and catchments for sustainable water resources. The policy also advocates for conservation, wise use, and minimisation of water use. The proposed project shall be designed so that water use is kept to the minimum using modern technologies such as the installation of plumbing fixtures, faucets and flushing cisterns that minimise water use. It will also ensure that pollution of water sources is avoided or minimised during the construction and operation phases.

3.2.7 The National Health Policy (URT, 2003)

The National Health Policy emphasises the need to increase community involvement in health development and improve 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 or rural areas. The policy encourages safe, basic hygienic practices in workplaces, promotes sound use of water, promotes the construction of latrines and their use, and encourages the maintenance of a clean environment, a working environment which is conducive to satisfactory work performance. This project will ensure compliance with this policy by ensuring the provision of health services to the University community and surrounding local communities.

3.2.8 Education Training Policy (2014)

The country aims to improve education quality through collaboration with all education stakeholders to modernise the curricular at all levels and ensure that it meets requirements. The education training policy of 2014 advocates for the improvement of the quality of education in Tanzania so that it is accessible to all people in need. This project is in line with this policy as it will modernise education training and provide opportunities for other areas with higher education learning by opening branches, including the UDSM Kagera Campus.

3.2.9 National Mineral Policy (2009)

The National Mineral Policy also addresses the need for mining activities to be undertaken in a sustainable manner that conserves the environment. It further requires land reclamation after mining activities, especially after mining closure. Regarding this project, mining activities will mainly involve quarrying to obtain sand, stones, and aggregates. For the proposed project, all these materials (sand, aggregates, both fine and coarse aggregates) will be purchased from authorised vendors.

3.2.10 The National Employment Policy, 1997

The National Employment Policy (1997) aims at promoting employment opportunities by identifying potential areas for employment and stipulating strategies of how to utilise such areas in promoting employment, to identify and elaborate on the status of and roles of the Government, private sector and society in general in promoting and sustaining employment. The proposed UDSM Kagera Campus will employ not less than 300 people during construction and about 100 during the operation phase. The project is in line with the policy as it promotes employment. However, the policy recommends applying strategies that consider special groups such as women, youths, and disabled persons, of which need special consideration. This contributes to promoting and increasing the level of employment in Kagera at Bukoba District Council in general, hence supporting the livelihood of the people in line with the national employment policy.

3.2.11 National Policy on HIV/AIDS (2003)

The National HIV/AIDS Policy focuses on the Prevention of transmission of HIV/AIDS by creating and sustaining increased awareness of HIV/AIDS through targeted advocacy, information, education, and communication for behaviour change at all levels by all sectors. This hinges on effective community involvement and empowerment to develop appropriate approaches in the prevention of HIV Infection, care and support to those infected and affected by the epidemic, including widows and orphans. The policy requires the developers, including UDSM for this project, to work in line with these objectives to fight against HIV through sensitization and awareness creation among the surrounding community in the proposed UDSM Kagera Campus.

HIV/AIDS is a cross-cutting issue that affects all sectors. In view of this, UDSM developed its HIV/AIDS Policy in 2006. The UDSM HIV/AIDS Policy aims at preventing the spread of HIV infection, providing equal access to treatment, care and support services to people living with or affected by HIV/AIDS, generating and disseminating HIV/AIDS knowledge, and providing strong and committed leadership in response to the pandemic at the UDSM and the wider society. Therefore, the project will ensure compliance with the HIV/AIDS Policy and is further encouraged to strengthen HIV/AIDS prevention programs within the UDSM Kagera Campus and the surrounding community from implementation to operation phases.

3.3 Legal framework

3.3.1 Environmental Management Act (EMA), 2004

The Environmental Management Act No. 20 of 2004 is the principal legislation governing environmental management in the country. The Act was established to address the environmental management priorities set in the NEP (2021). The Act provides a legal framework for managing the environment in the country. Furthermore, the act made possible provision of environmental management tools, namely: Environmental Management (Environmental Impact Assessment and Audit) Regulations 2005 (Amendment), 2018; Environmental Management (Hazardous Waste Control and Management) Regulations (2009); and Environmental Management (Soil Quality Standards) Regulations (2007).

The EMA requires an Environmental and Social Impact Assessment (ESIA) to be carried out to develop any project that is likely to significantly impact the environment. The ESIA provides the institution responsible for the environment with sufficient information to justify, on environmental, social, and community development grounds, the acceptance, modification, or rejection of the project and its implementation. Moreover, the ESIA is targeted to provide the basis for guiding subsequent actions of the project life cycle, which -through management and monitoring plan - will ensure that the proposed project is carried out considering the environmental and socio-economic issues and resettlement initiatives identified along with requirements for compliance throughout the project's life cycle.

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, and preparation of the Environmental Impact Statement and its review before the decision on environmental clearance is made. As per the Act, there is an ESIA screening, scoping and review process, while the preparation of the EIS is carried out by the registered expert commissioned by the project proponent and only after having been approved by the National Environmental Management Council (NEMC). The proposed UDSM Kagera campus project must conform to all environmental clearance and safeguards requirements, including EIA, auditing, monitoring, and implementation of the project's environmental and social management plans.

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

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

These laws declare all land in Tanzania to be “Public land” to be held by the state for public purposes. The Acts empower the President of the United Republic of Tanzania to revoke the “Right of Occupancy” of any landholder for the “public/national interest” should the need arise. The laws also declare the value attached to land. The Land Act, among other things, will determine the land ownership where the project will be implemented.

The law provides technical procedures for preparing land use plans, detailed schemes, and urban development conditions in conformity with land use plans and schemes. The Local Government Authority has the power to impose conditions on the development of any area according to the land-use planning approved by the Minister. The proposed establishment of UDSM Kagera campus is consistent with the Act since the proposed site has been planned for institutional purposes.

3.3.3 The Urban Planning Act (2007)

The law provides for the orderly and sustainable development of land in urban areas, the preservation and improvement of amenities, the grant of consent to develop land, and powers of control over land use and other related matters. Section 29-(1) of the law states that "Notwithstanding the provisions of any other written law to the contrary, no person shall develop any land within a planning area without planning consent granted by the planning authority or otherwise than in accordance with planning consent and any conditions specified therein".

The proposed site is in line with these provisions. It was planned for educational institutions.

3.3.4 Occupational Health and Safety Act (2003)

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

employees. Employers must also ensure that the equipment used by employees is safe and shall also provide proper working gear as appropriate. This shall be adhered to during construction and operational phases.

The Act is relevant to the project because it will involve the construction of buildings. Therefore, the project is responsible for providing workers /constructors with a safe environment during project implementation. In addition, the project construction sites are required to implement safety measures, regulations, and precautions, ensure workers' health and welfare, and properly handle hazardous materials and chemicals. The Proponent/Contractor will acquire a workplace registration certificate from OSHA to abide by the law.

3.3.5 Engineers Registration Act and its Amendments 1997 and 2007

The Acts regulate engineering practices in Tanzania by registering engineers and monitoring their conduct. It establishes the Engineering Registration Board (ERB). Laws require any foreign engineer to register with ERB before practising in the country. Foreign engineers involved in this UDSM project shall abide by the legal requirements.

3.3.6 The Contractors Registration Act (1997)

The Contractors Registration Act requires contractors to be registered by the Contractors Board (CRB) before engaging in practice. It also requires foreign contractors to be registered by the Board before gaining contracts in Tanzania. Only registered contractors shall be involved in implementing the proposed project. UDSM shall, therefore, appoint a registered contractor and ensure that the provisions of the Act are adhered to.

3.3.7 The Architects and Quantity Surveyors Act (1997)

Similarly, architects and quantity surveyors (QS) must be registered with the Board before practising. Only registered architects and quantity surveyors shall be involved in implementing the proposed project.

3.3.8 Public Health Act 2009

An Act provides for promoting, preserving and maintaining public health to ensure 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, especially through Section 66 of the Act stating 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. UDSM will observe this Act by promoting and preserving public health throughout the project lifetime. Among other things, UDSM shall have a health centre and an environment equipped with clean and safe water and the state-of-the-art sanitation systems.

3.3.9 Fire and Rescue Act (2007)

According to the Act, among others, the functions of the force are to: '(a) Extinguish fire (b) grade cities, municipalities, townships and villages into various fire and rescue services levels (c) conduct fire inspection and investigations for purposes of obtaining information relating to the causes of fire and loss inflicted by fire (d) Conduct studies on investigation of arson and accidental fire (e) Conduct training for fire department personnel, other officers and voluntary fire fighters (f) Prepare fire statistics and fire service information (g) Conduct fire tests on protection facilities, equipment and materials. Section 3(1) (g) covers the premises of a facility used to store flammable liquids, gas or chemicals. The Act also obliges the owners and managers of the structures to set aside places with free means of escape and install fire alarm and detection systems or other escape and rescue modalities in the event of a fire. The design and construction of all buildings shall consider strict considerations specified in this Act. In this regard, UDSM has consulted the Fire and Rescue Force to get the requirements for establishing the campus. UDSM shall work closely with the Fire and Rescue Force to ensure compliance to the provisions.

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

The Act prohibits forced labour and discrimination of any kind in the workplace. It provides employment standards such as contracts with employees, work hours, remuneration, leave, unfair termination of employment and other incidents of termination. The Act provides 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; it provides that no person shall employ a child under the age of fourteen years, and it further provides that a child under eighteen years of age shall not be employed in any worksite, including construction, that being a case. The Act prohibits discrimination, being direct or indirect, in any employment policy or practice on any of the following grounds: colour, nationality, tribe or place of origin, race, national extraction, social origin, political opinion or religion, sex, gender, pregnancy, marital status, or family responsibility, disability, HIV/AIDS, age or situation of life. It is an offence for any employer to contravene this provision. During its implementation, the proposed project will follow this Act requirements in matters related to labour and employment.

In the Employment and Labour Relations Act, Section 7(1) provides details on conditions of a good and reliable employment environment. Furthermore, sections 11-91 make provision for wage determination that stipulates a minimum term and condition of employment as shall be the employment standard. Section 11(2) and 14(1) provide detail on employment contractual conditions, while sections 19(1), (2), (3) and (5) state the working duration and overtime conditions. Moreover, section 31 provides information on employment leave and sections 32(1), (2) and (3), provide information on sick and maternity leave.

UDSM 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, to ensure that employees are motivated to discharge their duties for maximum productivity. Further, the Proponent observes

and will continue to observe this Act by ensuring all labour discrimination at the workplace should be prohibited during all the phases of the project, which will bring economic justice to the employees and labour rights to be observed.

3.3.11 Workers Compensation Act (No.20), 2008

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

UDSM/contractor shall comply with this act by ensuring that all workers from the Contractor shall be compensated accordingly in this manner and registered to WCF.

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

This Act focuses on the prevention, treatment, care, support and control of HIV and AIDS, and to provide for appropriate treatment, care and support using available resources to people who are living with or at risk of HIV and AIDS. Further Section 4(1) provides details to promote public awareness on the cause, mode of transmission, consequences, prevention and controls of HIV and AIDS. Further, it describes the mode of curbing the spreading, prevalence of STIs in the population and adverse impacts resulting from HIV and AIDS, as well as protection rights for orphans. The increase of care, support and access to persons living with HIV and AIDS is also stipulated in Section 4(1) (f). 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 6(4) stipulates that TACAIDS is the main coordinator and adviser of such matters.

Section 8(1) describes the necessity to operate within the requirements of this legislation and be conscious of the public awareness of HIV and AIDS. In addition, Section 9 illustrates how to operate within the requirements of this legislation, to coordinate and establish workplace programs on HIV and AIDS for employees under his control, and such programs should involve the provision of gender responsive HIV and AIDS education, distribution of condoms and support to people living with HIV and AIDS (awareness creation). Finally, Section 19(2) describes the provision of community-based HIV and AIDS prevention, support, and care services. The project may involve the construction of a workers' campsite. This may lead to 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, the UDSM Kagera campus project will have to operate within the requirements of this legislation in adherence to the requirements of its respective regulations in addition to the HIV/AIDS policy.

3.3.13 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. Therefore, the proposed project will fulfil this legal requirement in all project phases, from design to construction and operation.

3.3.14 The Child Act, 2009

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

3.3.15 The Local Government (Urban Authorities) Act, [Cap.288 R.E 2019]

This Act establishes urban authorities for the purposes of local government, to provide for those authorities' functions and other matters connected with or incidental to those authorities.

Section 55 of the Act enumerates the basic functions of the urban authorities. The functions that are relevant to the proposed project are:

- to provide for the prevention and abatement of public nuisances or of nuisances which may be injurious to the public health or to the good order of the area of the authority;

- to regulate any trade or business which may be noxious, injurious to the public health or a source of public danger, or which otherwise it is in the public interest expedient to regulate, and to provide for the issue of licenses or permits to facilitate the regulation of any such trade or business, and for the imposition of fees in respect of such licenses.

Section 80 of the Act empowers the urban authorities to set by-laws. The proponent shall observe these and other relevant provisions in this Act.

3.3.16 Standard Act, 2009

This Act aims to promote the specifications of commodities and services and re-establish the Tanzania Bureau of Standards (TBS), the designated national standards authority established under the TBS Act 1975 and repealed by this act. TBS is responsible for developing all kinds of national standards, including environmental standards.

The Standards Act has established the National Environmental Standards Compendium (NESC), a collection of various standards prepared at different times and recognized by EMA 2004. NESC is divided into three parts. Part 1 comprises standards that require compulsory compliance. Compulsory standards are categorized as generic or specific. Specific standards cover those industries with peculiar effects on 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.

Part 2 of NESC contains those standards that may be implemented on a voluntary basis. These include guideline standards, codes of practice, and other such standards that may not necessarily be directly enforced but whose results are implied in some legal requirements. One of such standards include the Environmental Management Systems (EMS) standards, like TZS 701/ISO 14001 whose compliance specifications include the relevant legal requirements. Part 2 thus has important requirements for companies and developers who wish to demonstrate their commitment to sustainable development by way of self-regulation mechanisms. On the other hand, some companies or developers may be compelled to follow these standards because of requirements from mother companies and for other various reasons like certification requirements by environment friendly banks or tenders. Part 2 also includes standards used in evaluating environmental performance.

Part 3 has the requisite test methods to be followed when testing compliance. The test methods included are referred to in at least one of the specification standards appearing under Part 1. Although it is not stated in the Act, in the absence of national standards, project proponents are encouraged to use international standards such as those of the World Health Organisation (WHO), World Bank, British Standards (BS), European Union (EU), American Public Health Association (APHA), United States Environmental Protection Agency (US EPA) etc. Standards set by the relevant sectors, which also make use of international standards, are also applicable. Such

standards include the environmental standards set under the Mining (Environmental Management and Control) Regulations, 1999. Relevant national environmental standards include:

- TZS 860: 2005 Municipal and Industrial Wastewaters – General Tolerance Limits for Municipal and Industrial Wastewaters: This standard provides permissible limits of important environmental parameters such as BOD, COD, pH, colour, temperature range, total suspended solids and turbidity. It also gives permissible limits to a range of inorganic and organic components. All effluents discharged from the project activities during all phases shall comply with these specifications. Special attention will be paid to treatment of effluents from laboratories as some are hazardous in nature.

- TZS 845:2005 Air Quality – Specification: This standard gives permissible emission limits of sulphur oxides, carbon monoxide, hydrocarbons (as total organic carbon), dust, nitrogen oxides and lead. The emissions from earth-moving equipment, power generation plants and others will include SO2, CO, dust and NOX; as such, the project will have to observe these limits.

- TZS 983:2007 Air Quality - Vehicular Exhaust Emissions Limits: This standard is mainly derived from EU Directives 96/69/EC, 91/542/EEC and 97/24/EC. This Tanzania Standard gives permissible limits for some common substances found in exhaust emissions of motor vehicles, namely carbon monoxides, suspended particulate matter (PM), oxides of nitrogen, and hydrocarbons. The standard covers all types of vehicles, namely, passenger cars, light commercial vehicles, heavy-duty vehicles, and four-stroke motorcycles and scooters. In order to carry out quarrying activities and processing operations, the project will operate a fleet of heavy-duty and light vehicles in addition to hiring other vehicular equipment. As such, the project will need to observe the provisions of these standards.

- TZS 932:2006: Acoustics—General Tolerance Limits for Environmental Noise: This standard focuses on urban environmental noise and does not cover the occupation environment. In the absence of other standards, it may be used to indicate permissible noise levels in factory/workshop environments.

- TZS 789:2003 - Drinking (potable) water – Specification: This standard prescribes the quality requirements for drinking water other than packaged drinking water. It does not cover the requirements for natural mineral water. It prescribes the quality requirements for drinking water distributed in the food industry, domestic and catering purposes. It applies to bacteriological, biological, virological, physical, chemical and radiological quality criteria. It is intended also for community piped water supplies, i.e., those water systems serving cities, municipalities and townships, community standpipes and wells and drinking water distributed by tankers. To protect the health of consumers, portable water during all the project phases shall comply with these standards.

- TZS 931:2006 Protection against ionising radiation - Limits for occupational exposure: This standard aims at protecting workers, whose practices expose them to ionising radiation, namely, gamma- and X-rays, alpha, beta and other particles that can induce ionisation. The Standard does not apply to non-ionising radiation such as microwave, ultraviolet, visible light and infrared radiation. It applies to all workplaces in which employees are occupationally exposed or in which there is a potential for occupational exposure to ionising radiation, unless exempted by the Regulatory Authority.

The proposed UDSM project will adhere to this Act requirement during implementation, whereby regular monitoring and inspections will be conducted to ensure that all environmental parameters are within standards.

3.3.17 Universities Act No. 7 of 2005

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

3.3.18 The Education (Amendment) Act, 1995

This Act established the Higher Education Accreditation Council to provide the procedure for accreditation and other related matters. Among other functions, the council accredits higher education institutions; approves admissions into state institutions of higher education; examines and approves proposals for courses of study and course regulations submitted to it by institutions of higher education; makes regulations in respect of admission of persons seeking to enrol in state institutions of higher education and to provide a central admission service to higher education institutions; and make visitations and inspection of higher institutions. The courses to be offered and the facilities thereon for the proposed UDSM Kagera Campus shall be accredited by the Tanzania Commission for Universities (TCU).

3.4 Relevant Plans, Regulations and Guidelines

3.4.1 The Tanzania Development Vision 2025

The 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: (i) Achieving high quality livelihood characterised by sustainable and shared growth (equity), and

freedom from abject poverty in a democratic environment. Among others, the Vision aims to raise a well-educated and learning society. The establishment of UDSM Kagera Campus perfectly lines up with this vision, especially in creating a conducive environment for a well-educated and learning society. (2) to have good governance and the rule of law, moral and cultural uprightness, adherence to the rule of law, elimination of corruption and (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. The implementation of the proposed UDSM Kagera Campus by the UDSM contributes to countries efforts in achieving Development Vision objectives including provision of higher learning education opportunities that eventually contribute to poverty eradication.

3.4.2 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 the 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 audits in the country. The regulations also require the 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 categorised according to the extent of environmental and social impacts of the sub-projects. Furthermore, the First Schedule of the Regulation gives a list of projects requiring and not requiring EIA, and it categorises projects into four categories:

Type A – Category for mandatory project.

Type B1 – Category for the borderline project

Type B2 – Category for Non-Mandatory and

Special Category – project where potential risks are uncertain and require detailed specialised study prior to EIA.

According to this schedule, Type B2 Projects are small-scale activities and not enterprises and shall require registration but shall not require EIA. According to this regulation, the UDSM Kagera Campus falls under Type A that is where EIA study is mandatory and has been registered at NEMC for the EIA process and will be carried out in accordance with the guidelines stipulated in the Fourth Schedule to the Regulations.

3.4.3 Environmental Management (Air Quality Standards) Regulations, 2007

This standard provides air quality and emissions standards that define acceptable limits. It provides minimum air quality standards and maximum standards in which above that limit may lead to environmental pollution. This promotes adoption of environmentally friendly technologies within minimum pollution that will not exceed standards to ensure protection of human health and

environment. The standards provide a threshold level above which emissions levels are not allowed to exceed. Project implementation should comply with these standards to ensure environmental protection. Air pollution is the most likely issue during the implementation of this project that requires avoidance or mitigation measures during the mobilisation and construction phase. The limit for dust emissions is 250 mg/m^3 (mean over a 24-hour period). The proposed project will have to abide by 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 acceptable limits.

3.4.4 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 the discharge onto the soil of any material which will interfere with its natural quality or be polluted unless the person obtains permission to be exempted or obtain a soil pollutant discharge permit. Contaminants of heavy metals in habitat and agricultural soils shall comply with the parameters and upper limits specified in the standards. Elevated levels of heavy metals may occur naturally within the soil 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 by this regulation by discouraging the haphazard disposal of wastes into the environment.

3.4.5 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 into account 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 the 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 of 2009. It 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 industries and distances from pollution sources to water sources which the proposed project must adhere to specifically when managing discharges from the project activities including research training and undertakings.

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

The power to formulate standards for noise and vibration pollution control 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 vibration 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. It 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 ensure that noise and vibration levels do not exceed the maximum thresholds specified.

3.5 Relevant International Agreements, Conventions and Treaties

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

- United Nations Framework Convention on Climate Change (1992)
- Regional Agreements

3.5.1 United Nations Framework Convention on Climate Change (1992)

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

3.5.2 Regional Agreements

International Labour Organisation (ILO) Conventions ratified by Tanzania include: C138 Minimum Age Convention of 1973, which prohibits child labour, and C182 Worst Forms of Child Labour Convention of 1999. As the Tanzania Government has adopted the conventions, UDSM Kagera campus project will abide by them and ensure that no child labour is practised throughout the project. Other relevant agreements include ILO Convention C148 Working Environment (Air Pollution, Noise and Vibration) Convention of 1977, which protects workers against occupational

hazards in the working environment due to air pollution, noise and vibration. The proposed project will ensure workers work in a safe environment.

3.6 Institutional Framework for the Management of Environment

Tanzania is among the countries in East Africa that have an Act for environmental management legislation. The legislation, Environmental Management Act (EMA) (2004), provides a legal and institution framework that guides the implementation of the environmental management activities. The framework provides a pre-requisite for the effective implementation of Environment Policy at all levels (National, Region, Council, and Village/Mtaa/Hamlet). According to the Environmental Management Act (EMA) (2004), there is the Environmental Management Committee established at the Hamlet/Village/Mtaa, Ward, and Council and at the National level with the responsibility for the proper management of the environment in respect of the area in which they are established. The functions and responsibilities of these committees are well explained in the Act. Moreover, section 36 (1), (2) of EMA stipulates that each City, Municipal, District and Town councils shall designate or appoint an Environmental Management Officer (EMO) who shall perform among the following functions:

i) Advise the environmental management committee to which he/she belongs on all matters related to the environment.
ii) Promote environmental awareness in the area he/she belongs to protecting the environment and conserving natural resources.
iii) Monitor the preparation, review and approval of Environmental Impact Assessments for local investments.

The Institutional setup up as presented in Table 4.1, explains the layers of decision making from national to Village/Mtaa/Hamlet levels.

UDSM Project Implementation Unit

PIU is established by Article 3 (2) (ii) of the Grant Agreement between the Ministry of Education Science and Technology (MoEST) and the University Dar es Salaam. The PIU is chaired by the Deputy Vice Chancellor (Planning, Finance and Administration) and assisted a senior university staff at the level of at least Deputy Vice Chancellor, assisted by a qualified and experienced staff in adequate numbers and under terms of reference as outlined in the Project Operational Manual (POM). These include Coordinator, Deputy Coordinator, infrastructural Development, Capacity building, curriculum development, Finance, ICT, Procurement, M&E, Industrial linkage and Communication officer. The PIU is vested with the responsibility of the day-to-day implementation of the respective USIP activities, including financial management, procurement, environmental and social risk management, governance and anti-corruption, monitoring and evaluation, and reporting. At the project level, both contractors and a consultant have been guided in the contracts to employ experts in the environment, society, and gender. The Environmental and Social Safeguard Team will make sure that this is implemented. The ESS Team is involved in SE, providing inputs in all ToR and contracts for the procurement of contractors and consultants. It has

also developed GRM which is operational as well as developed an ESS Office. 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. The key institutional arrangement for HEET Project Implementation is stipulated in Table 3.1, which summarizes the responsibilities of each institution involved in ESIA.

Table 3:1 Key Institutions for implementation of the project

Level	Institution	Role and Responsibility
National level	Vice President's Office (Division of Environment)	● Coordinate various environment management activities in Tanzania ● Advise the Government on legislative and other measures for the management of the environment ● Advise the Government on international environmental agreements ● Monitor and assess activities being carried out by relevant agencies in order to ensure that the environment is not degraded ● Prepare and issue a report on the state of the environment in Tanzania; ● Coordinate the implementation of the National Environmental Policy
	Vice President's Office – NEMC	● Carry on environmental audit and environmental monitoring ● Carry out surveys which will assist in the proper management and conservation of the environment ● Undertake and co-ordinate research, investigation and surveys in conservation and management ● Review and recommend for approval of environmental impact statements ● Enforce and ensure compliance of the national environmental quality standards ● Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur; ● Undertake in co-operation with relevant key stakeholders' environmental education and public awareness;

Level	Institution	Role and Responsibility
	Ministry of Education Science and Technology	● Issuing policy guidance ● Providing legal frameworks ● Issuing licences, provisions of certificates of compliance ● Enforcement of laws and regulations ● Project monitoring.
	Tanzania Commission for Universities (TCU)	● Mandate to recognise, approve, register and accredit Universities ● Conduct regular and impromptu periodic evaluation of universities, their systems and programmes ● Advise the government and the general public on matters related to higher education in Tanzania as well as international issues pertaining to higher education, including advice on program and policy formulation and other best practices. ● Providing support to universities in terms of coordinating the admission of students, offering training and other sensitisation interventions in key areas like quality assurance, university leadership and management, fundraising and resources mobilisation, entrepreneurial skills and gender mainstreaming.
	Occupational Safety and Health Authority OSHA	● Approval of building plans for the proposed project ● Monitoring the Health and Safety of workers on working premises
District level	Bukoba District Council	● Oversee and advise on the implementation of national policies at the Municipal level ● Oversee enforcement of laws & regulations ● Advice on the implementation of development projects and activities at the Municipal level
Ward Level	Karabagaine Ward office	● Oversee general development plans for the Ward. ● Provide information on local situation and Extension services ● Technical support & advice ● Project Monitoring

Level	Institution	Role and Responsibility
Village level	Itahwa and Kangabusharo villages offices	● Information on the local social, economic and environmental situation ● View on the socio-economic and cultural value of the sites and on proposed plant operations ● Rendering assistance and advice on the implementation of the project ● Project Monitoring (watchdog for the environment, ensuring the wellbeing of residents and participating in project activities.

3.7 World Bank Environmental and Social Standards

There are 10 approved Environmental and Social Standards (ESS) to address environmental and social issues within the Bank's supported development projects. Thus, all projects under World Bank financing must comply with Environmental and Social Standards (ESS) before being cleared for implementation. Given the nature of this project's activities, except for ESS 9: Financial Intermediaries, the relevance and/or applicability of the other nine (9) ESSs to the project was assessed (Table 3.2).

Table 3:2: Applicable Environmental and Social Standards

Environmental and Social Standards (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 assessing, developing and implementing World Bank-financed projects where appropriate.
ESS2: Labour and Working Conditions	YES	Requirement for the Borrower to prepare and adopt labour management procedures. Provisions on the treatment of direct, contracted, community, and primary supply workers, as well as government civil servants. Requirements on terms and conditions of work, non-discrimination, equal opportunity, and workers' organizations are required. Provisions on child labour and forced labour. The occupational health and safety requirements are in keeping with the World Bank Group's Environmental, Health, and Safety Guidelines (EHSG).

Environmental and Social Standards (ESS)	Applicability	Requirements
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 ecosystem service. Measures to avoid or minimize the risk of water related, communicable, and non- communicable diseases. Requirements to assess risks associated with security personnel, and review and report unlawful and abusive acts to relevant authorities.
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	NO	UDSM through Bukoba district council has acquired a village land without displacing communities.
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	NO	The construction site is located in plots without IUCN or CITES species; hence, there is no important critical habitat in the area.
ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	NO	No Indigenous communities in the project area

Environmental and Social Standards (ESS)	Applicability	Requirements
ESS8: Cultural Heritage	Yes	This standard is applicable in the proposed project because the construction phase will involve demolishing and excavating the soil. Therefore, the chance of finding physical cultural resources is likely.
ESS9: Financial Intermediaries (FIs)	NO	No financial intermediaries involved
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.

3.8 World Bank Group EHS Guidelines

The Environmental, Health, and Safety Guidelines (EHS Guidelines) of the World Bank Group are technical documents that provide examples of international industry practices that are considered good and acceptable by the World Bank Group. These guidelines also contain performance levels and measures that can be achieved by existing technology at reasonable costs. The World Bank Group mandates borrowers/clients to adhere to the relevant levels or measures of the EHS Guidelines. If the regulations of the host country vary from the levels and measures specified in the EHS Guidelines, projects will be required to meet the more stringent regulations.

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 Environmental and Social Impact Assessment (ESIA) proposes the construction of the UDSM Kagera Campus while adhering to the guidelines mentioned in Table 3.3. These guidelines will ensure that all environmental, occupational health and safety (OHS), and community health and safety (CHS) requirements are taken into account during the project design and implementation phases.

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

4.0 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

The project area is located in Bukoba district, which is in Lake Victoria basin. The climate is more of a tropical rainforest with rainfall over the lake for much of the year. The rainfall distribution in Bukoba district is bimodal with two rainy seasons namely, long rainy season (*masika*) and short rainy season (vuli). The long rainy season is due to passage of the Inter-tropical convergence Zone (ITCZ) from March to June and short rainy season caused by the Southward movement of the (ITCZ), from September to December. The average annual rainfall in the area is about 1,938.5 mm as per data from Bukoba Maji station (1988-2020). The altitude of the district ranges between 700 m and 1200 m, above the mean sea level. Temperature in the district area varies with altitude. The average minimum and maximum temperatures are about 15^{o}C and 29^{o}C, respectively. The warm season lasts from October to March and is accompanied by high humidity. The cool season starts from June to September.

4.2.2 Hydrological characteristics of the project area

The campus is in Bukoba district which lies within the Lake Victoria basin. The site is drained by two permanent streams originating from the springs. The streams are Rwamrumba and Kilele which form a wetland downstream. The wetlands drain to Lake Victoria. The flow increases during the rainy seasons. Groundwater occurrence in Basement Complex rocks is largely limited to secondary permeability, such as weathered zones, joints, fractures, faults or solution features. The potential of weathered zones depends on the degree and depth of weathering and associated fracturing, and the saturated thickness. The aquifers are generally discontinuous, and often confined. The basement aquifers are typically up to 50 m thick. Recharge generally occurs through fracture zones, faults or lineaments.

Variations in water quality parameters were observed across different sampling locations, such as Rwamrumba stream (Latitude: 03.61006, Longitude: 98.50212), a wetland near the Prison farm (Latitude: 03.60203, Longitude: 98.49434), Kwauso secondary borehole (Latitude: 03.60689,

Longitude: 98.48912), Kilele 1 stream (Latitude: 03.61187, Longitude: 98.48960), and Kilele 2 stream (Latitude: 03.61172, Longitude: 98.48640). In general, both physical and chemical variables were within acceptable ranges of water quality for ecology as well as for aquatic environmental health. However, for the bacteriological parameters, the parameters for some stations are above the acceptable range. This can be attributed to human activities the water sources.

4.2.3 Air Quality and Noise

Ambient Dust Levels

The average measured ambient concentration of $PM_{2.5}$ and PM_{10} ranged between (16 - 20) $\mu g/m^3$ and (20 - 23) $\mu g/m^3$, respectively, both below their respective TBS limits and the WHO standards.

Ambient Gaseous Pollutants levels

The ambient gaseous pollutants measurements are also presented in Table 4.2 from the fifth to eight columns. Major sources of pollutants at the site include cars and motorcycles incidentally traversing the site (via the Maugulu-Mwogo unpaved regional road), and probably smoke from nearby human settlements using local cooking materials such as firewood. Ambient air quality, especially gaseous pollutants, was measured in terms of concentrations of NOx, SO_x, and CO which were found below detectable limits. These results are an indication of the good air quality at the site, which had no visible sources of air pollution. The main Noise receptors would be the adjacent residential area. However, the closest residential/institutional facility adjacent to the proposed site is KWAUSO Secondary School which also had no major pollution effect to the proposed projects area.

Noise Levels

Noise level at the site ranged from 40-47 dBA with is well below the TBS and WHO guidelines of 52 dBA and 55 DBA, respectively. The main Noise receptors would be the adjacent residential area. However, the closest Institutional/residential area adjacent to the proposed project area is the KWAUSO Secondary School, which borders the site.

4.2.4 Existing land use

The proposed land use plan generally makes provisions for various land use components namely: academic functions, administrative facilities, students support facilities, sports facilities, community facilities, staff housing, waste facility, main roads, environmental conservation areas (in steep slopes, forest and valleys). *The proposed project will be implemented as per land use planning stipulated in the UDSM master plan.*

4.2.5 Existing land cover

The proposed project site exhibits diverse land cover characteristics. On the eastern and northeast sections, there are outcrops of less weathered rocks, while other areas are primarily covered with soil. Within the site, several notable features are present, including, springs, and streams, creating wetlands. Other features are natural trees such as misambwa, mkoma, mvuyo, mfuku, and acacia, alongside artificial trees like eucalyptus and guava.

The project site is notably intersected by a pre-existing road network that connects Kangabusharo and Itahwa to Ibaraizibu village, spanning from the southern to the northern extremities of the area.

Also, an access route emerges from the eastern part, extending to the western section of the site. Furthermore, electricity infrastructure is already in place, running through the project site and passing across plot no 2. The majority of the site is characterized by dense shrubbery, which blankets nearly the entire area. The execution of the UDSM Kagera Campus project necessitates the removal of natural vegetation and modifications to the land cover in specific zones. These adjustments involve excavation and levelling of sections to prepare for construction.

4.2.6 Land Development

The land needs in urban areas are dominated by the demand for building plots for residential, commercial, institutional or industrial purposes. In rural areas, agriculture and other social and production activities are the major needs for land. Recent statistics indicate that the number of surveyed plots in trading centres has increased by 40 percent. Allocation of plots has also increased by 24 percent. Town centres looks to be growing faster than before implying that the proposed UDSM-Kagera campus shall stimulate the growth of the same. However, development control around the proposed UDSM site is paramount as it will be a marketable area for investment.

4.2.7 Topography

The UDSM Kagera Campus exhibits a diverse and undulating topography, featuring both relatively flat and sloping areas, as clearly illustrated by the digital elevation mode. The overall terrain slopes gently from east to west. From an administrative perspective, this campus falls within Bukoba District Council, specifically located in the Karabagaine ward. The elevations across the site vary, ranging from 1151 meters to 1352 meters above mean sea level (a.m.s.l).

The highland portions of the project site are primarily situated in the eastern part, while the northern and southern sectors boast more low elevations. Interestingly, the southwestern corner of the area stands at the lowest elevation point, measuring 1150 meters a.m.s.l. This diverse topography not only adds character to the campus but also presents several opportunities for incorporating natural storm water drainage and rainwater harvesting systems into the campus's infrastructure design. The site's valleys play a crucial role in managing storm water, guiding its flow from higher elevations towards the lower-lying areas.

These valleys can inform the placement of water retention ponds, the design of storm water drainage systems, and the strategic location of wastewater treatment facilities. Embracing the natural features of the site in our infrastructure planning aligns with our commitment to sustainable and environmentally conscious campus development.

4.2.8 Soils

The proposed project site exhibits a unique soil composition and geological characteristics. Surface soil analysis indicates that the site predominantly features sandy soils, which have originated from

the physical weathering of quartzite rock. Additionally, the project site is partially bordered by a rocky hill formation, notably situated on its eastern side.

A comprehensive geotechnical study delves into the subsurface soil conditions. In the uppermost layers, extending from the surface to a depth of 0.6 meters, the soil is described as dry to slightly moist, featuring a reddish-brown hue. This soil type is characterized by loose consistency and possesses weak binding properties. Also, the presence of grass roots within this layer is noteworthy.

Descending deeper into the ground, specifically from a depth of 0.6 meters to 10 meters, the soil composition undergoes a transformation. This zone is marked by moist reddish soil, characterized by a medium-density profile. Notably, this soil exhibits stronger moderate binding properties and is considered to have low plasticity, which enhances its suitability for construction purposes. Beyond the 10-meter mark, the geotechnical investigation reveals the existence of fresh rock formations. This geological feature signifies the transition from soil to solid bedrock at greater depths.

The geotechnical assessment confirms that the site possesses the necessary soil strength and structural stability required for the construction of the proposed building blocks. These findings, underscore the project's feasibility and suitability for the intended construction purposes.

4.2.9 Soil erosion potential

Through physical observations, it becomes evident that soil erosion presents a notable concern within the eastern section of the designated project site. This erosion phenomenon is attributed to several factors, including sand mining activities carried out by the local village community and the naturally sloping terrain of the area.

The predominant form of soil erosion observed on-site aligns with rill erosion, manifesting as the presence of small channels etched into the landscape. These channels are a consequence of various factors, including the gravitational pull-on soil due to the area's natural slope, the effects of wind during dry seasons, and the erosive forces exerted by moving water during periods of rainfall.
Notably, with the impending construction of the proposed buildings, the volume of storm water runoff is expected to increase. This augmentation in storm water flow raises concerns regarding the potential exacerbation of soil erosion and the expansion of existing rill erosion. There exists a real possibility that multiple rill erosions may coalesce into a more substantial and wider valley, posing a significant hindrance to various land development activities planned for the campus.

To address these challenges effectively and ensure the preservation of soil quality and landscape integrity, it is imperative to implement robust soil conservation measures and employ sound

stormwater management strategies during the project's execution. These measures will play a pivotal role in mitigating erosion risks and safeguarding the campus's environmental sustainability.

4.2.10 Geological features

Bukoba District is located in the Kagera Region of Tanzania, along the eastern shores of Lake Victoria. The geology of the district is characterized by various rock formations and geological processes that have shaped the landscape over millions of years. The region is part of the East African Rift System, which is a tectonic plate boundary where the African Plate is splitting into two separate plates. This rift system has resulted in geological features such as fault lines and rift valleys. The rocks in Bukoba District are predominantly of Precambrian age, with formations belonging to the Tanzania Craton. The craton is composed of ancient rocks that have undergone extensive geological processes, including metamorphism and deformation.

In some areas of Bukoba District, outcrops of exposed bedrock, especially in higher elevated regions, are observed. These bedrocks often consist of ancient metamorphic rocks like quartzite. The geological composition of the proposed site is predominantly characterized by Precambrian rock formations, with a notable prevalence of weakly metamorphosed sandstone, specifically Quartzite. These geological features are most prominently observed in the hilly and elevated regions situated on the eastern side of the site. Conversely, the remaining areas of the site are covered by soils resulting from the processes of chemical and physical weathering acting upon Quartzite and other meta-sedimentary rock types. A noteworthy characteristic of the site's soil is its reddish hue, which can be attributed to the oxidative alteration of iron minerals inherent in the parent rock formations.

4.2.11 Potential natural disasters- risks

- **Issue on Earthquake risk on the proposed new UDSM campus in Bukoba District, Kagera Region**

In 2018, the Kagera region in Tanzania experienced a significant earthquake that profoundly impacted the local communities. The earthquake, with a magnitude of 5.9 on the Richter Scale, struck the region on September 10, causing widespread destruction and loss of life. The epicentre of the quake was located near the border with Rwanda, and its tremors were felt across neighbouring countries.

The earthquake resulted in the collapse of numerous buildings and infrastructure, leaving many families displaced and in urgent need of assistance. The local authorities, along with humanitarian organisations, quickly mobilized to provide relief and aid to the affected communities. Efforts were made to assess the damage, provide medical assistance, and offer support for the reconstruction and rehabilitation of the affected areas. The earthquake served as a reminder of the

region's vulnerability to seismic events and emphasized the importance of earthquake preparedness and mitigation measures in future development projects.

The occurrence of the 2018 Kagera earthquake has raised concerns for the proposed new UDSM Campus, as it falls within the affected area. Consequently, the ESIA study thoroughly incorporates an assessment of the environmental impact caused by the disaster. It is crucial to propose appropriate measures to address these impacts during the design, construction phase, and future operation of the campus. The proposed precautions should be carefully considered to ensure the campus's resilience and safety. The ESIA study will play a vital role in providing essential insights to mitigate risks and enhance the preparedness of the campus to tackle potential seismic events effectively.

4.3 Biological Features

4.3.1 Type of habitat

The habitat at UDSM-Kagera Campus can be classified as a mixed habitat according to the IFC Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012). The area remains relatively natural, and a considerable portion of the campus is covered with grasses, and exotic plant species are present. According to Hamilton (1989), the botanical assessment revealed that many of the species found thrive in lowland or submontane environments, typically occurring at altitudes ranging from 800 to 1,800 meters above sea level.

4.3.2 The Flora

In a lush, forested area, a diverse range of plant life thrives, including the Rambutan plant (*Nephelium lappaceum),* the African tulip tree (*Spathodea campanulata*), the Redbuds tree (*Cercis siliquastrum*), and the Yakooro plant (*Barringtonia racemosa*). This verdant landscape is characterized by herbs, trees, shrubs, and grasses. These plant species coexist alongside a flowing water stream inhabited by small fish, particularly tilapia, and a variety of arthropods. The area also hosts a rich avian population, featuring common birds like the Yellow-bellied Bulbul, while monkeys roam freely.

Moving to a distinct wetland ecosystem, a unique collection of plant species can be found. Among them are the Candlenut tree (*Aleurites moluccanus*) and the Sugar Bush (*Rhus ovata*). Additionally, the Sea Randa plant, also called Sea Randia or Funeral Flower (*Guettarda speciosa*), can be observed. This wetland area is characterized by shrublands adorned with herbs, trees, and grasses. The water bodies within this ecosystem harbour various arthropods, contributing to its ecological diversity.

In the forest ecosystem at Plot 2, an array of plant species is present, including the White Teak or Malay Bush Beech (*Gmelina arborea*), the Konjac species, also known as Devil's Tongue (*Amorphophallus konjac*), and the Velvet Bean or Deer-eye Beans (Cowitch), scientifically referred to as *Mucuna pruriens*. This forested region is punctuated by water streams and encircled by grasses, such as the Common Reed (*Phragmites australis*), further enhancing its ecological significance.

Table 4.1 Types of vegetation types identified in the proposed construction areas

S/N	Vegetation type	Botanical Name
1.	Shrubs	*Senna singueana, Lippia ukambesis, Lantana auleata, Psidium guajava, Lantana camara, Grewia bicolar*
2.	Herbs	*Ocimum Basilicum, Agave sisalan, Hoslundia opposita,*
3.	Trees	*Nephelium lappaceum, Spathodea campanulata, cercis siliquastrum, Barringtonia racemosa, Aleurities moluceanus, Rhus ovata, Guettarda speciosa*
4.	Climbers	*Cissus rotundifilia*
5.	Grass	*Phragmutes australis*

4.3.3 Vegetation categories in the study area

The vegetation categories in the study area can be categorized as follows:

Forest Area:
This region is characterized by lush forested areas, including the presence of Rambutan (*Nephelium lappaceum*), African Tulip Trees (*Spathodea campanulata*), Redbuds Trees (*Cercis siliquastrum*), and Yakooro Plants (*Barringtonia racemosa*). These areas support a diverse range of plant life, including herbs, trees, shrubs, and grasses. The forested areas are inhabited by various wildlife, such as birds like the Yellow-bellied Bulbul and monkeys.

Wetland Ecosystem:
The wetland ecosystem is marked by its unique collection of plant species, including the Candlenut Tree (*Aleurites moluccanus*), Sugar Bush (*Rhus ovata*), and Sea Randa Plant (*Guettarda speciosa*). This area features shrublands adorned with herbs, trees, and grasses. The water bodies within this ecosystem harbor various arthropods, contributing to its ecological diversity.

Grassland with or scattered trees
This vegetation category is dominated by grasses with scattered trees and bare land and it covers more than 50% of the vegetation areas. This type was observed where the cafeteria, classrooms, playground, student centre are proposed to be developed. Dominant trees observed were

Eucalyptus globulus and Acacia nilotica. The patches of grassland are dominated by the grass species of *Digitaria Sanguinalis* and *Cynodon dactylon*.

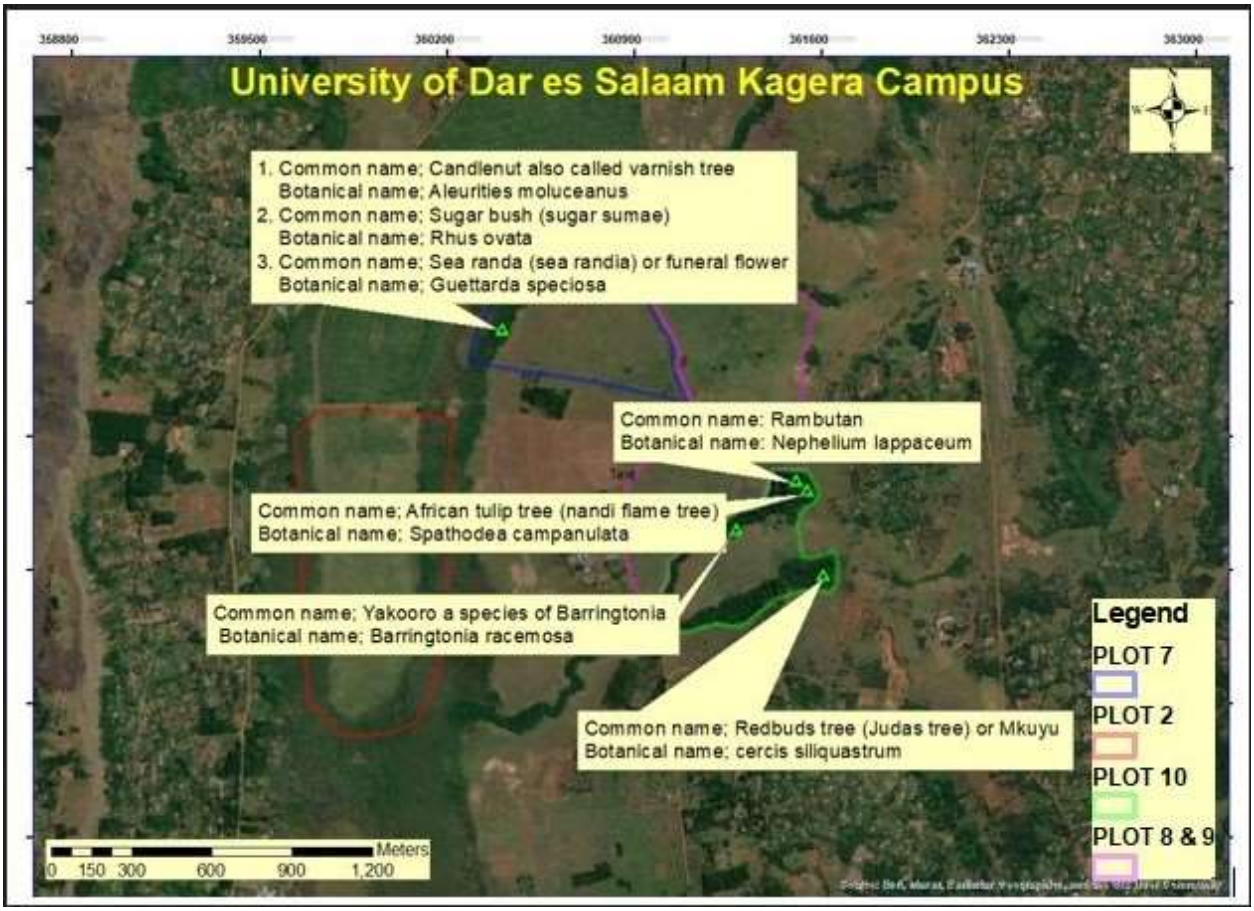

Figure 4.1Map showing vegetation categories at UDSM-Kagera Campus

4.3.4 Animals

The assessment did not identify any animals listed on the CITES or the IUCN Red List. Most of the animals observed at the site were domesticated animals originating from the nearby community and surrounding residential area. The species observed included goats, cows, dogs, chickens, various localized and visiting avifauna species, dwelling macro-invertebrates and others.

However, it is important to mention that laboratory analysis for microbial populations was not conducted during this assessment. This information underscores the coexistence of various animal species within the site, both domesticated and wildlife, contributing to its ecological diversity and potential roles in nutrient cycling and ecosystem maintenance.

4.3.5 Ecosystem and Ecosystem Services

The UDSM-Kagera campus site ecosystem provides services (benefits important to humans) which have environmental, ecological, social and economic value. The site has been covered by the bare environment, vegetation and natural wetlands. These features might provide useful products (provisioning services), regulation services, non-material benefits (cultural services) and supporting services (services necessary to produce all other ecosystem services). The proposed project will be localised to prevent excessive site clearance.

4.4 Socio-economic and cultural conditions

The socio-economic survey documented a number of activities in the area for people and communities living around. In the area, the dominant social economic activities are small agricultural services. Also, the people in this area engage in other kinds of economic activities like retail shops, mama Ntilie, livestock keeping, and fishing.

4.4.1 Demography

As per the National Population Census of 2022, Karabagaine Ward had 16,312 people, with 7,839 males and 8,473 females. The population will increase pressure on the available social services and change the lives of the people of Karabagaine and the surrounding communities. During construction, the project is expected to employ 150 people from outside Karabagaine village. Therefore, the village will have more people than before. The change in population level due to the influx of workers and labourers will contribute to new market opportunities for small, middle and big business persons. This will increase money circulation in the area, leading to high income for the local suppliers and service providers.

4.4.2 Education

Until 2015, the district had a total of 37 secondary schools. Out of 37 secondary schools, 30 secondary schools equivalent to 81.1 percent are publicly owned and 7 secondary schools (18.9 percent) owned by the private sector. In the Karabagaine ward, there are two public secondary schools (Kabale Sec and Karabagaine Sec) and one private school (Kwauso Sec). However, the District has no public University. In terms of transitioning, only 55.7 percent of pupils from Primary education joined secondary education in public schools and the remaining 44.3 percent of children entered tertiary education and the labour market. Looking at sex differences, more boys (59.1 percent) than girls (51.5 percent) were transited into secondary education. Further, out of cumulative students who did form VI examinations in the last five years (2017 – 2021), 4.6 percent attained division I, 16.5 percent students got division II, 55.6 percent awarded division III and 17.1 percent attained division IV, while only 6.2 percent failed their examination. The establishment of the proposed campus in the district council shall improve the transition rate, hence reducing the number of children who enter the labour market without having enough education.

4.4.3 Literacy Rate

The literacy rate is another quality aspect of the population in any country and gauges the ability to understand various issues of their socio-economic development and environment. 66.1 percent of the people in Bukoba District Council know Kiswahili, 0.7 percent know English only, 11.3 percent know both English and Kiswahili, and only 0.2 percent know other languages. The proposed UDSM-Kagera campus shall stimulate learning institutions to produce quality education to students who can utilize the proposed campus, considering that it will be the first university in Bukoba.

4.4.4 Special Needs Education

The level of disability appears to be on the increase in most societies. Recent statistics indicate that 218 disabled children were enrolled in primary school in the district with more so on for physical Impairment (88), intellectual impairment (96) and visual impairment. This implies that the need to have schools with infrastructures to accommodate children of all types of impairment is important as stipulated in the education policy. The campus design has accommodated infrastructures to cater for children of special needs.

4.4.5 Health Services

The major killer diseases in Bukoba District include Malaria, Anaemia, Pneumonia, clinical AIDS and other communicable diseases. Bukoba District experiences shortages of health facilities, practitioners, medical equipment, and medicines. These shortages cause unnecessary loss of peoples' lives due to incomplete treatment of preventable diseases. The district had 2 hospitals, 6 health centres and 32 dispensaries distributed unevenly into 29 wards. The available facilities cannot serve the ever-increasing population of the district. The council authority motivates the community to participate in the current initiative of construction of more health facilities. UDSM-Kagera campus shall have its own health centre to serve both patients within and outside the campus community.

4.4.6 HIV/AIDS Infections

There was a decline in the prevalence rate of persons with HIV positive from 13 percent in 2011 to 11 percent in 2015. Looking at sex differences, Sex observations from the data show that females who were screened to have been affected by HIV was 5.4 percent while males were 5.94 percent. The proposed project shall increase interaction with the local community from the construction phase to the operation phase. This will increase the HIV prevalence rate. The project shall implement mitigation measures as outlined in this report.

4.4.7 Gender Empowerment

Various measures had already been taken to ensure that all genders, particularly women, fully participate in policy and decision-making processes and in all aspects of economic, socio-cultural and political life. These measures include the establishment of women economic groups, participation in SACCOS, CBOs and other cooperative activities. The project shall be implemented in a manner consistent with the ongoing initiatives of Bukoba District on gender issues in development activities. This shall include gender consideration in children enrolment to university and equitable employment opportunities during both construction and operation phase.

4.4.8 Crime Statistics

A total of 532 crime cases were reported in Bukoba DC at the end of 2015. The most common crime was related to property, with 190 reported cases; reported crimes related to violence were

108, and reported drug crime cases were only two. Also, a total of 199 persons were jailed, 89 for property crimes, 108 for violent crimes and two were jailed due to drug-related crimes. The presence of the campus shall attract more people, hence more crimes. The project shall have its own police post to handle such cases.

4.4.9 Religious Facilities

In the Karabagaine ward, there are two major types of religions: Muslims and Christians. There are also local traditional beliefs which are not very popular in the Ward. The Christians denominations include Roman Catholics, Anglicans, Lutherans, and Pentecostals. In Karabagaine village, there are ten churches and two mosques. However, the current religious institutions seem to be enough for the available population, and the influx of people and students after the opening of the UDSM Kagera Campus in Karabagaine will likely cause pressure on these institutions.

4.4.10 Transportation service

The campus is conveniently accessible from both Bukoba District town centre and Muleba district in either direction. The roads leading to the site from the highway are accessible (Maugulu-Mwogo unpaved regional road), but they are rough and suitable mainly for cars or motorcycles. The road is unpaved and lacks traffic separation for motorized and non-motorized traffic. In addition, air transportation is another transportation option for the campus.

4.4.11 Food Security and Food Poverty

According to the 2019/2020 National Sample Census of Agriculture, 39 percent of the total agricultural households in the Kagera region do not experience food requirement problems while 61% experience problems of food requirement at different levels. Households that “sometimes' ' experience food satisfaction is 12 percent; “often” experienced satisfaction is 9 percent and those who always experience satisfaction is 5 percent. Nevertheless, 35 percent have never experienced any food problems. In Bukoba District Council about 41 percent of the households were not satisfied, 36 percent were seldom satisfied, 15 percent were sometimes satisfied, 6 percent were often satisfied, and only two percent were always satisfied. The proposed UDSM-Kagera campus will demand food of which is double swords. It may stimulate agricultural production on one hand due to availability of markets or may increase food scarcity. The project shall commission the food supply service to reliable vendors.

4.4.12 Telecommunication

In Bukoba District Council there is a moderate availability of internet and telephone services for both cellular phone and landline-based telephone services. In 2019, the council had no radio operating from the council, television stations and internet cafes; the council had one post office at Karabagaine Ward. However, in 2019 the council had access to mobile phones which include Tigo, Vodacom, Airtel, Zantel and TTCL Mobile at different percentages of accessibility. Despite

Mobile towers located close to the area, the signal strength varies from firm to weak in some locations. Thus, the site requires improved mobile communications to provide reliable data services to allow interaction within and outside the campus.

4.4.13 Water

A large quantity of water is used mainly for domestic purposes. 31.1 percent of the households have access to improved drinking water sources. The remaining 68.9 percent access unimproved drinking water sources. These results imply that the council has a high proportion of households that depend on unimproved drinking water sources. The improved main source of clean and safe drinking water used by households was protected springs(11.1percent) followed by public tap water (10.3 percent), Protected Dug well (four percent), Tube Well/Bore Hole (three percent) and Piped water one percent. However, due to the increase of economic activities and delivery of social services both of which utilize water in one way or another, supply of water has become a burden. Hence, the government is encouraging private investment to allocate enough resources to improve the water sector. The proposed campus shall put pressure on water service due to population increase, such that the university shall have water supply and storage facilities to maintain water quantity on campus.

4.4.14 Power

The main sources of energy for cooking and lighting in Bukoba District Council were firewood, charcoal, electricity, paraffin and solar energy. The main source of energy for lighting is Kerosene, followed by Kerosene, Electricity, acetylene, solar energy, candles, firewood, Rechargeable torches and Generators. The main source of energy for cooking in Bukoba District Council is firewood, followed by Charcoal, Paraffin, coal and Electricity. Up to 2019 Bukoba DC had only 28 percent of its households supplied with electricity. However, the electricity supply in the council is not yet stable and faces a number of problems, such as low power supply, low voltage, rationing, and outages. In one way or another, these problems affect the production of goods and services in the council. The proposed campus shall use electricity as the main energy source for cooking and lighting to conserve the environment. In addition, solar power shall be used for lighting while diesel generators shall be used as an alternative to electricity.

4.4.15 Natural Resources Conservation

The forestry sub-sector plays an important role in maintaining ecological balance, protecting soils from erosion and conserving water and wildlife. Between 2016 and 2020, the district council raised a total of 7,133,725 tree seedlings. The best year was 2015, when tree seedlings raised were at the peak of 2,111,223, which equals 29.6 percent of the total tree seedlings raised. The worst year was 2016 when only 799,748 tree seedlings (11.2 percent) were raised. The campus area has a natural forest conservation area while bushes and trees of no ecological importance dominate the other part where the building construction will take place. However, the project implementation shall be

in line with the ongoing greening initiatives. Clearance of the project area shall consider the preservation of natural vegetation, including trees, and during the operation phase, botanical gardens and other rush gardens shall be in place as per design.

4.4.16 Waste Management

Bukoba District Council does not have a waste disposal system. Therefore, there are no proper ways of disposing of solid waste and wastewater. Most people burn their solid wastes as a way of disposing of them. Very few households have septic tanks, and the most common way of disposing of human waste is through pit latrines. The University will ensure the availability of the systems in collaboration with the Bukoba District Council.

4.5 Economic Context and Analysis of Economic Activities in the Project Area

Farming and livestock keeping are the dominant economic activities in Itahwa and Kangabusharo villages. Other economic activities include business.

4.5.1 Fishing Activities

Inland production is from water bodies, and Lake Victoria is the major source for fishing in the Kagera Region. Fishing activities in Bukoba District Council mainly take place in the Kaagya, Kishanje, Rubafu, Nyakato, Kanyangereko, Maruku, and Kemondo wards. The project will stimulate more fishing activities to meet the demand of the increased population on the campus.

4.5.2 Farming Activities

Agriculture is the backbone of the Bukoba District Council economy, and most of its residents depend on it as their main source of livelihood. Bukoba District Council has a total land area of 137,120 ha, of which 50,376ha, equivalent to 47.1 per cent, is arable land suitable for crop farming. Arable land planted with crops has 23,743ha (47.1 percent of the total arable land of the council). The proposed UDSM-Kagera campus has not been used for agricultural land, implying that the project shall not affect the arable land.

4.5.3 Tourism

Bukoba District Council is a land of many wonders, holding an unparalleled diversity of fauna, flora and many natural features. The beaches of Lake Victoria all offer opportunities for the tourism industry in the district council. Bukoba District Authority, through Public Private Partnership (PPP), is striving to promote tourism. The increase of people in Bukoba District due to the presence of UDSM campus shall necessitate areas for relaxation. Thus, it becomes an opportunity for improving the beach areas to tap the business opportunities.

4.5.4 Commercial Activities

Karabagaine ward centre harbours both formal and informal commercial activities. Transacted goods include agricultural products found within the Ward and manufactured goods from Bukoba town and Mwanza city. Even though business and commerce are a promising sector, the sector operates at a minimal scale due to a lack of market at the village level. It is envisaged that the establishment of UDSM-Kagera campus will attract a number of investors from within and outside surrounding communities to invest in meeting the needs of the increased population as well as people seeking for employment in the area. This is likely to enhance the development of the centres in surrounding areas. It is also expected that service providers such as food venders and general viosks (dukas) may be established and increased to provide services to both students, investors and staff working in the project site.

CHAPTER FIVE

5.0 STAKEHOLDERS' ENGAGEMENT

5.1 Introduction and state of the Art

Stakeholder engagement is the continuous and iterative process by which the proponent 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 considers the different access and communication needs of various groups and individuals, especially those more disadvantaged or vulnerable, including consideration of both communication and physical accessibility challenges. The stakeholders' engagement under this construction project of UDSM-Kagera Campus was conducted for the following reasons;

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

5.2 Stakeholder Identification and Analysis

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 interest in the project. The stakeholder consultations were done in July 2023 in their respective offices. However, the village meetings were done in open spaces in village offices or schools' premises. Table 5.1 shows stakeholders identified and level of interest.

Table 5.1List of Stakeholders identified, their roles and the rate of interest in the Project

Authority	Role of the stakeholder	Rate of Interest
Kagera Regional Administrative Secretary	Political and administrative issues	**HIGH**
Bukoba District Council	Overall advice on both professional works (land, Planning, environments, social, economics) with regards to the execution of the project	**HIGH**
Tanzania Buildings Agency (TBA)	Institution responsible for buildings construction control	**LOW**
Occupational Safety and Health Authority (OSHA)	Oversees the provision, availability and control of health and safety issues to manpower in the project area	**LOW**
Tanzania Electricity Supply Company (TANESCO	Power supply	**HIGH**
Bukoba Water and Sanitation Agency (BUWASA)	Plan, design, construct and supervise water supply projects	**LOW**
Water Quality Laboratory	Responsible for water quality and safety	**LOW**
TANROADS	Construction and supervision of roads	**LOW**
Fire and Rescue Force	Provide overall guidance, advice and management of fire and rescue	**LOW**
Lake Victoria Basin /HQ	Provides networks which offer a comprehensive range of telecommunication services	**HIGH**
KWAUSO Secondary School	Neighbour	**MEDIUM**
Karabagaine Ward	Beneficiaries of the new campus in Bukoba	**HIGH**
Local Government Members and Community Members of Itahwa, Ibaraizibu, and Kangabusharo,	Providing information to inform environmental and social plans, baseline information and representation of various groups at local level.	**HIGH**
Bukoba District Disaster Unit	Provide education on disaster issues	**LOW**
NON-STATE ACTORS (NGOs, CBOs, FBOs)	Employment opportunities associated with project	**HIGH**

5.3 Stakeholder engagement Approach, views and response during Preparation Phase

During the preparation phase the consultations, presentations and discussion with the above-identified stakeholders were conducted. The agenda for the consultations were presenting the Project and Obtaining the environmental and socio-economic concerns and perceptions regarding the proposed project, which included land use of the project site, land ownership issues, envisaged negative environmental impacts, negative and positive impacts of the project, management aspects of the identified negative impacts, enhancement mechanism of positive impacts and aspects to be considered for sustainable project operations.

In the presentations, the team shared with these stakeholders the information in a culturally appropriate manner free of manipulation, interference, coercion, discrimination, and intimidation. The ESIA team collected views and opinions on what were the main concerns and issues from different stakeholders. The raised concerns were analysed and then given a due weight based on the frequency of issues raised. Stakeholders expect that the project proponent will take their views into consideration in the planning and implementation of the project as per chapters seven, eight and nine. The stakeholders' views and concerns are presented in Table 5.2, and their names and signatures are presented in Appendix IV.

Generally, the consultation with local stakeholders indicated that they generally view the proposed project as a positive venture that might stimulate new economic and social activities and contribute to the development of Bukoba District and Tanzania at large. The stakeholders argued that the proposed development will contribute to the availability of employment opportunities to local people, the availability of universities in the region, and the creation of linkages to the community in terms of increasing business opportunities for the local people. In addition, participants were convinced that the project would not negatively impact the environment or community in the foreseeable future. Immediate threats of the proposed project to the nearby communities were identified as Management of dust, noise and various emissions from the construction site; Influx of people in the proposed UDSM Kagera Campus; management of stormwater, which will be originating from various parts of the Kagera UDSM Campus; management of liquid waste; the risk of intensification of sexually transmitted diseases (STDs) and HIV/AIDS due to the influx of labourers, workers, students and staff from different areas; health and Safety of workers during construction and operation phases; and employment opportunities – the project will create short term and long-term employment opportunity to the local people who will be absorbed in the project.

Table 5.2Views and Concerns from Stakeholders and Responses

Stakeholder	**Views and concerns**	**Responses**
Kagera Regional Office	Given the expensive nature of land in Bukoba and its cultural significance as a symbol of wealth for the local population, the decision to grant free land to the University of Dar es Salaam for constructing a new campus holds special importance. To avoid any potential conflicts and safeguard the designated land, it is crucial for the University to take immediate action and initiate the construction process without delay, thereby preventing any potential encroachment by local villagers.	The University of Dar es Salaam is fully aware of the situation and is making concerted efforts to ensure the construction starts on schedule. Presently, they are conducting the final study, which includes the ESIA, to adhere to both the World Bank's regulations and the country's established laws
Bukoba District Council	The University should establish a properly designed sewage system to meet its internal demands and, if viable, cater to the surrounding community's needs.	The design will encompass a well-designed sewage system for the campus. If funding permits, the potential extension of the system will also be taken into consideration to accommodate the surrounding community.
District Commissioner	Given the absence of an existing solid waste dump site in the proposed area, it is essential for the University to prioritize awareness and planning for both liquid and solid waste management. They should consider the possibility of addressing this matter for the benefit of the surrounding community and their own utility as well.	Under usual circumstances, the University relies on the Municipal/District dump site for solid waste management. However, in situations where the matter is highly sensitive, and no existing dump site is available, the University will engage in collaboration with the district council to establish a suitable dump site.

Stakeholder	Views and concerns	Responses
District Executive Director-Bukoba District	The University of Dar es Salaam should allocate funds to facilitate the connection of water from the newly established water supply network to the proposed campus site.	The University will conduct a comprehensive study on all the available freshwater resources in the vicinity of the campus area. Based on the findings, suitable decisions will be made regarding water management. Also, the suggestions you have provided will also be taken into consideration during the decision-making process.
Natural Resources Office	1. The option of constructing an independent storage tank dedicated to supplying water to the campus is recommended. 2. Preserving natural forests is essential, and if feasible, tree-planting programs should be initiated. 3. The buildings should be designed to incorporate and embrace the cultural heritage of Bukoba. For instance, using symbols like the kingdom sign to represent the Haya tribe from ancient times would be appropriate	1. The suggestion has been taken for evaluation and careful consideration. 2. The suggestion has been acknowledged, and we will recommend the University of Dar es Salaam management to give it due consideration. 3. The suggestion is commendable, and we will recommend incorporating the culture of Bukoba into the design.

Regional Administrative Officer, RAEO and AAS Education	1. The regional office in Bukoba has raised concerns about the issue of unemployment among citizens, particularly due to a lack of practical skills and knowledge among many graduates. In light of this, we strongly advise the University to develop curricula that focus on imparting more practical skills to address this challenge. The Education office in Kagera is highly optimistic that the university's efforts will bring positive changes to the lives of graduates and help them better meet the demands of the job market 2. There is a pressing need to prioritize innovation among the youth in Bukoba to seize the existing opportunities. For instance, the preservation of their major agricultural products like bananas, tendons, fishing and coffee could be a significant focus area. Encouraging innovative approaches in these sectors will empower the youth to tap into the region's potential and contribute to its economic growth and development. 3. Emphasis should be placed on introducing short courses in entrepreneurship and secretarial skills, as well as offering specialized courses on sign language for individuals with hearing impairments. These initiatives aim to equip individuals with valuable skills that can enhance their career prospects and inclusiveness in the workforce. 4. The University of Dar es Salaam should consider the requirements of neighbouring countries, such as Uganda, Burundi, Rwanda, and Kenya, as they are anticipated to be significant stakeholders and potential major customers for the new campus. Considering the needs of these neighbouring countries will be essential in shaping the campus's offerings and fostering regional cooperation and educational opportunities.	1. The University is well aware of the market demands, and we are currently in the process of preparing a new curriculum that addresses all the requirements of employers and empowers graduates to become self-employed. 1. The new curriculum currently being developed takes the concern of innovation into full consideration and is designed to accommodate it effectively. The opportunities in Bukoba will then be captured effectively 2. The concern has been duly acknowledged, and it will be considered when advising the University management for their careful consideration. 3. The concern has been noted for advising the University management. 4. Noted and appreciated

Stakeholder	Views and concerns	Responses
	5. The proposed new UDSM campus stands to benefit from the existing large water supply project that runs near the site	
Town Planning Office	The design should encompass the inclusion of roads to connect the campus with the surrounding community.	The suggestion has been taken for evaluation and careful consideration.
Primary and Secondary Education Office	1. The University should incorporate capacity building for the community/villagers to facilitate interactions between the new university community and the existing residents. 2. The surrounding community should reap benefits from the establishment of the UDSM campus in the area, with specific focus on employment opportunities, access to social services including a hospital, and improved safety measures	1. The suggestion Is taken for action 2. The suggestion is good and is taken for consideration
Community Development Office	The University management should prioritize fostering proper interaction between the University students and students from the existing KWAUSO secondary school and primary school. Efforts to address UKIMWI (HIV/AIDS) should be prioritized in Bukoba, considering the area's well-known problem with the disease.	We can confidently assure that the establishment of the university will undoubtedly bring substantial benefits to the surrounding community. Not only will it create employment opportunities and improve access to social services, but it will also positively impact the economic and living standards of the people in the area. Great care will be given to addressing HIV/AIDS, and special programs aimed at raising awareness will be taken into consideration.

Stakeholder	Views and concerns	Responses
Environmental Office	The University should consider the issues of earthquakes, landslides, lightning, snow (experienced in the past), and soil erosion, as they can pose significant risks and potential losses.	We appreciate your raising these concerns and want to assure you that the University is fully aware of the issues mentioned. To safeguard the newly constructed campus from any negative impacts, the University will actively engage experts and involve all important stakeholders before, during, and after the construction phases. This proactive approach is aimed at effectively addressing and mitigating potential challenges, thereby ensuring the successful and sustainable development of the new campus.

Stakeholder	Views and concerns	Responses
Karabagaine Ward	1. The community is very positive about the development of a university in their ward which comes with great opportunity. 2. Their main concern is on when the project will to start. 3. The community wants the contractor to locally source for available construction materials. 4. The community wants the contractor to consider the local people for employment. 5. The community needs roads to be designed to consider the accessibility of all the villages surrounding the university	1. It is a positive project to the community as it comes with many opportunities. 2. The project was expected to start earlier but it has delayed due to procedures. The process has resumed and soon the construction activities shall commence. 3. The contractor shall survey the raw materials to check their availability and suitability depending on the requirements 4. The contractor shall be encouraged to use local people from Karabagaine ward and Bukoba at large to reduce project costs and enhance security and ownership of the project as well as maximise project benefits to the community 5. Design for access roads is done in such a way that all the surrounding villages are considered.

Stakeholder	Views and concerns	Responses
Itahwa Village	1. The project is well accepted in the village as it will bring more social economic benefits. It is expedient that the project be implemented within a short period. 2. The community is aware of the social and health impacts that are likely to come with this development. 3. The community is happy with the access road design connecting the villages surrounding the University. 4. The project should commence without a delay since the village allowed the villagers to use the land for agricultural activities and stopped using it when the proposal came. So, delay may tempt them to come back to the land for cultivation. 5. The contractor should provide reasonable wage and within time 6. The contractor should consider the local community for the work that does not require special skills. 7. If there are land issues in place, the resolutions should be done in advance to ensure the smooth execution of the project 8. The is need for the community to uphold security, report on any security threat and work closely with the community-based police department especially with the expected population growth and the security challenges that might come along with this it.	1. It was expected to commence earlier but procedures have delayed the process. 2. The community is doing sensitization on HIV and AIDS to the community. 3. Positive impact of the project to surrounding community. 4. The process has resumed and soon the construction activities shall commence 5. The contractor shall adhere to labour law and WB framework on labour working conditions 6. The University is working closely with District council and local leaders to resolve any grievance on land issues 7. The University is working closely with the District council and local leaders to resolve grievances on land issues 8. The police will be required to conduct regular surveillance which will be difficult because of the limited number of available police officers. Therefore, there should be a community support on security issues such as to have community surveillance group or community security people (Police Jamii) which will be supporting security issues in the surrounding areas.

Stakeholder	Views and concerns	Responses
Ibaraizibu Village	1. The project is good as it will absorb the students exiting from the secondary schools 2. The topography of the proposed site favors water supply system at low cost. 3. The university shall increase pressure on social services like electricity and water supply. 4. The project should consider improving the road network to enhance accessibility to the proposed site. 5. The project shall bring employment opportunities to the village. 6. The District Council should consider planning and surveying the surrounding areas immediately to avoid mushrooming of the settlement around the proposed project. 7. The proposed site has small forest in its proximity, so the university needs to conserve it as is the main source of water downstream. 8. The project shall increase the land value around the proposed project area. So, land use planning is important in this case. 9. The university should consider planting natural trees as the way to adapt climate change impacts. 10. Women should organize themselves in groups to tape employment opportunities during construction period. 11. Employment opportunities that do not need specialization should consider the local people.	1. The project shall reduce costs incurred in education 2. The university shall locate the tank at the highest elevation to ensure supply of water by gravity 3. The university shall have its own transformer and water supply 4. The plan has incorporated the road network 5. The contractor shall be encouraged to have on job training and ensure gender consideration 6. The plan is in place and the survey is going on 7. The project components are located aware from the natural forest reserve 8. The ongoing land use planning will increase land value 9. The university shall plant trees not only for climate change mitigation and adaptation but also for beautification 10. This increases trust to get involved in big assignment/opportunities 11. The contractor shall be encouraged to use local people from Karabagaine ward and Bukoba at large in order to reduce costs and enhance security and ownership of the project as well as maximizing project benefits to the community

Stakeholder	Views and concerns	Responses
Kangabusharo village	1. We are thankful to the proposed project for construction of UDSM Campus at Bukoba in Kagera 2. The local community is pleased to know how the University will collaborate with other institutions such as surrounding primary and secondary schools in support of their development. 3. The infrastructures such as roads which provide access to the proposed University should be well planned to ensure good access and provide opportunity for development of other associated activities within the area 4. The villages insisted that, streams within and surrounding the proposed UDSM area can be used for fishing if this is planned 5. We need our plots surrounding the proposed University area to be surveyed for proper development and investments. 6. Power supply in this area is still inadequate hence TANESCO should ensure adequate power supply in the area to facilitate other development activities 7. Similarly for water supply, we need water supply services to be improved to ensure all people have access to safe and clean water 8. The project should consider to give priority to local people on employment opportunities 9. Other issues to be observed during project implementation include accidents, speed controls, health and safety issues 10. The District Council, University and other key stakeholders should consider to design or plan for infrastructure support such as health facilities, water supply, wastewater, roads, electricity, etc., which will serve the incoming population in a few years ahead because of this University. 11. All future plans should observe the proposed developments and provide proper planning.	1. Noted 2. Noted 3. The District Planning Officer ensured the local communities of good access roads to the proposed University Campus to promote associated developments. 4. This can be done on local arrangements not but within the project 5. The District planning officer accepted the idea as they are currently continuing with surveying the surrounding areas. 6. TANESCO is ready to provide adequate supply to the proposed New University Campus 7. BUWASA is ready to supply water to the project area, but they should make an application for requesting the service. 8. This was noted and will be included as condition to support surrounding villagers 9. The project supervision team will be responsible to ensure all safeguard issues are well addressed during implementation. 10. The District accepted to include in their plans infrastructures that were not yet included to accommodate the new University campus 11. All development plans as of now will integrate the project in its planning.

Stakeholder	Views and concerns	Responses
Karabagaine Ward Police office	1. The coming of this University project will be associated with a number of issues 2. Some of these issues will be increase of crimes in the surrounding areas 3. The police will be required to conduct regular surveillances which will be difficult because of limited number of available police officers 4. Therefore, there should be community support on security issues such as to have community surveillance groups or community security people (Police Jamii) which will be supporting security issues in the surrounding areas. 5. The collaboration between the Police Jamii and the local community will bring positive results and we will manage crime levels in this area. 6. We need support from local communities on security issues such as providing information on the right time and promptly, provide information GBV cases 7. The local communities should be empowered on conflict resolutions in order to reduce cases that will be filled in the police and the court as well.	1. Noted 2. The ward police office has promised to set a plan to address this issue accordingly 3. Awareness creation will be done to ensure the community is well involved in security issues 4. The community indicated their readiness to provide support 5. The community was asked and promised to provide support 6. Noted 7. Empowerment will be done during project implementation

KWAUSO Secondary school	1. The Administration highly support the proposed construction of the UDSM Campus at Karabagaine ward, Bukoba in Kagera Region 2. The project will be beneficial to the Kagera communities particularly from this area 3. We used to have a quiet environment here without any disturbances but the coming of the proposed University will make this area active and busy 4. We need to increase restrictions here at school and construct a fence to ensure our students are safe 5. There will be increase of interactions between university and secondary students which can inspire secondary students to achieve university level but we need to increase restriction 6. There is a need to provide awareness education for HIV/AIDS and other STDs in order to make students more knowledgeable on protective measures and to have good moral behaviours 7. Currently the school have a total of 610 students (342 male and 268 female) 8. There are about 48 staff (21 teaching staff and 27 supporting staff) 9. The main source of water here in the school is borehole 10. Most of villagers get water from water streams 11. The major source of water in the streams are spring sources which enable to have water flow throughout the year in the streams 12. The main source of electricity is from the national grid	1. Noted 2. Noted 3. The project will observe and maintain environmental and social standard 4. The idea was well appreciated 5. Noted 6. The project will provide awareness on all students and community members in the project surrounding areas. 7. Noted 8. Noted 9. Noted 10. Noted 11. Noted 12. Noted

Stakeholder	Views and concerns	Responses
TANESCO	1. TANESCO regional office is aware of the proposed establishment of the UDSM-Kagera Campus in the Karabagaine ward 2. There is a planned construction of a 33KV transmission line that will service the project, where the survey is completed (part of the ongoing pre-urban electrification project) 3. UDSM is advised to submit Electricity load requirements for TANESCO to procure the relevant Transformer 4. UDSM is advised to submit the request to relocate/re-route the existing transmission line (servicing KWAUSO Secondary School) 5. TANESCO Kagera region receives reliable electric supply from Uganda (132 KV), which is enough to service the operations of the University	1. Noted 2. Noted and appreciated 3. The comment has been duly noted, and we will inform the relevant management to take appropriate action accordingly. 4. The comment has been duly noted, and we will inform the relevant management to take appropriate action accordingly. 5. Noted and appreciated
TANROADS	1. TANROADS regional office is aware of the proposed establishment of the UDSM-Kagera Campus in the Karabagaine ward 2. There is an un-paved regional road (Maugulu-Mwaogo road), with a 60 m wayleave traversing the UDSM plot 3. There is a potential for busy traffic that might interfere with the university's operations 4. The requested downgrading of the road to a strict road (30 m way-leave), should be submitted by the Bukoba DC to the regional Road Board. 5. TANROADS should be made fully aware and involved during the construction of the project.	1. Noted 2. Noted 3. We will communicate with the management and request a review of the wayleave, or explore alternative road options that do not cross the university, in order to minimize interference with our operations. 4. The management will be duly informed regarding the provided suggestion. 5. Noted

Stakeholder	Views and concerns	Responses
Tanzania Building Agency (TBA)	1. According to the nature of the project and its proposed site, geotechnical and geological studies are important to be undertaken. 2. There are difficulties to acquire construction materials. Cement is sourced outside Bukoba Region while reliable aggregates and sand are sourced from the Kyaka area situated 60km from the proposed site. 3. The rocks found in Bukoba are soft which may not be good for the proposed building construction.	1. The studies are being undertaken to check the compatibility /suitability of project components on site 2. The contractor shall survey the raw materials to check their availability and suitability depending on the requirements 3. The rocks shall only be used for activities that do not demand materials from hard rocks
FIRE OFFICE	1. The land use planning should be done in advance to accommodate enough roads and water supply systems (including water tanks) to ensure accessibility and provisions of fire hydrants, especially in hostels, offices and kitchen areas respectively 2. The contractor should work closely with Fire and Rescue Force office to ensure maximum integration of the fire management system in the project design 3. Fire is not a problem in Bukoba. However, engineering designs should ensure proper design of the power supply system as most of the reasons for fire occurrences are electric faults and lightning. 4. Currently, the Fire and Rescue Force Office has enough tools and equipment for firefighting and more trucks are expected to be received to meet the increasing demand and to strengthen the current fire management system	1. The land use has been planned and the survey is going on 2. The contractor shall cooperate with the fire and rescue force to integrate the same 3. The design has considered the provisions of the same 4. The ongoing concerted efforts will assure the safety of the investment

Stakeholder	Views and concerns	Responses
OSHA Office	1. The contract is obliged to register the work place to OSHA as a safe working environment 2. The contractor should undertake a regular work place risk assessment 3. The contractor should ensure that all workers' welfares are given due consideration when at work which include provision of First aid facilities, shade, water, restaurant 4. The contractor should provide all persona protective equipment (PPE) 5. The contractor should have safety officer during his or her operations at the site. 6. The health and safety budget should be in place to ensure a total compliance to OSHA requirement 7. The contractor should send workers' representatives to OSHA for training purposes 8. The contractor should seek an approval from OSHA in case, the lifting equipment and scaffold will be used. 9. The contractor should have accidents register and undertake toolbox meeting with workers	1. To adhere as it is also a requirement for the WB-funded project 2. To be adhered to for the safety and health of workers 3. The contractor shall have such requirements as per OSHA regulations 4. The budget shall accommodate safety gear for all workers due to the risky nature of the project 5. Adhered to as it is also the WB requirement to the contractor 6. The budget is inevitable for the management of safety and health risks at the site 7. To adhere to ensure enough health and safety education for all workers 8. To be adhered to as it is required by OSHA 9. The contractor shall be encouraged to use toolbox meetings as a platform to increase safety and health risks awareness

Stakeholder	Views and concerns	Responses
LAKE VICTORIA WATER BASIN-Kagera Office	1. Lake Victoria Basin Office highly support the project 2. The main source of water supply in Bukoba is from Lake Victoria 3. Currently there is water supply project in Karabagaine ward which will also supply water to the proposed University area 4. The water supply is already at Ibaraizibu village and will soon proceed to Itahwa and Kangabusharo villages 5. If the University will decide to drill a borehole, then they should get permission from BUWASA 6. The proposed construction of the University Campus should not disturb water resources available within the prosed area especially small streams 7. Baseline studies for water quality in the existing water resources are important and should be conducted whereas in future if there will be pollution of water, then the University will be responsible 8. Any abstraction of water during construction, they must get permission from BUWASA 9. We advise the University to construct its own WSPs in order to reduce costs 10. The wetland below within Kangabusharo village can be used for receiving treated wastewater effluents from the treatment system.	1. Noted 2. Noted 3. Noted 4. It was insisted to supply water also in the project village areas 5. If there is adequate water supply from BUWASA, there is no need to drill borehole 6. All streams or water sources within the project area will be protected. 7. Baseline survey is ongoing 8. Noted 9. Noted for consideration 10. Noted for consideration

Stakeholder	Views and concerns	Responses
Water Quality laboratory	1. The water Laboratory offer services for water quality measurements and monitoring. 2. The university should conduct water quality measurements for all water resources available in the proposed Campus 3. The Lake Victoria Basin Office is responsible for monitoring all sources in the Basin 4. There are no major challenges in water quality in Bukoba, but actual measurements will provide insight into the real situation and quality of the water.	1. Noted 2. Sample has been taken for measurements 3. Noted 4. Samples for measurement have been taken
Bukoba District Disaster Unit Disaster Focal Person	1. Education on earthquake evacuation procedures should be provided for the University community upon its establishment. 2. The construction of buildings should adhere to earthquake-resistant standards to mitigate the risks associated with earthquake events. 3. Currently, the committee that comprises multidisciplinary units, such as Fire, Transport, Police, etc., which deals with disasters, is inactive due to insufficient funding and stimulation	1. Suggestion is taken into consideration 2. The University is committed to incorporating comprehensive measures in the design to mitigate the risks associated with earthquakes and all other disasters, including landslides, flooding, etc. 3. With the establishment of the University, we anticipate that it will contribute value to the committee by involving experts and providing education to the community regarding disaster risks. Furthermore, we will recommend to the management that they become active participants in the committee from now on.

BUWASA	1. BUWASA support the project and would like to start as soon as possible 2. The proposed Kagera Campus will be located at Karabagaine ward where water supply is currently available and we assure the UDSM water is available 3. The University will be required to apply for water connection and BUWASA will be responsible to build the pipeline up to the University proposed Area 4. The costs from bringing water to the University area will be covered by BUWASA but water supply within the University Campus and Installation of water supply infrastructure system within the Campus will be covered by the UDSM. 5. These costs should be included in the project particularly when designs are being undertaken 6. Currently there is no sewerage system in Bukoba Town and most of the people and institutions use the onsite sanitation system whereas BUWASA provides services for desludging, transporting wastewater to the existing Waste Stabilization Ponds (WSPs) 7. The existing ponds are located at Nyanga area in Nyanga Ward, Bukoba Municipality. 8. The University should ensure proper management of waste water either by having their own wastewater treatment system or by using onsite sanitation system where wastewater will be taken to the existing Waste Stabilization Ponds 9. We advise the University to either have its own WSPs or use BUWASA existing ponds whereas transportation of wastewater from the University area to the Ponds can be provided by BUWASA and may cost Tshs. 150,000/= per trip (the current price). 10. If the University decides to construct its own wastewater treatment ponds, then they will be required to employ manpower for operation and maintenance which may be challenging.	1. Noted 2. The site was visited, observed and assessed 3. This will be done earlier before construction work starts to facilitate water supply 4. BUWASA will work on their costs and the University will work on their costs particularly internal water supply within the Campus. 5. This will be considered at early stage of project implementation 6. The Project will use the existing ponds while looking for other possibilities. 7. Noted 8. There will be a proper university system for waste management 9. The viability of this option will be assessed to select the best options 10. The idea was taken for further consideration

5.4 Stakeholders Engagement during Implementation phase

During project implementation, engagement activities will be undertaken whereby different methods of collecting information from stakeholders will be well captured. A number of structured and formal meetings, focus group discussions, community meetings, one to one interview, distribution of information (pamphlets) and site visits will be deployed. The timing for the conduct of the above meetings will be determined by the progress of the project implementation and when it seems necessary to invite stakeholders for their comments and observation. However, the sharing of information and progress with stakeholders will be subject to scrutiny with regards to the kind of information to be shared and how the same will be communicated to stakeholders. Furthermore, at this stage, the University of Dar es Salaam will ensure equal and effective participation from project preparation to implementation stages.

CHAPTER SIX

6.0 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1 Introduction

The process of impact identification and assessment of the project is the key process in ESIA and considers various stages of the project, from mobilisation/pre-construction to construction and operation stages. Once the impacts are identified the ESIA process proceeds in addressing those impacts to prevent or reduce the adverse effects associated with these impacts. This study is conducted to ensure the proposed construction/establishment of the UDSM Kagera Campus under this project is designed and implemented in an environmentally sound approach and sustainable manner that meets both the World Bank Environmental and Social Standards (ESS) and the Government of Tanzania (GoT) requirements. However, the Environmental risks and impacts assessment done included: (i) those defined by the WB Environmental Health and Safety Guidelines, EHSGs; (ii) those related to community safety; (iii) those related to climate change (iv) any material threat to the protection, conservation, maintenance and restoration of natural habitats and biodiversity; and (v) those related to ecosystem services and the use of living natural resources.

Furthermore, the assessment covers also social risks and impacts aspects that include: (i) threats to human security through crime or violence; (ii) risks that project impacts fall disproportionately on individuals and groups who, because of their 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 potentially significant impacts are identified and considered in project design and implementation. Several ‘tools’ are available to assist in impact identification. The simplest and most frequently used are checklists of impacts, matrices, network diagrams and map overlays. 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, as such, help also practitioners to avoid overlooking some of the potential of the impacts associated with a particular activity. The matrix provides a rather systematic way of evaluating the identified impacts.

6.2.1 Impacts associated with preconstruction, construction and operational phase.

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

Impacts associated with mobilization and construction phase

i. Generation and Accumulation of Solid Waste at the Site;
ii. Creation of Noise Pollution/Auditory Nuisance;
iii. Dust Emission and Air Quality Degradation;
iv. Soil Erosion and Land Degradation;
v. Fire outbreak and Other Related Environmental Disaster;
vi. Contamination for poor management of liquid waste;
vii. Health and Safety of workers; and
viii. Employments and other Socio-economic benefit;

Impacts Associated with Operation Phase

i. Employment opportunities;
ii. Increased skills and impart knowledge to local communities
iii. Population increases and increased pressure on social services
iv. Child labour and incidence of GBV
v. Increased transmission of STDs, COVID etc.
vi. Increase in level of crimes and conflicts
vii. Change in social values and ethics
viii. Increase of academic facilities in Kagera
ix. Increase in revenue to the government
x. Increased solid and liquid waste
xi. Increased Effluent waste and Surface/Storm Runoff Generation
xii. Increased Risk to Safety and Health
xiii. Increased traffic
xiv. Fire risk.
xv. Increased commercial and social activities around project location

Impacts Associated with Decommissioning Phase

i. Loss of Employment Opportunities;
ii. Livelihoods and Economic Loss;
iii. Solid Waste Generation;
iv. Excessive Noise and Vibration pollution;
v. Dust and Exhaust Emissions;
vi. Occupational /Public Health and Safety Hazards;

vii. Displacement of people;

viii. Abandoned Structures

6.2.2 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 impact 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 experience.

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.

6.2.3 Impact Rating Criteria

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

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

Table 6.1Spatial Rating

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

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

Table 6.2Temporal Rating

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

- **Phase-** During which phase of the construction is the impact likely to occur. The phases included Pre-construction/Mobilization, Construction, Demobilization and Operation.

- **Reversibility of the impact-** Every impact was checked if its effect can be reversed or not. Letter R was used to denote reversible impacts while IR was used to denote Irreversible impacts.

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

Table 6.3Impact Correlation Matrix for the proposed construction of UDSM buildings

S/n	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance and demolition	Establishment and operation of campsite	Exploitation of quarries /natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching/imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact

Impacts on the physical environment																												
1.	Risk to generate emergency/disaster events	-2	0	0	-1	0	-1	-1	-2	0	-2	-1	-2	-2	-2	-2	-2	-1	-1	-2	0	0	N	MT	R		
2.	Loss of biodiversity			-2	-1	-2	-2	-1	-2	-1	0	0	-1	+1	+1	+1	-1	-1	-1	-1	-1	0	I	MT	R		
3.	Change of habitant			-1	-1	-2	-2	-1	-2	-1	0	0	-1	+1	+1	+1	-1	-1	-1	-1	-1	0	I	MT	R		
4.	Acceleration of soil erosion	0	0	-3	-1	-3	-1	-1	0	-1	0	0	0	-1	-1	-1	0	-1	0	0	-1	0	L	ST	R	✓	
5.	Generation of liquid waste	0	0	-1	-3	-1	0	-1	-3	0	-2	-2	-3	+3	0	+3	0	-1	-1	-3	0	0	L	MT	R	✓	
6.	Generation of solid waste	0	0	-3	-3	-2	-1	-1	-2	-1	-3	-2	-3	0	+3	+3	0	-1	-1	-3	-3	0	L	MT	R	✓	
7.	Generation of Hazardous waste	0	0	0	-3	-1	0	0	-2	0	-2	-3	0	0	0	+3	+3	-1	-1	-1	-2	0	R	LT	IR	✓	✓
8.	Increased runoff/storm water	0	0	-2	-2	-1	0	0	-2	-2	0	0	0	+1	0	0	0	0	-1	-2	-1	0	R	MT	R	✓	
9.	Land pollution	0	0	-1	-2	-1	-1	-1	-3	-1	-1	-1	-1	+3	+3	+3	0	-1	-1	-2	-3	0	R	MT	R	✓	
10.	Surface and ground Water Pollution	0	0	-1	-2	-2	-2	-1	-3	-1	-1	-1	-2	+3	+3	+3	0	-1	-1	-2	-3	0	R	MT	R	✓	
11	Air pollution	0	0	-1	-1	-2	-2	-1	-3	-1	-1	-1	-1	0	-1	0	0	-1	-1	-1	-1	0	I	LT	IR	✓	✓
12	Noise pollution	0	0	-2	-2	-2	-2	-1	-3	-1	-1	-1	-1	0	0	0	0	-1	-1	-2	-2	0	L	MT	R	✓	
13	Generation of vibrations	0	0	-2	-2	-2	-2	-1	-3	-1	-1	-1	-1	0	0	0	0	-1	-1	-2	-2	0	L	MT	R	✓	
14	Visual impact	+3	0	-1	-1	-1	-1	-1	-2	-2	0	0	0	0	0	0	0	0	0	0	-2	0	L	LT	IR	✓	✓

15	Increase pressure on natural resources	0	0	-2	-1	-2	-1	-1	-2	-1	0	0	-1	+3	+3	+3	-1	-1	-1	-2	-2	0				✓	
Impacts on Social Environment																											
1.	Employment opportunities	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+1	+2	+1	-3	I	LT	IR	✓	✓
2.	Increase in income generation opportunities	0	0	+2	+1	+1	+1	+1	+2	+1	+3	+3	+2	+1	+1	+1	+1	+1	+1	+2	+1	-3	L	LT	IR	✓	✓
3.	Changes in lifestyle and quality of life	0	0	+2	+1	+1	+1	+1	+2	+1	+3	+3	+2	+1	+1	+1	+1	+1	+1	+2	+1	-3	L	LT	IR	✓	✓
4.	Increased skills and impart knowledge to local communities	0	0	+1	+1	+1	+1	+1	+3	+1	+2	+1	+2	+1	+1	+1	+1	+1	+1	+1	+1	-3	N	LT	IR	✓	✓
5.	Increase of academic facilities in Kagera	0	0	0	0	0	0	0	0	0	+3	+2	+2	0	01	0	0	0	0	0	0	-3	N	LT	IR	✓	✓
6.	Loss of cultural assets and displacement ritual sites	0	-2	-2	-1	0	0	0	+1	0	0	+2	0	0	0	0	0	0	0	0	0	0	L	LT	R		✓
7.	Change of habitant	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	L	LT	R	✓	✓
8.	Population increase	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-2	-2	0	0	0	0	-1	-1	-2	-1	0	R	LT	IR	✓	✓
9.	Increased pressure on social services	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-2	-2	0	0	0	0	-1	-1	-2	-1	0	R	LT	IR	✓	✓
10.	Increased traffic flow	0	0	-1	-1	-1	-1	-1	-1	-1	-3	-1	-1	0	0	0	0	-1	-1	-1	-1	0	L	LT	IR	✓	✓

11.	Increased risks of road/ ferry accidents	0	0	-1	-1	-1	-1	-1	-1	-1	-3	-1	-1	0	0	0	0	-1	-1	-1	-1	0	R	LT	IR	✓	✓
12.	Increase in level of crimes	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-1	-1	0	0	0	0	-1	-2	-2	-2	-2	L	LT	R	✓	
13.	Increased risks of communicable diseases	0	0	-1	-1	-1	-1	-1	-2	-1	-3	+2	-1	+2	+2	+2	+2	-1	-2	-2	-2	-2	I	LT	R	✓	
14	Change in social values and ethics	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-1	-2	-1	-1	-1	-1	-1	-2	-1	-1	-1	L	I	IR	✓	✓
16	Increase in conflicts	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-1	-2	0	0	0	0	0	-1	-2	-1	-1	L	LT	R		
17	Food insecurity	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	-2	0	0	0	0	0	-1	-2	-1	-1	R	LT	R	✓	
18	Price inflation of goods and services	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	-2	0	0	0	0	0	-1	-2	-1	-1	R	MT	R		
19	Occupation health, safety and security risks	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	-2	0	0	0	0	0	-1	-2	-1	-1	L	MT	R		
21	Community health and safety risks	0	0	-1	-1	-2	-1	-2	-1	-3	+2	-2	+2	+2	+2	0	0	-1	-2	-1	-1	L	MT	R			
22	Child labour	0	0	-1	-1	-1	-1	-1	-2	-1	0	-1	-2	-1	-1	-1	0	-1	-1	-1	-1	-1	L	MT	R		
23	Increased incidence of GBV	0	0	-1	-1	-1	-1	-1	-2	-1	-3	+2	-2	0	0	0	0	-1	-1	-1	-1	-1	L	MT	R		
24	Increased transmission of STDs, COVID etc	0	0	-1	-1	-1	-1	-1	-2	-1	-3	+2	-2	0	0	0	0	-1	-1	-1	-1	-1	I	LT	R	✓	
25	Loss of livelihood	0	0	-2	-1	-1	-1	-1	-2	-1	+3	+2	+2	0	0	0	0	+1	+1	-1	+1	-2	L	MT	R	✓	

26	Restrictions on use of access road connecting Itahwa and Kangabusharo through the campus	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	0	0	0	0	0	0	0	-1	-1	0	L	LT	R		
27	Loss of employment	0	0	+1	+1	+1	+1	+1	+3	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	-3	I	MT	IR		
Economic Impacts																											
1.	Increased Revenues to local authorities	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	N	LT	R	✓	✓
2.	Increased commercial and social activities around project locations	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	L	LT	R	✓	✓
3.	Increased Income to local suppliers and service providers	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	I	LT	IR	✓	
4.	Increased land values	0	0	+1	+1	+1	+1	+1	+3	+1	+3	+2	+2	+1	+1	+1	+1	+1	+1	+1	+1	-2	L	LT	IR	✓	✓
5.	Loss of revenue to the government and University	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	N	ST	R		

Source: Consultant analysis, 2023

6.3 Potential environmental and social impacts during the pre-construction phase

Positive social impacts

6.3.1 Job Creation and employment opportunities

During the mobilisation/Pre-construction phase, the project will involve the contractor that will employ over 150 people to carry out mobilisation tasks, such as the establishment of campsite, quarrying, material extraction, transportation activities, etc. This will boost self-employment opportunities due to the increased demand for various services and goods by those working on the project. For instance, there will be a noticeable rise in the number of restaurants and food vendors to cater to the growing workforce. This increased demand for services within the community will contribute to an improvement in their economic well-being. The impact is moderately significant, primarily affecting the Kagera Region at a regional level, with some lasting effects on the local community.

6.3.2 Increase in income generation opportunities.

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

This impact will be moderate and will affect the surrounding communities in Karabagaine ward and Bukoba district and will be a long-term impact in the sense that even at the end of the phase the created income generation opportunities will leave the lives of the beneficiaries improved in one way or another. One of the important things to note is that, after the end of this phase the impacts will never be reversible.

6.3.3 Changes in lifestyle and quality of life

It is expected that, the increase in employment opportunities both formal and informal will result in the rise of high wages among the population in the areas as well as the surrounding communities. 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 such as bicycles and radios. Apart from that, the influx of people in the area

will result in an increased number of people with mixed culture, hence easy to alter or influence the same to undergo some changes that may be positive or negative.

This impact will be moderate and will affect the surrounding communities in Karabagaine ward and Bukoba district and will be a long-term impact in the sense that even at the end of the phase the new lifestyle developed and improved quality of life will persist. After the end of this phase, the impacts will never be reversible (irreversible).

6.3.4 Increased Revenues to local and national Authorities

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

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

6.3.5 Increased commercial and social activities around project locations.

It is envisaged that the pre-construction stages of the buildings at Itahwa and Kangabusharo villages in Karabagaine Ward; Bukoba District which includes but is not limited to; site clearance, the establishment of campsites, and transportation of materials will attract several investors from within and outside surrounding communities to invest in meeting the needs of the increased population as well as people seeking for employment in the area. This is likely to enhance the development of the centres in surrounding areas. It is also expected that service providers such as food vendors and general small business enterprises (Viosks) may be established and increased during the construction phase to provide services to both skilled and unskilled labourers working in the project site.

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

6.3.6 Increased income to local suppliers and service providers

The Population of Itahwa and Kangabusharo villages is expected to triple in the next few years as a result of the UDSM, Kagera campus construction. During construction, the project is expected to employ more than 150 people from outside Itahwa and Kangabusharo villages. Therefore, the villages will be having more people than before. The change in population level due to influx of workers and labourers will contribute to the new market opportunities for small, middle and big businesspersons. This will increase money circulation at the area leading to high income to the local suppliers and service providers.

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

Negative social Impacts

6.3.7 Community health and safety risks

During the site clearance and demolition, establishment of campsite, and trench excavation and casting of foundations will involve some activities that may rise in endangering the lives of the community members living close to those activities. This in turn will likely endanger the lives of the local communities in the form of accidents if appropriate measures are not taken. In the areas where raw materials will be taken like sand, stones and water accidents are likely to happen if appropriate measures are not taken on board. On the transportation of raw materials to the site, drivers may fail to observe safety measures along the road, something that may result in accidents to other road users like pedestrians, motorcyclists, and bodaboda drivers.
This impact will be moderate and will affect the project communities of Itahwa and Kangabusharo as well as other local communities surrounding Karabagaine ward and Bukoba district and will be a short-term impact in the sense that at the end of this phase all the risks will die natural death. Furthermore, the impact will not be piling up and no

cumulative effects may be witnessed at the end of this phase. The impacts arising out of this are reversible in the sense that the same can be controlled upon strict use of road safety measures and occupational safety measures.

6.3.8 Loss of revenue to the government

During pre-construction, the local government will collect revenues from the workers and suppliers of materials. This will end when the phase is over. This is because workers will stop being paid, and suppliers will no longer sell the materials to the project. In this case, the government will lose revenue.

This impact will be moderate and will affect the entire nation in the sense that revenue collected from the project area not only benefited the local area but also the entire nation and will be likely to have a short-term impact in the sense that even at the end of the phase the source of revenues is expected to grow in terms of size and services in the phase next to this, the construction phase. Furthermore, as explained in the previous sentence, the impact will not be piling and no cumulative effects. One of the important things to note is that, after the end of this phase the impacts will be reversible in the sense that the government may propose and or develop strategies to retain the revenues or even multiply as the project will be more growing in the stage to follow.

Negative Environmental Impacts

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

The design of buildings or structural elements which do not consider the emergencies due to technical and financial reasons may be prone to structural failure, fire incidences, flooding, and attract disease causing agents at the proposed UDSM Kagera campus. These may ruin the proposed UDSM, Kagera campus investment plans as well as the health and safety of the students, staff, service providers, community, and physical environment at large. Also, the buildings and structures may not become user friendly due to failure to consider climate, safety and security issues. The incompatibility of the buildings design with UDSM, Kagera campus master plan and failure to meet the design capacity may also affect the intended use of the buildings hence becoming white elephant buildings. This risk is projected to be moderate during construction and high during operation phase (impacts shall be fully realised during operation phase than the construction phase). The scale of the impact will be National and Medium term.

6.3.10 Change of habitat

Change in habitat is expected to occur due to change in land use, removal of vegetation cover and top-soils, pollution emanated during construction and operational phase, and infrastructure development. Plants offer a critical medium to protect the wide variety of species.

Cleaning of land during the construction phase will remove important vegetation/plants which serve different purposes, including soil erosion control, air quality regulation, providing habitats and feeding to some animals. The vegetation cover will account for the larger percentage of the land (including proposed road reserve areas) of the total UDSM Kagera campus area.

The extent of change of habitat is local and long term during the life of the project. The project has a negative impact on the provision of ecosystem services to the community. The results of the impacts are reversible and have some cumulative impacts.

6.3.11 Loss of biodiversity

Loss of biodiversity: It was observed that UDSM, Kagera campus site contains different species of plants which provide natural habitats for small animals. Presence of the proposed project will lead to the following.

- Cleaning of land during the construction phase will cause the loss of animal and plant species due to the loss of habitat. Trees provide shelter for some species and provide the canopy that regulates the temperature, which could affect biotic components of the ecosystem.
- Plant root systems provide habitats for microorganisms. Destroying the same will affect the microbial community responsible for the water treatment, the removal of pollutants through phytodegradation and the recycling of nutrients.
- Poor disposal of hazardous waste which will be generated during operation e.g. from laboratories, workshops and other phases may kill some of plant species and reduce their richness.

The extent of loss of biodiversity is local and long term during the life of the project. The impact significance is moderate by the local biodiversity of the site. The results of the impacts are reversible, and have some residual impacts even after the life of the project.

6.3.12 Acceleration of Soil Erosion

Human activities, including land clearing and excavation leave soil vulnerable to erosion. Soil erosion happens when construction equipment destroys/removes vegetation, which provides root systems that hold dirt in place and prevent erosion. Once the soil is loose, the top soils are displaced by both wind and water erosion. The existence of abandoned sandpits at the proposed site increases the risks of water caused soil erosion. *This impact is localized and will be short term, only during the construction phase. The significance of the impact is high; however, the situation is reversible with application of mitigation measures.*

6.3.13 Loss of Landscape and scenic view

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

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

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

6.3.14 Land pollution

Construction activities will generate large quantities of waste materials, both liquid and solid (including hazardous waste), with varying nature, including scrap metal, plastic, wood, concrete, bricks etc. When these materials are not properly disposed of, it will contribute to land pollution. Land could also be polluted by oil spills, from machines and equipment, placement of construction materials on bare land and others.
This impact is assessed to be of local scale and short-term during construction. The significance of the impact is high and reversible.

6.3.15 Impacts on surface and ground water quality

The main sources of pollution during preconstruction and construction phases of the project could be:

- Oil spills from construction equipment and vehicle (hydrocarbons (for example grease, oils and lubricants);
- Release of wastewater from domestic and construction activities;
- On land disposal of construction wastes and other mixed wastes during the operation phase;
- Runoff on piled construction materials (could potentially contain heavy metals, leaching from the materials);
- Sediments and solids eroded from the surface

The hydrological study of the site indicated that the site is within the Lake Victoria basin. The Kilele and Rwamrumba streams collect surface runoff from the site to the wetland, which is located in one of the project sites. Therefore, release of any contaminants (solids or liquid) on the land can potentially contaminate surface runoff, and eventually impair the quality of the water by altering its physical- chemical parameters of Lake Victoria water, which is the main source of water supply to the Lake Zone communities. Further, infiltration of contaminated runoff could potentially contaminate groundwater.

Contaminated water could directly affect domestic water quality, render it useless for irrigation, contaminate food chains and also affect living organisms in water. *This impact is assessed to be of regional scale (due to the size of Lake Victoria) and short-term during construction. The significance of the impact is high and irreversible.*

6.4 Potential environmental and social impacts during construction phase

Positive social impacts

6.4.1 Jobs creation/Employment opportunities

Considering the extensive amount of construction work that needs to be done, this phase will require a large number of workers. The contractor chosen for the job will be expected to hire around 150 people, including professionals and non-professionals, from both the local area and other parts of the country. Additionally, there will be opportunities for indirect employment and self-employment related to tasks such as transporting construction materials and supplying various products and services. For instance, the number of food vendors, including "Mama Ntilie," will increase to cater to the growing workforce. This will lead to a significant increase in income in the community, which will greatly improve their economic well-being. This will have a significant impact, felt at a regional level in the Kagera Region, and is expected to have long-term benefits for the local community.

6.4.2 Increase in income generation opportunities

The influx of people, including both skilled and unskilled labourers, in the area presents a lucrative opportunity for local residents to engage in business activities. This will allow them to earn more income than they did previously, when most of them relied solely on agriculture and farming. The project will create a new source of income not only for the people within Itahwa and Kangabusharo communities but also for the surrounding communities of Karabagaine ward and Bukoba district at large.

6.4.3 Changes in lifestyle and quality of life

It is expected that the increase in employment opportunities, both formal and informal, will lead to higher wages for the population in the areas and surrounding communities. This is likely to increase their spending power and therefore improve their standard of living. Additionally, this will have a positive impact on the communities where the workers come from or reside, as they will have more resources to pay for things like school fees and assets. However, the influx of people in the area may also result in an increased number of people with diverse cultural backgrounds. This could potentially lead to cultural changes, both positive and negative.

The impact of this project will be moderate and will affect the communities of Itahwa and Kangabusharo, as well as other local communities surrounding Karabagaine ward and Bukoba district. It is expected to have a long-term impact, as the new lifestyle developed and improved quality of life will persist even after the project phase ends. Additionally, the impact will be cumulative and not limited to those directly involved, but also those associated with them. It is important to note that the impacts will be irreversible after the end of this phase, hence making it crucial to carefully consider the project's effects.

6.4.4 Increased skills and impart knowledge to local communities

As mentioned earlier, the construction phase of the proposed buildings will offer numerous employment opportunities for both skilled and unskilled labourers. This phase may also provide practical learning and training opportunities for locals and people from different parts of the country, which will help them acquire the necessary skills and knowledge for the construction of the new UDSM Kagera campus. During this phase, technicians and machine operators from the local area and other parts of the country will be employed and acquire essential skills that will be beneficial for both their individual and communal lives. These skills will enable them to improve their economic activities, leading to a higher income and a better standard of living. Alternatively, they may use these skills to enhance the lives of their fellow community members in the local areas of Itahwa, Kangabusharo, and the entire nation.

6.4.5 Increased Revenues to local and national Authorities

The proposed project development has the potential to benefit local communities by providing employment opportunities during the construction phase, which can generate income. This will create opportunities for local businesses to provide services and supply goods such as food, hotels, and building materials. As a result, more money will circulate within the local business community, leading to additional spin-off effects that will improve the local economy. It is also expected that increased business and investments in the area will allow local government authorities to collect more taxes, which can improve the availability of social services in the area. As users pay specific taxes and fees for services, the local and national revenue will increase even before the operational phase commences.

The impact of the project will be moderate and will affect the entire nation in the sense that the revenue collected from the project area will not be used solely in the local area, but will contribute to the national budget. This will have a long-term impact, as the source of income developed prior will persist and grow in terms of size and services. Furthermore, the impact will be cumulative, not only for those directly involved but also for the entire nation, which will benefit from the increased government revenue in terms of improved social services and other government support for citizens. It is important to note that after the end of this phase, the impacts will be reversible in the sense that the government may propose and develop strategies to retain the revenues or even multiply them, as the project will continue to grow during the operation phase.

6.4.6 Increased commercial and social activities around project locations

It is expected that the initial stages of building construction at the project site, such as site clearance, setting up campsites, and transporting materials, will attract investors from both the surrounding communities and beyond. This is likely to meet the needs of the increased population and create job opportunities in the area. As a result, the surrounding villages are expected to experience significant development. During the construction phase, it is also anticipated that service providers such as food vendors and small business enterprises (viosks) will be established to provide services to both skilled and unskilled labourers working on the project site.

It is expected that the impact of this project will be moderate and will affect the communities of Itahwa and Kangabusharo, as well as other local communities surrounding Karabagaine ward and Bukoba district in general. This impact will be long-

term, meaning that even after the project phase has ended, new commercial activities at the project site will persist and grow in terms of size and magnitude of the services provided. Moreover, the impact will have cumulative effects not only on those directly involved but also on the ones associated with them, including local authorities in the area and the people they serve. It is important to note that after the end of this phase, the impacts will be reversible, as the owners of these social and commercial activities may develop new strategies to reconstruct and redevelop or even multiply the interventions, as the project will continue to grow in the next stages of the project cycle.

6.4.7 Increased income to local suppliers and service providers

The construction of the UDSM Kagera campus is expected to cause a significant increase in population for the Itahwa and Kangabusharo villages. It is estimated that the population of these villages will triple in the coming years due to this project. Moreover, during the construction phase, around 150 workers from outside the villages will be employed, which will further contribute to the increase in population. This change in population will result in new market opportunities for small and medium-sized business owners, leading to increased money circulation in the area. As a result, local suppliers and service providers will also benefit from this development, generating higher income levels.

It is expected that the impact of this project will be moderate and will affect the communities of Itahwa and Kangabusharo, as well as other local communities surrounding Karabagaine ward and Bukoba district. This impact will be long-term and will improve the lives of the local suppliers and service providers, even after the completion of the project. It is important to note that the impact will have cumulative effects not only on those directly involved but also on those associated with them. Furthermore, it is irreversible, and once the project is completed, the impacts will persist.

6.4.8 Increased land values

The start of construction activities for the UDSM-Kagera campus will have a significant impact on the land status in Karabagaine Ward, Bukoba District. Landowners are optimistic that the introduction of the campus will increase the value of their land. As a result, they are actively seeking to acquire title deeds, which will enable them to secure loans from financial institutions. These loans will be used for a variety of purposes, such as home improvements, healthcare, and education services. This increase in land value will have a long-lasting and positive effect on the local communities, particularly in Itahwa and Kangabusharo, as well as neighbouring areas around Karabagaine Ward. It's important to note that once this phase is completed, these effects will be irreversible,

resulting in long-term and residual effects that will benefit not only those directly involved but also the broader local community.

Potential negative social impacts

6.4.9 Population Increase and increased pressure on social services

The residents in and around the project area are not receiving adequate social and infrastructural services such as health, education and water. This means that if more people move into the project area, the already limited social infrastructure will come under more pressure and further burden the existing service delivery system. During the construction phase, over 200 people are expected to reside in these communities, which will put additional pressure on the limited social services available. These negative impacts will be moderate and will have a long-term effect on the entire region surrounding the project area. Furthermore, the impacts will accumulate with time and affect not only those directly involved but also those associated with them in the region. It is important to note that the impacts will be irreversible and will have residual effects even after the end of the construction phase.

6.4.10 Increased level of crimes

During the selection and design stage of the project, it is expected that there will be a significant recruitment of both skilled and unskilled workers from nearby communities. This will also attract people from other areas who will want to invest in goods and services. As a result, the population around the project site will increase, leading to the growth of trading centres. However, experience and sociological studies have shown that with a high concentration of people from different backgrounds and behaviours, an increase in crime rates and changes in norms and behaviour are common. This is likely to be the case for trading centres like Itahwa, Kangabusharo, Ibaraizibu, and other nearby areas around the project site.

It is expected that there will be negative impacts of moderate severity resulting from the project. These impacts will affect the nearby areas such as Itahwa, Kangabusharo, and Ibaraizibu villages, as well as the entire area of Karabagaine ward. The impacts are likely to last for a long time and affect the whole region surrounding the project site. However, it is important to note that after the completion of this phase, UDSM in collaboration with local authorities and Police will establish strategies to reduce and combat crimes, making the impacts reversible.

6.4.11 Community health and safety risks

During the construction phase, certain activities may pose a risk to the safety of community members residing near these activities. This can lead to accidents and endanger the lives of local communities if appropriate precautions are not taken. In areas where raw materials such as sand, stones, and water will be extracted, accidents are likely to occur if adequate safety measures are not put in place. During the transportation of raw materials to the construction site, drivers may fail to observe safety measures, which could result in accidents involving other road users such as pedestrians, motorcyclists, and bodaboda drivers. The impact of the project will be moderate and will affect the communities of Itahwa and Kangabusharo villages, along with other local communities surrounding Karabagaine ward and Bukoba district. However, it will be a short-term impact, and all the risks will naturally cease to exist at the end of this phase. There will be no cumulative effects, and the impacts are reversible if strict OSHA safety measures are employed to control them.

6.4.12 Prevalence of Communicable diseases

The 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 centres in the area will attract different businesses and different people to the extent that the level of prostitution will likely increase in the area, provided that there will be employees from other areas of the country. Increased prevalence of communicable diseases like HIV/AIDS will likely to happen and consequently result in the increased number of orphans and single parenting in the project area.

Impacts on the physical environment

Negative Environmental Impacts

6.4.13 Air Pollution

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

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

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

6.4.14 Increased Greenhouse Gas (GHG) Generation

The current and projected concentration of greenhouse gases (GHGs) in the atmosphere poses a significant threat to the well-being of both present and future generations. The construction of the UDSM-Kagera Campus, as with any construction project, is associated with GHG emissions stemming from vehicles, machinery, and various equipment. Specifically, internal combustion engines used in this project will release GHGs, including carbon dioxide (CO2), methane (CH4), and small quantities of harmful gases like Nitrogen Oxides (NOx), Sulphur Oxides (SOx), and hydrocarbons.

The rate and volume of emissions will be influenced by factors such as the type of equipment, road conditions, vehicle speeds, equipment quantities, project duration, and prevailing atmospheric conditions, including wind and moisture levels. The primary source of atmospheric pollutant emissions will be from mobile sources, particularly exhaust emissions from trucks, tippers, and wheel loaders. Table 6.4 provides emission factors for various construction equipment and vehicles, along with estimated emissions.

Table 6.4Emission of construction equipment and vehicles

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

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

6.4.15 Contribution to Climate Change

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

The production of greenhouse gases has long-term consequences on a planetary level. This impact is considered of moderate significance, long term and of international concern. Further the impact is reversible and has residual impacts.

6.4.16 Reduction of CO_2 Sequestration Potential

The CO_2 sequestration potential as one category of the Ecosystem Services (i.e., regulating services). Vegetation clearance during construction activities will reduce the CO_2 sequestration process and hence reduction of global efforts towards climate change mitigation. It is estimated that a forest can absorb 162 g C/m^2 to 168 g C/m^2 annually

(Getter et al. 2009). Therefore, the potential reduction of about (166,066,200 – 172,216,800) g C/m^2 is expected.

6.4.17 Increased Noise Level during Construction

The baseline noise monitoring indicated that noise levels at the site ranged from 40-47 dBA, which is below national and IFC standards for daytime exposure. The Tanzania Standard Limits (TZS) guidelines require noise emission levels to be less than 55 dBA during the day within residential/institutional areas. The proposed project activities will inevitably increase noise levels. Noises from vehicles, equipment, construction crew, etc. may rather be significant. Noise beyond some level (70dBA) is itself a nuisance and needs to be avoided. This impact is local (at the proposed site) and of moderate significance, moderate and short term during the construction phase. The impact is reversible and is cumulative (adding to the existing noise level).

6.4.18 Increased vibration

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Vibration will be produced by construction vehicles, plants 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 the foundation. Due to an increase in activities and the number of operational vehicles, the impacts of vibration include causing disturbance to neighbours and physical damage to properties near the construction site. *This impact is moderate, localized and will be medium term.*

6.4.19 Generation of Waste during Construction

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

- Some of the construction wastes are difficult to dispose of and have no residual value (cannot be reused or recycled. This has impacts on waste management costs in terms of transportation, land required for disposal, and costs for establishing suitable disposal sites.

- Some of the construction wastes when exposed to moist environment, can release *hazardous components* such as lead, and other metal ions (i.e., Cu. Fe, Zn etc), then can contaminate land, and water resources. Such contamination can potentially enter the food chain and cause health effects to humans and other organisms.

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

6.4.20 Wastewater Management problems

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

6.4.21 Safety and health risks

The construction activities of the proposed project will expose the workers involved in this activity to safety and health risks. These will be due to poor usage of PPEs during construction, and misuse of site safety procedures. Also, the air/dusts to be emitted during this activity may expose the labourers to agents that may trigger bronchial and other respiratory tract infections/diseases. *This impact is considered negative, short term and low impact magnitude*.

6.5 Potential impacts during the operation phase

Potential Positive Social Impacts

6.5.1 Diversification of the University of Dar es Salaam

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

6.5.2 Job Creation and employment opportunities

During this phase, people shall be employed by the University to conduct a number of activities at the campus including both academic and administrative activities. During this phase, it is expected that more than 10,000 students will be registered at the University, calling for higher demand of both staff and non-staff, amounting to 100. In addition to that, there will be an increase in self-employment due to the higher demands and supply of various goods and services for people working at the campus as well as students studying at the campus. For example, an increase in restaurants, bars, hotels, *and Mama Ntilie will be obvious to meet the increased number of people working on* the site.

This positive impact arising from this will be high and is likely to affect large areas as the project will pileup from the local area to the international level (it is expected that some of the students and teachers may come out of the country) and will be a long-term impact in the sense that even at the end of the phase the created employment and business opportunity will leave the lives of those employed improved in one way or another. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also to the ones associated with them. One of the important things to note is that after the end of this phase, the impacts will never be reversible and, hence, irreversible.

6.5.3 Increase in income generation opportunities

This influx of people and particularly students amounting to 10,000 at the University calling for higher demand of both staff and non-staff amounting to 100 in the area will provide an opportunity for local people to engage in some sort of business activities that

will enable them to get more income compared to the previous time in which most of them depended on agriculture and farming as their only source of income. The project will create a new source of income for both the people within Karabagaine ward and Bukoba district in general.

This impact will be high and will affect the project communities of Itahwa and Kangabusharo as well as other local communities surrounding Karabagaine ward and Bukoba district and will be a long-term impact in the sense that even at the end of the phase the created income generation opportunities will leave the lives of the beneficiaries improved in one way or another. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also the one associated with them. One of the important things to note is that, after the end of this phase the impacts will never be reversible hence irreversible.

6.5.4 Changes in lifestyle and quality of life

It is expected that, the increase in employment opportunities both formal and informal will result in the rise of high wages among the population in the areas as well as the surrounding communities. This is likely to increase their expenditure and consequently alter their living standard. Apart from that, the influx of people in the area will result in an increased number of people with mixed culture, hence it is easy to alter or influence the same to undergo some changes that may be positive or negative.

This impact will be high and will affect the project communities of Karabagaine ward and Bukoba District and will be a long-term impact in the sense that even at the end of the phase the new lifestyle developed and improved quality of life will persist. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also the one associated with them. One of the important things to note is that, after the end of this phase the impacts will never be reversible hence irreversible.

6.5.5 Increased skills and impart knowledge to local communities

As noted above, the operation phase of the University will register and train up to 10,000 students in different phases till its full capacity of the campus. In addition to that, there will potentially be training opportunities or practical learning for local people who will be employed in the project particularly staff and non-staff during this phase and consequently acquire necessary skills that will be of paramount importance in their lives. During operation, the university will offer some short courses to help people to acquire necessary skills used to perform their daily activities. This will enable them to improve

their economic activities which will lead to higher income and hence improvement of their living standards.

This impact will be high and will affect the entire nation as well as the education system. It will have a long-term impact in the sense that even at the end of the phase, the new skills and knowledge acquired will be necessary for improving their own life as well as contributing to the development of the nation. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also to the ones associated with them. One of the important things to note is that, after the end of this phase, the impacts will never be reversible, hence irreversible and will have residual impacts.

6.5.6 Increase of academic facilities in Kagera Region

The UDSM-Kagera campus is expected to cooperate with other related academic institutions in Kagera. The nearby institutions will benefit from the campus through outreach services, short courses, or using university resources. This will reduce the cost to the institutions, which had to travel a long distance to seek similar services. The long-term relationships between the institutions will improve the quality of education in Kagera and the country at large.

This impact will be high and will affect the entire nation as well as the education system in Tanzania and will have a long-term impact in the sense that even at the end of the phase the new skills and knowledge acquired will be necessary in improving their own life as well as contributing to the development of the nation. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also to the ones associated with them. One of the important things to note is that, after the end of this phase, the impacts will never be reversible, hence irreversible and will have residual impacts.

6.5.7 Increased Revenues to local and national Authorities

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

This impact will be high and will affect entire nation in the sense that revenue collected from the project area will not be used in the local area but rather will contribute to the nation budget and will likely to have a long-term impact in the sense that even at the end of the phase the source of incomes developed prior will persist and grow in terms of size and services. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also the entire nation that will benefit from the increased government revenues in terms of improved social services and other government support to the citizens. One of the important things to note is that, after the end of this phase the impacts will be reversible in the sense that the government may propose and or develop strategies to retain the revenues or even multiply it.

6.5.8 Increased commercial and social activities around project locations

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

This impact will be high and will affect the project communities of Karabagaine ward and Bukoba district and will be a long-term impact in the sense that even at the end of the phase the new commercial activities at the project site will persist and grow in terms of size and magnitude of the services to be provided. Furthermore, the impact will be piling up with cumulative effects not only to those directly involved but also the one associated with them including local authorities in the area and people they serve. One of the important things to note is that, after the end of this phase the impacts will be reversible in the sense that the owners of these social and commercial activities may develop new strategies to re-construct and re- develop or even multiply the interventions.

6.5.9 Increased income to local suppliers and service providers

The population of Itahwa and Kangabusharo villages is expected to triple in the next few years as a result of the UDSM-Kagera campus construction. During construction, the project is expected to employ more than 100 staff and 10,000 students from different parts of the country. Therefore, the village will be having more people than before. The change in population level due to influx of workers and labourers will contribute to the

new market opportunities for small, middle and big business persons. This will increase money circulation at the area leading to high income to the local suppliers and service providers.

This impact will be moderate and will affect the project communities of Karabagaine ward and Bukoba District and will be a long-term impact in the sense that even at the end of the phase the life of the local suppliers and service providers will remain improved. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also the one associated with them. One of the important things to note is that, after the end of this phase the impacts will never be reversible hence irreversible.

6.5.10 Increased land values

Upon commencement of the operation, activities for the UDSM-Kagera campus will change the land status at Karabagaine ward, Bukoba District, as well as the land at surrounding villages (Itahwa, Kangabusharo and Ibaraizibu). Landowners have the understanding that the introduction of the campus will add value to their land, and therefore, they have to plan for it and obtain title deeds. The title deeds will help them to obtain loans from financial institutions, which will be used for different purposes, like improving their houses, paying for health services, education services, etc.

The positive impact arising from this will be high and will likely affect the project communities of Karabagaine ward in the long term. Furthermore, the impact will pile up with cumulative effects not only on those directly involved but also on the ones associated with them in the local area. One of the important things to note is that, after the end of this phase, the impacts will never be reversible, hence irreversible and will have residual impacts.

Negative Social Impacts

6.5.11 Population Increase and increased pressure on social services

Residents in the project area and surrounding communities do not have sufficient social and infrastructural services, such as health, education, and water, provided to them. In view of this, the influx of people in the project area will increase pressure on the already limited social infrastructure and may, without taking steps to mitigate this, it may place a heavy additional burden on the existing service delivery system. During the operation phase, it is expected that more than 10,000 students and 100 employees of UDSM will reside within these communities, causing burden and pressure on the available limited social services.

These negative impacts will be high and are likely to affect the entire areas surrounding the project villages for a long time. Furthermore, the impact will pile up with cumulative effects not only on those directly involved but also on those associated with them in the region. One of the important things to note is that after the end of this phase, the impacts will never be reversible; hence, they will be irreversible and will have residual impacts.

6.5.12 Increased level of crimes

The operation phase is expected to recruit more than 100 staff and 10,000 students from the communities around and others from within and outside the country. In addition, the project will attract people from various areas to come and invest in the provision of goods and services. The increase in population will stimulate the growth of the trading centres around the project site. Experience and sociological point of view show that where there is a high concentration of people from various backgrounds and behaviour, levels of crimes and changes in norms and behaviour are common. This is also likely to be the case of the trading centres around the project sites like Itahwa, Kangabusharo, Ibaraizibu villages and other nearby areas.

These impacts will be negative in nature at a high level and will cover the local areas surrounding the Karabagaine ward. The impacts arising from this will be moderate and are likely to affect the entire region surrounding the project area for the long term. One of the important things to note is that, after the end of this phase, the impacts will be reversible in the sense that UDSM, in cooperation with local authorities and police force, may set up strategies to reduce and combat crimes.

6.5.13 Increased traffic flow and increased risks of road accidents

During the operation, some activities may endanger the lives of the community members living close to those activities. This, in turn, will likely endanger the lives of the local communities in the form of accidents if appropriate measures are not taken. In the areas. On the transportation of raw materials and students and different individuals to the site, drivers may fail to observe safety measures along the road, which may result in accidents to other road users like pedestrians, motorcyclists, and bodaboda drivers. As stated above, the increased congestion of people and vehicles at the project site will cause multiple routes on the roads and sea. The multiple-vehicle routes will increase the chances of road accidents. This may cause loss of people's lives, which can lead to misunderstandings between local people and their government.

This impact will be high and will affect the project communities of Karabagaine Ward and Bukoba District and will be a long-term impact in the sense that at the end of this

phase, all the risks will die a natural death. Furthermore, the impact will not be pilled-up, and no cumulative effects may be witnessed at the end of this phase. One of the important things to note is that, after the end of this phase, the impacts will never be reversible; hence, they will be irreversible and will have residual impacts.

6.5.14 Prevalence of Communicable diseases

The influx of students and employees from different parts of the country (approximately 100 staff and 10,000 students from other parts of Tanzania and neighbouring regions) will increase interaction, consequently increasing the risk of getting HIV/AIDS infections and other communicable diseases. The growth of trading centres in the area will attract different businesses and different people to the extent that the level of prostitution will also increase in the area provided that there will be employees from other areas of the country. Increased prevalence of communicable diseases like HIV/AIDS will likely to happen and consequently result in the increased number of orphans and single parenting in the project area as well as an increased level of communicable diseases.

This impact will be high, and its effect will go internationally because currently, the world is like a village and the Campus will attract both local and international students and will have a long-term impact. Furthermore, the impact will not be pilled up, and no cumulative effects may be witnessed at the end of this phase. One of the important things to note is that, after the end of this phase, the impacts will be reversible in the sense that some strategies may be employed to reduce or control the transmission of communicable diseases.

6.5.15 Price inflation of goods and service

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

During the operation phase, more than 10,000 students and 100 employees of UDSM are expected to reside within these communities, causing inflation of goods and services. These negative impacts will be high and will likely affect the local communities for the long term. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also to the ones associated with the area. One of the important

things to note is that, after the end of this phase, the impacts will never be reversible; hence, they will be irreversible and will have residual impacts.

6.5.16 Increased incidence of GBV

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

These negative impacts arising from this will be high and are likely to affect the local communities for a mid-term. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also the one associated within the area. One of the important things to note is that, after the end of this phase the impacts will be reversible hence, no residual impacts.

6.5.17 Change in social values and ethics

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

During the operation phase it is expected that more than 10,000 students and 100 employees of UDSM will reside within these communities causing change in social values and ethics. These negative impacts arising from this will be high and are likely to affect the local communities for a long-term. Furthermore, the impact will be pilling up with cumulative effects not only to those directly involved but also the one associated within the area. One of the important things to note is that, after the end of this phase the impacts will never be reversible hence irreversible and will have residual impacts.

Impacts on physical environment

6.5.18 Impacts on surface and ground water quality

The main sources of pollution during the operation phase include:

- Contaminated runoff from parking lots (containing hydrocarbons grease, oils and lubricants);
- Discharge of untreated wastewater from wastewater treatment facilities;
- Improper solid waste disposal;
- Release of wastewater from domestic and construction activities;

Contaminated runoff could potentially contaminate Kileleni and Rwamrumba seasonal streams and eventually impair the quality of Lake Victoria water by altering its physical-chemical nature. Since the Lake is the main source of water supply to the Lake Zone communities, its contamination could directly affect domestic water supply quality, render it useless for irrigation, contaminate food chains and also affect living organisms in water. *This impact is assessed to be regional scale (due to the size of Lake Victoria) and medium. The significance of the impact is high and irreversible.*

6.5.19 Increased runoff/stormwater

Development of the proposed site, including the construction of structures and paved areas, will significantly reduce the surface area for stormwater infiltration and uptake by plants. The increased surface runoff could potentially accelerate soil erosion and increase sediment transfer and pollution load to the wet and eventually to Lake Victoria. This impact is of moderate significance, local scale, and *long term. The impact is reversible with proper mitigation; however, it is cumulative in nature.*

6.5.20 Health and safety risks due to fire hazards

Buildings are very prone to fire hazards because of the different types of combustible materials and machines which are used and installed, respectively. Electrical shock and Electrical fault are by large the main culprits 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 moderate, local, and will be long-term.

6.5.21 Contribution to Climate Change during the operation phase

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

6.5.22 Impacts associated with generation of solid waste during operation phase

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

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

Another impact is on air quality and climate change, especially if waste is burned. Burning solid waste (which is a common practice in the project areas due to the lack of coordinated waste management services) will result in the emission of greenhouse gases, which will impact local air quality and contribute to global climate change.

The significance of this impact is high, the scale of impact is local, and medium term. The impact is irreversible, and has cumulative effects.

6.5.23 Impacts of liquid waste generation during the operation phase

A significant amount of wastewater will be generated from toilets, bathrooms, kitchen, and laundry areas. At peak, the university will have about 10,000 people. High volumes

of waste water will be generated and treated onsite before disposal. Improper management of wastewater has a number of impacts/risks as listed hereunder:

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

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

6.5.24 Generation of Hazardous waste during the operation phase

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

Table 6.5 Waste types and associated risks

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

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

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

6.6 Impacts during the decommissioning phase

Social impacts

6.6.1 Loss of employment and business opportunities

People employed by the project will lose their jobs. This will have a 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 foodstuff and stationaries), will lose business opportunities. This impact is considered negative, long term and of moderate significance. This impact is high, local, and will be moderate in the term.

Environmental Impacts

6.6.2 Land pollution and loss of aesthetic

In the event that the decommissioning of the Campus involves the demolition of structures, there is a risk that improper waste management could contaminate land (soils and water resources). In case demolition waste is left scattered, it will destroy the aesthetic values of the area, and its neighbouring environment. Abandoned waste management facilities (septic tanks and wetlands) could potentially become breeding areas for disease-causing vectors that could transmit infectious diseases to neighbouring communities.

The significance of the impact is high. The spatial scale of the impact is regional, and its duration will be short-term.

6.6.3 Generation of Demolition waste materials

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

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

6.6.4 Air pollution resulting from demolition works

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

6.6.5 Noise pollution from demolishing works

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

6.6.6 Loss of revenue to institutions and the government

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

6.7 Cumulative impacts

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

6.7.1 Cumulative Socio-Economic Impacts

Positive Cumulative Socio-Economic Impacts

The proposed construction of classrooms, cafeterias, workshops, laboratories, hostels, dispensaries, etc, are likely to have positive impacts during project implementation. The proposed UDSM-Kagera campus shall modify the existing Kangabusharo and Ibaraizibu settlements due to the introduction of state-of-the-art buildings. The project shall enhance the available social services by introducing health services and education facilities, hence contributing to government efforts to provide health and education services to the people. Further, the presence of the proposed campus shall increase employment opportunities, income generation activities, lifestyle changes, and skills to the local community more than the current status.

Negative Cumulative Socio-Economic Impacts

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

6.7.2 Cumulative Impacts on Bio-physical Environmental

6.7.2.1 Incremental noise and air pollution

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

6.7.2.2 **Greenhouse Gas Emissions and Climate Change**

Greenhouse gas emissions have 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 through the use of equipment, plants and vehicles during the project implementation. Also, electricity use is associated with greenhouse gas emissions since the electricity generation is met by hydropower and thermal generation plants. On the other hand, increasing vegetation clearance during the construction and operation phases reduces carbon sequestration potential, hence reducing efforts towards climate change mitigation.

6.7.2.3 Acceleration of soil erosion

The proposed project area and the surrounding community have land parcels having been affected by erosion due to sand mining and transportation. On the other hand, the biodiversity at the proposed site is already disturbed. The proposed UDSM - Kagera campus shall increase the effect of soil erosion through stormwater generation and disturbance of soil material. Thus, the introduction of new buildings and infrastructure shall lead to more soil erosion. In addition, the presence of the UDSM -Kagera campus

shall attract land developments, which will further intensify soil erosion. These shall cause cumulative siltation to nearby water bodies.

6.7.2.4 Cumulative impacts of liquid and solid waste generation

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

6.8 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;

6.8.1 No project alternative

The "No Project" alternative refers to the option of maintaining the current status quo and not constructing the proposed UDSM Kagera Campus. By adopting this alternative, the predicted negative impacts of the project implementation can be avoided, but so can the predicted positive impacts of the project. The HEET project at UDSM aims to expand the university's capacity to contribute to key areas such as innovation, economic development, and labour market relevance. The proposed modern infrastructure is expected to facilitate effective teaching and research, producing graduates who can become a driving force for Tanzania's new industrial-based economy.

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

6.8.2 Alternative Site

As presented in Chapter 2 of this report, the proposed structures will be located within the UDSM Kagera 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 owned by UDSM (No need to buy a new piece of land);
- The selected area is compatible with the land use

- 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
- The site will be easily supplied with water and electricity.

6.8.3 Alternative Energy Sources

The main source of energy for UDSM Kagera campus is Electricity, supplied by the national grid. For the proposed infrastructure, the University considered three alternative sources of energy namely; electricity, Solar energy and diesel-powered generators.

- ***Alternative one - Electricity:*** As it is the case in most 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 power outages.
- ***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: After evaluating three alternatives based on capital costs, availability of adequate supply, reliability, and environmental protection, it was determined that a combination of at least three options would be most suitable. As a result, the proposed infrastructure will be connected to the National grid as a basic power supply. There will also be provisions for installing solar panels in the future. However, since some machines and laboratory equipment require high voltage which cannot be supplied by solar energy, standby generators will be provided, especially for the laboratories.

6.8.4 Water supply Alternative

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

The Bukoba Water Supply Authority (BUWASA) is the leading water supplier in the Bukoba District from Lake Victoria. This is the option considered to be appropriate as the water supply network is near the proposed site, and therefore can guarantee reliable, clean and safe water supply to the proposed UDSM Kagera Campus.

Alternative two: Groundwater Extraction

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

Alternative three: Rainwater Harvesting

The project considered rainwater-harvesting potential as an alternative source of water. It is proposed to harvest rainwater from both roof and land catchment. It will entail the design of a 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 reduce surface runoff and soil erosion.

Conclusion: *The University opted to use a combination of two water sources namely piped water supply from BUWASA and rain water harvesting.*
BUWASA water, although relatively expensive, is of the most reliable quality. Therefore, BUWASA water will be used for domestic purposes and in the running of laboratories. Rainwater will be used for cleaning and garden maintenance but shall be complemented by BUWASA water.

6.8.5 Liquid waste Management Alternatives

No Project Alternative/Business as Usual

The "Business as Usual" scenario means maintaining the current situation without any solutions implemented for water supply and wastewater systems in the UDSM Kagera Campus. If this scenario is adopted, the existing challenges will continue to occur and even increase. The project will not be implemented in this case, leading to the loss of all the benefits associated with it, such as increased water supply capacity, improved water quality, better sanitation and health conditions, access to a modern WWM system, and employment opportunities. Although choosing the "Business as Usual" scenario may avoid some of the negative impacts of the project implementation, it does not solve the challenge of reliable wastewater treatment.

Alternative Two: Waste Stabilization Ponds (WSPs)

Waste or Wastewater Stabilization Ponds (WSPs) are large ponds made by humans. They use natural processes such as solar light, wind, microorganisms, and algae to treat wastewater or faecal sludge. There are three types of ponds: anaerobic, facultative, and aerobic (maturation), each with different treatment and design features. WSPs are low-

cost for operation and maintenance (O&M) and have high BOD and pathogen removal. However, they require large surface areas and expert design. The effluent of WSPs mostly contains nutrients (e.g., N and P) and is, therefore, appropriate for reuse in agriculture but not for direct recharge in surface waters. For the most effective treatment, WSPs are linked in a series of three or more ponds. The anaerobic pond is the primary treatment stage and reduces the organic load in the wastewater. Solids and BOD removal occurs by sedimentation and subsequent anaerobic digestion inside the accumulated sludge. Anaerobic bacteria convert organic carbon into methane and, through this process, remove up to 60% of the BOD. The effluent from the anaerobic pond is transferred to the facultative pond, where BOD is removed further. The top layer of the pond receives oxygen from natural diffusion, wind mixing, and algae-driven photosynthesis. The lower layer is deprived of oxygen and becomes anoxic or anaerobic. Settleable solids accumulate and are digested on the bottom of the pond. The aerobic and anaerobic organisms work together to achieve BOD reductions of up to 75%.

When constructing anaerobic ponds, it is recommended to build them to a depth of 2 to 5 meters with a detention time of 1 to 7 days. Facultative ponds, on the other hand, should be 1 to 2.5 meters deep and have a detention time of 5 to 30 days. Aerobic ponds are typically between 0.5 to 1.5 meters deep and are useful in removing most of the nitrogen and phosphorus from the effluent when combined with algae and/or fish harvesting. It is important to line the ponds with a material that is impervious to prevent leaching into the groundwater. Clay, asphalt, compacted earth, or other such materials can be used. Additionally, a protective berm made from the excavated material should be constructed around the pond to prevent erosion and runoff. Finally, a fence should be installed to ensure that people and animals stay out of the area and that garbage does not enter the ponds.

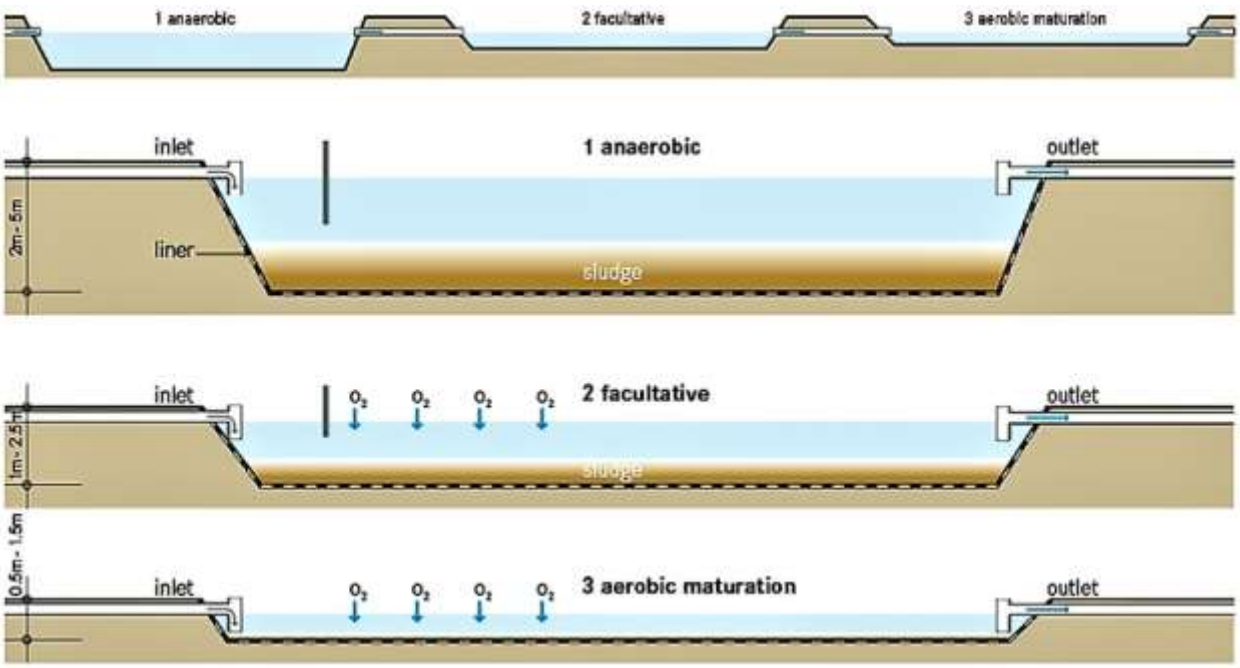

Figure 6.1 Waste Stabilization Ponds system for Wastewater treatment

Applicability: WSPs are among the most common and efficient methods of wastewater treatment around the world. They are especially appropriate for rural communities with large, open, and unused lands, away from homes and public spaces, and where it is feasible to develop a local collection system. They are not appropriate for very dense or urban areas. This option was considered inappropriate for this project.

Alternative three: Constructed treatment wetland

The University considered adoption of constructed wetlands, which are engineered systems 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: Up-flow anaerobic sludge blanket (UASB)

Up-flow anaerobic sludge blanket technology, also known as UASB reactor, is a form of anaerobic treatment system that is used in wastewater treatment. It is a methane-producing digester, which uses an anaerobic process and creates a blanket of granular sludge processed by the anaerobic microorganisms. UASB reactor is based on the so-called three-phase separator, which enables the reactor to separate gas, water, and sludge mixtures under high turbulence conditions. Generally, during the treatment, the substrate first passes through an expanded sludge bed containing a high biomass concentration. After that, the remaining part of the substrate passes through a less dense biomass called the sludge blanket.

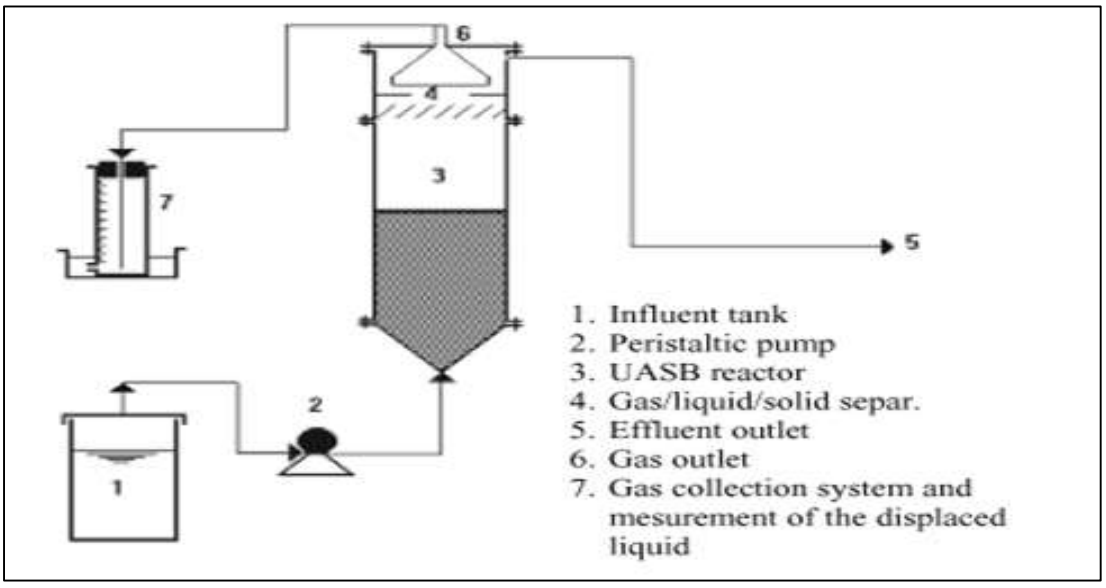

Figure 6.2: Schematic diagram of the laboratory UASB reaction system

The influent is pumped to the UASB reactor from the bottom, moves upwards, and gets in contact with the biomass in the sludge bed, then continues to move upwards to the sludge blanket, which has a lower biomass concentration than the sludge bed below. As the wastewater moves upward to the sludge blanket, the treatment process continues, and further treatment continues in the sludge blanket to ensure a stable effluent quality. The 3-phase (Gas-Liquid-Solid or GLS) separator located above the sludge blanket is used to separate the solid particles from the mixture (gas, liquid, and solid) after treatment, hence allowing liquid and gas to leave the UASB reactor. The effluent collection system will eventually collect the treated wastewater via a number of launders distributed over the entire area, discharging to the main launder provided at the periphery of the reactor. The biogases generated are collected as a valuable fuel.

Generally, dimensions range as follows: the height of the sludge bed should be at least about 1.5 to 2.5 meters, and hence, the height of the reactor should be restricted to 4

meters to provide convenient accommodation for the sludge bed, sludge blanket, and 3-phase separator. As the standard mentioned, the maximum height of the reactor is around 8 meters, but the applicable height in common usage is between 4.5 and 6 meters. In addition, the sludge bed occupies 30 to 60% of the total reactor volume, 20 to 30% of the total volume is provided for the sludge blanket, and the GLS separator occupies the remaining 15 to 30% of the total volume.

Applicability: The UASB system is suitable in warm climates, particularly for the treatment of domestic or industrial wastewater. The system is best for small areas where there is no adequate space for other treatment methods, such as WSPs, which require big areas.

Conclusion: After considering these alternatives, the WSP was found inappropriate because of the large area requirements and the high capital cost investment required to construct the treatment system. The No Alternative option or Business as Usual was dropped because there will be no proper wastewater treatment, and it would lead to losing all benefits if the project is implemented.

The UASB reactor option was considered the best option and selected for implementation because it does not require a big area, which is one of the most favourable conditions. This option has more benefits compared to others; some of these benefits include;

i. Small area requirements i.e., 0.5 ha is enough for this project in one site
ii. Resource recovery: the system produces water that is safe to go to the environment for recharging
iii. The effluent has nutrients which can be used for agricultural purposes or can be used for making fishpond
iv. Biogas is harvested and can be used as a source of energy
v. Bio-fertilizer from sludge drying beds can be used for agricultural activities
vi. The system can be used as a pilot study for research
vii. The wetland area can provide an area which can be used as a recreational area
viii. It is safer (no flies, odour smell, no breeding of mosquitos, etc.) compared to WSPs
ix. The effluent from this system can be used for gardening purposes.

6.8.6 Solid Waste Management Alternatives

The proposed project will generate a considerable large amount of solid waste (estimated at 3.7tones/day) from hostels, stationeries, workshops, laboratories, restaurants and offices. The University has considered two alternatives namely;

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

Alternative i: Alternative one will involve the transportation of huge amounts of waste to the dumpsite. Since solid waste management is a service and doesn't generate any revenue, such a practice will become a burden to the University. The generated amount will require at least one trip per day to the Bukoba dumpsite, which is about 10 km from the university. Therefore, an alternative was abandoned.

Alternative ii: alternative two will involve integrated solid waste management; whereby 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 recyclable wastes will be collected and untied in research work within the campus or sold to recycles (including 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 recyclables will be stored on-site in constructed chambers before being transported to the Bukoba dumpsite for final disposal.

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

Concrete: Concrete is a composite material made from fine and coarse aggregates, bonded together with cement. Its versatility, cost and strength make it the ideal material for building foundations. It is most preferred since it can carry heavy loads 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 stone, which has been around for thousands of years. In fact, the most ancient buildings still in existence 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 evaluated these based on criteria such as *strength, weight, and durability, which would make them suitable for various uses; compatibility with National standards and testing methods that govern the use of building materials in the construction industry; consideration for structural integrity;* and cost and aesthetics. The University shall opt to use a combination of materials except brick/masonry.

6.8.8 Alternatives roofing materials

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

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

CHAPTER SEVEN

7.0 IMPACTS MITIGATION AND ENHANCEMENT MEASURES

This chapter provides mitigations and enhancement measures or interventions that shall be implemented to minimise the potential negative impacts of the proposed project and enhance the potential positive impacts identified. Many of the proposed mitigation measures are essentially good practice which are recommended for implementation during project execution in all project phases.

7.1 Mitigation measures during preparatory phase

Social Impacts

7.1.1 Community health and safety risks

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, maximum loading restrictions and compliance with all Tanzania transportation law and standards;
x. Ensure enforcement of speed limits to avoid risks of accidents;
xi. Awareness campaigns /Education on HIV and STDs shall be provided to workers;
xii. Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided;
xiii. During construction, the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire fighting and clean and safe water supply;
xiv. A well-stocked First Aid kit (administered by medical personnel) shall be maintained at the construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce;
xv. 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;
xvi. Emergency contact details in the event of an accident shall be provided;
xvii. Develop a detailed health and safety measures and train all contractor staff about safety measures.

7.1.2 Loss of revenue to the government

i. The government must find alternative source of revenues
ii. University fees should reflect actual costs to avoid further losses to the government
iii. Strengthening revenue collection mechanisms
iv. Awareness creation for the people in the area on the importance of paying revenues for local service providers
v. Enhanced cooperation between the project and local authorities

Environmental mitigation measures

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

i. Buildings/structural designs considerations shall incorporate safety considerations in all stages
ii. Structural elements of a project will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. The Structural design will consider climate change considerations, as appropriate.
iii. Where the project includes new buildings and structures that will be accessed by members of the public, the UDSM will consider the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events. Where technically and financially feasible, UDSM will also apply the concept of universal access to the design and construction of such new buildings and structures
iv. Provision of adequate safety services. Where the project involves provision of services to communities, UDSM will establish and implement appropriate quality management systems to anticipate and minimize risks and impacts on community health and safety.
v. Ensuring provision of Emergency Preparedness and Response, UDSM will prepare an Emergency Response Plan (ERP) in coordination with the relevant local authorities and the affected community, and will consider the emergency prevention, preparedness and response arrangements put into place with project workers under ESS2. ERP will include, as appropriate: (a) engineering controls (such as containment, automatic alarms, and shutoff systems) proportionate to the nature and scale of the hazard; (b) identification of and secure access to emergency equipment available on-site and nearby; (c) notification procedures for designated emergency responders; (d) diverse media channels for notification of the affected community and other stakeholders; (e) a training program for emergency responders including drills at regular intervals; (f) public evacuation procedures;

(g) designated coordinator for ERP implementation; and (h) measures for restoration and clean up of the environment following any major accident

7.1.4 Increase in pressure on natural resources

i. Exploitation of construction materials will take place from authorised and reliable sources only;
ii. Restoration of the borrow pits/quarries after use will involve levelling the area and seeding or planting trees and/or grasses in association with the local government (department responsible for natural resources). If appropriate, the levelled area will be left for natural re-vegetation.
iii. For potential significant use of energy, the UDSM will adopt measures specified in the EHSGs to optimize energy usage, to the extent technically and financially feasible
iv. For potential significant water use, the UDSM shall apply resource efficiency requirements, technically feasible water conservation measures, the use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations.

7.1.5 Solid waste generation due to demolition

i. All materials which can be reused shall be reused
ii. Recyclable materials should be taken to recycling industries
iii. Materials that cannot be reused shall be sent to Bukoba dumpsite

7.2 Potential mitigation measures during the construction phase

Negative Social Impacts

7.2.1 Community health, safety risks and security from the handling, transport, and disposal of construction wastes

i. Institute good site practices including preventing public access to the construction site by securing equipment and demarcating 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 laws and standards;

iii. Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided;
iv. During construction, the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire fighting and clean and safe water supply;
v. A well-stocked First Aid kit (administered by medical personnel) shall be maintained at the construction site. The medical personnel shall also be responsible for the primary treatment of ailments and other minor medical cases as well as providing health education to the workforce;
vi. Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation should be put in place;
vii. Emergency contact details in the event of an accident shall be provided;
viii. Develop and implement an emergency plan including spill response;
ix. Training all contractor staff in emergency planning and spill response; and
x. Developing a detailed health and safety plan and training all contractor staff on the plan.

7.2.2 Gender-based violence

- The project will ensure the provision of GBV awareness raising among project workers and the surrounding community and prepare a list of GBV service Providers to which GBV survivors will be referred.
- Provision of 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 project shall ensure gender consideration in employment opportunities

7.2.4 Child labour

i. UDSM will conduct regular checks on project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law.
ii. Work with local authorities and schools in the area to control school dropout in relation to child labour
iii. Cooperate with relevant authorities like Ministry of Labour to control child labour
iv. Create awareness raising to the communities on the importance of education to the children

v. The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities

7.2.5 Increased level of crimes

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

i. Constructions of min-police stations at UDSM Kagera Campus which will work in collaboration with the one at Karabagaine Ward which serves the surrounding communities like Itahwa and Kangabusharo in order to strengthen security services
i. Establish community-based security in collaboration with village/ward leaders.
ii. The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
iii. The community should be encouraged to participate in security matters by providing information on suspects
iv. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.

7.2.6 Increased pressure on social services

The project surrounding communities already do not have sufficient social and infrastructural services. In view of this, the influx of people in the project area will increase pressure on the already limited social infrastructure. In order to minimise this problem, the following measures are very important;

i. Explore alternative sources of domestic water, such as rainwater harvesting.
ii. Link to mandated structures to support the improvement of social and infrastructural services at the project site and communities surrounding the project area.
iii. The Bukoba District should support the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures in the project and surrounding areas
iv. Use of water conservatively by instituting technologies (e.g., self-lock water taps) and awareness raising notices to users, etc.;
v. Construction of underground water reserve tank and introduction of rainwater harvest system for additional or alternative water source;

7.2.7 Restrictions on using community roads passing through the project site

There is a designated road which passes across the proposed UDSM Kagera Campus, there will be some restrictions especially through the night durations for security purposes. This may cause chaos to the community members who will be using the road

during the daytime. In order to reduce disturbance to community members the following measures should be applied:

i. New Alternative roads shall be constructed
ii. Improving the existing alternative roads
iii. Allow people to pass through project site during day time
iv. Ensure adequate security systems in the project area

7.2.8 Prevalence of Communicable diseases

The 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 the public on pathways of communicable diseases.
- Provide Voluntary Counselling and Testing (VCT) centres for HIV/AIDS.
- Work close to government and private institutions that deal with the spread of communicable diseases
- A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever;
- The project shall include information education and communication components (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,
- Adequate medical services shall be made available at the University dispensary to meet the population demand.

Environmental Impacts

7.2.9 Occupational Health and Safety

Slips and fall

i. Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from footpaths
ii. Cleaning up excessive waste debris and liquid spills regularly
iii. Locating electrical cords and ropes in common areas and marked corridors
iv. Use of slip retardant footwear

Work in Heights

v. Training and use of temporary fall prevention devices, such as rails or other barriers able to support a heavy load, when working at heights equal or greater than two metres or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
vi. Training and use of personal fall arrest systems, such as full body harnesses and energy-absorbing lanyards capable of supporting heavy loads (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose falls have been successfully arrested.
vii. The tie in point of the fall arresting system should also be able to support heavy loads
viii. Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labelling covers for openings in floors, roofs, or walking surfaces

Struck By Objects

ix. Using a designated and restricted waste drop or discharge zone, and/or a chute for the safe movement of wastes from upper to lower levels
x. Conducting sawing, cutting, grinding, sanding, chipping or chiselling with proper guards and anchoring as applicable
xi. Maintaining clear traffic ways to avoid driving heavy equipment over loose scrap
xii. Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as handrails and toe boards to prevent materials from being dislodged

xviii. Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes
xix. Institute good site practices including preventing public access to the construction site by securing equipment and demarcating excavate, using warning signs with appropriate text (local language) and graphic displays;

Moving Machinery

xiii. Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
xiv. Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and

training of workers to verify eye contact with equipment operators before approaching the operating vehicle

xv. Ensuring moving equipment is outfitted with audible back-up alarms

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

Disease prevention

xx. Awareness campaigns /Education on HIV and STDs shall be provided to workers;

xxi. A well-stocked First Aid kit (administered by medical personnel) shall be maintained at the construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce;

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

xxiii. Training all contractor staff in emergency planning and management; and

xxiv. Developing a detailed health and safety plan and training all contractor staff on the plan.

Over-exertion, and ergonomic injuries and illnesses

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

xxvi. Planning work site layout to minimize the need for manual transfer of heavy loads

xxvii. Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable workstations

xxviii. Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks

7.2.10 Loss of biodiversity (flora and fauna)

i. Clearance of patches of native forest remaining in the neighbourhood of the proposed project components shall be avoided;

ii. Close supervision of earthworks shall be observed in order to confine land clearance within the project site;

iii. Appropriate landscaping programme to help in the re-vegetation of part of the project area after construction shall be designed and implemented,

iv. Minimize the cutting or clearing of vegetation to the extent possible

7.2.11 Loss of habitat

i. Appropriate landscaping programmes to help in the re-vegetation of part of the project area after construction shall be designed and implemented.
ii. Maintain habitat by avoiding unnecessary clearing

7.2.12 Acceleration of soil erosion

i. Maintain gravel fill and/or re-vegetate around the structures;
ii. Unnecessary ground clearance and sensitive re-alignments shall be avoided;
iii. Directing flow to properly designated channels;
iv. All excavation works shall be properly backfilled and compacted
v. Most of construction activities will be done during dry weather;
vi. Mulching to stabilize exposed areas;
vii. Designing channels and ditches for post-construction flows
viii. Lining steep channel and slopes (e.g. use jute matting) and
ix. Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.

7.2.13 Generation of liquid waste

i. Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste;
ii. Construction workers shall be provided portable/temporary toilets by contractor; and
iii. Training on waste management shall be done for all personnel, operators and service providers.

7.2.14 Generation of solid waste

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

ix. Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.

7.2.15 Air pollution

Impairment of air quality due to emissions

- Equipment shall be maintained in good running condition and equipment,
- All equipment which generates excessive black smoke shall not be used,
- 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;
- There will be routine inspection of equipment;
- Turn off engines to reduce idling.

Impairment of Air Quality Due to Dust

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

7.2.16 Contribution to climate change

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

7.2.17 Noise pollution

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

7.2.18 Generation of vibrations

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

7.2.19 Visual impacts

i. Locating parts of the development further away from the general public.
ii. Avoid light pollution through choice of light fixtures when construction is done during the night

7.2.20 Generation of hazardous waste

i. Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
ii. Using impervious surfaces for refuelling areas and other fluid transfer areas
iii. Training workers on the correct transfer and handling of fuels and chemicals and the response to spills

iv. Providing portable spill containment and clean up equipment on site and training in the equipment deployment
v. Assessing the contents of hazardous materials and petroleum-based products in building systems and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal
vi. All hazardous materials shall be handled by registered personnel/company

7.2.21 Land pollution

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

7.3 Potential mitigation measures during the operation phase

Negative Social Impacts

7.3.1 Increased incidences of diseases and ill health

- 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
- The project will raise more awareness on HIV/AIDS, and means to suppress its incidence;
- Environmental sanitation systems shall be regularly improved; and,
- Adequate medical services shall be made available at the dispensary for meeting the population demand.

7.3.2 Increased pressure on social services/facilities and utilities

i. Limit the number of unskilled workers recruited from outside the direct vicinity as far as possible.
ii. Explore alternative sources of domestic water, such as rainwater harvesting.
iii. Link to mandated structures to support improvement of social and infrastructural services at the project site and communities surrounding the project area.
iv. The Bukoba District should promote construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures
v. Use of water conservatively by instituting technologies (e.g. self-lock water taps) and awareness raising notices to users, etc.;
vi. Construction of underground water reserve tank and introducing rainwater harvest system;
vii. Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using a natural ventilation system shall be strongly explored during the design process.

7.3.3 Increased incidences of Gender based violence

- The project will ensure provision of GBV awareness raising among project workers and surrounding community and prepare a list of GBV service Providers to which GBV survivors will be referred.
- Provision of GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.

7.3.4 Child labour

i. UDSM will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law.
ii. Cooperate with relevant authorities like Ministry of Labour to control child labour
iii. Create awareness raising to the communities on the importance of education to the children.

7.3.5 Increased level of crimes

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

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

7.3.6 Increased traffic flow and increased risks of road accidents

i. 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;
ii. A well-stocked First Aid kit (administered by medical personnel) shall be maintained at the construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce;
iii. 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;
iv. Emergency contact details in the event of an accident shall be provided;
v. Working with relevant authorities and private stakeholders to make sure that road safety measures are intact and implemented accordingly
vi. Develop and maintain an active rescue plan in collaboration with Fire and Rescues offices for both road and water accidents

7.3.7 Prevalence of Communicable diseases

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

i. Provide awareness to the public on pathways of communicable diseases.
ii. Provide Voluntary Counselling and Testing (VCT) centres for HIV/AIDS.
iii. Work close to government and private institutions that deal with the spread of communicable diseases
iv. A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19
v. The project shall provide more awareness on HIV/AIDS, and means to suppress its incidence;
vi. Environmental sanitation systems shall be improved; and,
vii. Adequate medical services shall be made available at the campus and surrounding communities for meeting the population demand.

7.3.8 Restrictions on use of access road across the University

i. The University management will provide alternative route for the community
ii. The community will be allowed to use the University pathways during daytime

7.3.9 Change in social values and ethics

Ethical training and discussion will be conducted in collaboration with government and non-government stakeholders

Impacts on physical environment

7.3.10 Increased runoff/stormwater

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.

7.3.11 Land pollution

vii. Septic tank and soak away pits shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites (UASB); and
viii. No, on-site burial or open burning of solid waste shall be permitted.

ix. Wastes not suitable for incineration and general municipal waste dumping (e.g., plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate.
x. There should be proper procedures for handling hazardous waste such as oils, lubricants and non-combustible waste.
xi. Wastes not suitable for incineration and general municipal waste dumping (e.g., plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate.

7.3.12 Surface and groundwater pollution

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

7.3.13 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 systems shall be installed in the buildings; and
vi. Install water tanks

7.3.14 Contribution to Climate Change

UDSM 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 carbon dioxide emissions.
iii. Promote use of natural green space at the campus to increase energy saving
iv. The university shall transform to digital software operated work (i.e., e-office) in order to minimize paper consumption rates.

7.3.15 Increased solid waste generation

i. UDSM management shall provide adequate waste handling facilities such as waste bins for temporarily holding waste before disposal.
ii. A private cleanliness firm with an adequate number of staffs shall be commissioned to ensure cleanliness.
iii. The skip buckets shall be emptied in authorized landfill twice a week.

iv. All hazardous waste shall be handled by registered authorized dealers recognized by NEMC

7.3.16 Increased liquid waste generation

i. The campus shall have liquid waste to collect the wastewater (sewage) to treatment facilities found at the campus
ii. The collected sewage shall be disposed of in septic tank systems before final disposal

7.3.17 Visual impacts

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

7.4 Mitigation measures during the decommissioning phase

Social impacts

7.4.1 Loss of employment

i. Seminars shall be conducted on alternative means of livelihood after termination of the job
ii. Create awareness of alternative sources of income generation for them to have alternative solutions
iii. Create awareness of a saving scheme that will support them during the transition period upon losing their employment from the project

Negative impacts

7.4.2 Loss of revenues to local authorities

iv. Local authorities should identify new sources of revenue in the area
v. Strengthening revenue collection mechanisms
vi. Awareness creation for the people in the area on the importance of paying revenues
vii. Accountability in revenue collection among local authority employees

Negative environmental impacts

7.4.3 Noise and dust

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

7.4.4 Occupational Safety and Health

i. Training of workers in lifting and materials handling techniques in decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
ii. Planning work site layout to minimize the need for manual transfer of heavy loads
iii. Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable workstations
iv. Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks
v. Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes.

7.4.5 Waste materials handling

i. Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from footpaths
ii. Cleaning up excessive waste debris and liquid spills regularly.

7.5 Enhancement measures for positive project impacts

7.5.1 Enhancement measures for project positive impacts during preparatory and construction phases

- **New source of income for the people living around project area**

In order for the project to maximize the benefits to the local communities in making it a new source of their income, the following enhancement measures are highly recommended

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

- **Increase in both formal and informal employment**

The project is expected to provide employment to both skilled and unskilled laborers as well to both the people living around the project sites and those coming from far areas within and outside Tanzania. In order for the project to maximize this benefit to both local and outsider's employee, the following enhancement measures are highly recommended

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

- **Improved quality of life and standard of living**

It is expected that the increase in employment and entrepreneurship opportunities for local people in the area will have positive impacts on the quality of people living close to the project site. In order to enhance these benefits, the project is advised to do the followings;

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

- **Increased Revenues to local authorities**

The proposed project will increase the level of trade and investment in the area, which are main sources of revenues for the local communities. In order to enhance revenue collection arising from direct from the project activities or indirect activities like trade and investment, the following enhancement measures are very vital

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

- **Increased skills to local communities**

In order to maximize the infusion of skills to the community members surrounding the project, the followings actions should be done;

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

- **Growth of trading activities around project site**

In order to speed up business growth and maximize its benefits thereafter, the following are recommended as enhancement measures;

i. Improve the infrastructure like roads in the project site
ii. Improve the availability of services in the project site
iii. Create favourable environment for traders to work with the projects
iv. Pay reasonable wages to both formal and informal employees
v. Create favourable environment for investors and contractors to work with the project

- **The growth of banking activities in the project area**

The growth of population, investment and trading activities in the project area will attract some banks to open their offices. In order to maximize this benefit, the project has to do the following;

i. To connect workers, students with interested banks
ii. To make all the payment whether formal or informal through the banking system
iii. To invite different banks to come and talk to both employees, students and other community members

iv. If possible and under certain agreements, to provide a space for the banks to open their branches

7.5.2 Enhancement measures for project positive impacts during operation phase

- **Increase of student's enrolment to UDSM**

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

- **Increase of revenue to UDSM**

UDSM shall innovate business activities linked with academic activities for enhancing income of the University

- **Job creation**

Employment shall be on equal opportunities for all genders.

- **Increased commercial and social activities at UDSM**

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

- **Growth of Trade and Increased Investment around UDSM**

i. Sensitize the community to invest to accommodate business opportunities inclined by the increasing students' enrolment
ii. Production of skilled labour force for nation development
iii. Production of skilled labour force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation

- **The growth of banking activities in the project area**

i. Provide good security within the project area and area of influence.
ii. Create conducive business environment for investment
iii. Increased Revenues to local authorities
iv. Local authorities should identify the new sources of revenue in the area
v. Strengthening revenue collection mechanisms
vi. Awareness creation for the people in the area on the importance of paying revenues
vii. Accountability in revenue collection among local authority employees
viii. Enhanced cooperation between the project and local authorities

CHAPTER EIGHT

8.0 ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PLAN

8.1 Impact Management Plan

This chapter provides plans for implementing mitigation measures for the proposed project. The Plans indicate institutional responsibilities, time to take 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.

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 UDSM Management.

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

- Ensuring that UDSM staff and students are aware of the project implementation
- Ensuring that the implementation of the ESMP is part of the Contractor's contractual obligations. UDSM 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, UDSM Management will manage the building and implement the ESMP. When the project reaches a stage of decommissioning, the UDSM shall prepare a decommissioning plan that will include risks and impacts not limited to 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. UDSM shall cover all the costs proposed in the ESMP.

Table 8.1 Environmental and Social Impact Management Plan for the proposed establishment of UDSM Kagera Campus

Identified Impact	**Mitigation Measure**	**Responsible Institution**	**Time of mitigation**	**Monitoring frequency**	**Relative cost (TZS)**
Preparatory phase					
Local Conflicts arising from land use and land ownership	i. Involve local communities in the identification of the project boundaries; ii. To raise awareness to the communities on the available laws guiding land ownership and land use; and iii. To develop a clear demarcation of the land owned by both parties engaged in a conflict through a participatory approach.	UDSM	Preparatory phase	Weekly	500,000
Increased pressure on social services	i. Limit the number of unskilled workers recruited from outside the direct vicinity as far as possible. ii. Provide First Aid Facilities on site. iii. Explore alternative sources of domestic water, such as rainwater harvesting. iv. Link to mandated structures to support improvement of social and infrastructural services at the project site and communities surrounding the project area.	UDSM	Preparatory phase	Daily	10,000,000
Risk of buildings/structural designs to have potential to generate	i. Geotechnical studies, Environmental and social impact assessment studies, master plans and feasibility studies shall be done by competent professionals to ascertain the project risks hazard profile of the site ii. Structural elements of a project will be designed and constructed by competent professionals, and certified or approved by competent	UDSM	Preparatory phase	Daily	100,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
emergency/disaster events	authorities or professionals. The Structural design will consider climate change considerations, as appropriate. iii. Where the project includes new buildings and structures that will be accessed by members of the public, the UDSM will consider the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events. Where technically and financially feasible, UDSM will also apply the concept of universal access to the design and construction of such new buildings and structures iv. Where the project involves provision of services to communities, UDSM will establish and implement appropriate quality management systems to anticipate and minimize risks and impacts that such services may have on community health and safety. In such circumstances, UDSM will also apply the concept of universal access, where technically and financially feasible v. UDSM will conduct a risk hazard assessment (RHA) to projects having potential to generate emergency events), as part of the environmental and social assessment. Based on the results of the RHA, UDSM will prepare an Emergency Response Plan (ERP) in coordination with the relevant local authorities and the affected community, and will consider the emergency prevention, preparedness and response arrangements put into place with project workers under ESS2. ERP will include, as appropriate: (a) engineering controls (such as containment, automatic alarms, and shutoff				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	systems) proportionate to the nature and scale of the hazard; (b) identification of and secure access to emergency equipment available on-site and nearby; (c) notification procedures for designated emergency responders; (d) diverse media channels for notification of the affected community and other stakeholders; (e) a training program for emergency responders including drills at regular intervals; (f) public evacuation procedures; (g) designated coordinator for ERP implementation; and (h) measures for restoration and clean up of the environment following any major accident				
Increase in pressure on natural resources	i. Exploitation of construction materials will take place from authorized and reliable sources only; ii. Restoration of the borrow pits/quarries after use-constituting of levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (department responsible for natural resources) and local environmental NGOs. If appropriate, the levelled area will be left for natural re-vegetation iii. When the project is a potentially significant user of energy, the UDSM will adopt measures specified in the EHSGs to optimize energy usage, to the extent technically and financially feasible iv. When the project is a potentially significant user of water or will have potentially significant risks and impacts on water quality, in addition to applying the resource efficiency requirements, UDSM shall use additional technically feasible water conservation measures, the use of alternative	UDSM	Preparatory phase	Daily	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations.				
Sub-total during preparatory phase			**120,500,000**		
CONSTRUCTION PHASE					
Community health, safety risks and security from the handling, transport, and disposal of construction wastes	i. GBV training before working on the Project which will be provided by the Community Social Officers from the LGA and on the Child and Gender desk of the police. This will include information on the GBV reporting mechanisms. ii. Institute good site practices including preventing public access to the construction site by securing equipment and demarcating project boundaries using warning signs with appropriate text (local language) and graphic displays. iii. 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. iv. Awareness campaigns/education on HIV and STDs shall be provided to workers and the community. v. Low-skilled workers will be hired around the project jurisdiction, if necessary, to reduce the population of foreigners.	UDSM	Construction phase	Daily	2,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	vi. Protect stockpiles of friable material subject to wind through wetting. vii. Cover loads with friable material during transportation. iii. Contractors will be provided with signage on issues such as HIV/AIDS, GBV, etc. which will be posted at worksites. ix. Contractors/workers will attend education sessions on disease transmission notably HIV/AIDS, and malaria and will implement the control measures needed to protect public health. x. Contractors/workers will ensure good housekeeping arrangements on-site to avoid creating breeding grounds for rodents and insects which can spread diseases. xi. Contractors will ensure access to potable water for all workers. xii. Contractors will be required to abide by national law about vehicle conditions and movements and behaviour of drivers. iii. Signage will be erected at construction sites to advise the community of the dangers of entering the site and appropriate barricades (fencing, tape, etc.) will be put in place, especially around quarries, trenches, etc.				
Gender based violence	The project will ensure 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.	UDSM	Construction phase	Daily	5,000,000
Gender discrimination	This project will ensure that there is involvement of women in project activities.	UDSM	Construction phase	Daily	500,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Child labour	i. UDSM 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	UDSM	Construction phase	Daily	500,000
Increased level of crimes	i. Bukoba District to strengthen security services by provision of more police stations/posts. ii. Establish community-based security in collaboration with village/ward leaders. iii. The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force. iv. The community should be encouraged to participate in security matters by providing information on suspects v. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.	UDSM	Construction phase	Daily	1,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Increased pressure on social services	i. Limit the number of unskilled workers recruited from outside project area ii. Provide First Aid Facilities on site. iii. Explore alternative sources of domestic water, such as rainwater harvesting. iv. Link to mandated structures to support improvement of social and infrastructural services in villages at the project area. v. Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures	UDSM	Construction phase	Monthly	10,000,000
Restrictions on using community road passing through project site	i. New Alternative roads shall be constructed ii. Improving the existing alternative roads iii. Allow people to pass through project site during day time	UDSM	Construction phase	Daily	500,000
Occupational Health and Safety	i. Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from footpaths ii. Cleaning up excessive waste debris and liquid spills regularly iii. Locating electrical cords and ropes in common areas and marked corridors iv. Use of slip retardant footwear v. Training and use of temporary fall prevention devices, such as rails or other barriers able to support a heavy load, when working at heights equal or greater than two meters or at any height if the risk includes falling into	UDSM	Construction phase	Daily	

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface vi. Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support heavy loads (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. vii. The tie in point of the fall arresting system should also be able to support heavy loads viii. Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labelling covers for openings in floors, roofs, or walking surfaces ix. Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels x. Conducting sawing, cutting, grinding, sanding, chipping or chiselling with proper guards and anchoring as applicable xi. Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap xi. Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as handrails and toe boards to prevent materials from being dislodged xii. Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	xiii. 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; xiv. Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic xv. Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle xvi. Ensuring moving equipment is outfitted with audible back-up alarms xvii. Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations. xviii. Awareness campaigns /Education on HIV and STDs shall be provided to workers; xix. A well-stocked First Aid kit (administered by medical personnel) shall be maintained at the construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce;				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	xx. Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health Emergency contact details in the event of an accident shall be provided; xxi. Training all contractor staff in emergency planning and management; xxii. Developing a detailed health and safety plan and training all contractor staff on the plan. xxiii. Training of workers in lifting and materials handling techniques in construction projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary xxiv. Planning work site layout to minimize the need for manual transfer of heavy loads xxv. Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable workstations xxvi. Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks				
Loss of biodiversity (flora and fauna)	i. Clearance of patches of native forest remaining in the neighbourhood of the proposed project components shall be avoided; ii. Close supervision of earthworks shall be observed in order to confine land clearance within the project site; iii. Appropriate landscaping programme to help in the re-vegetation of part of the project area after construction shall be designed and implemented, iv. Minimize the cutting or clearing of vegetation to extent possible	UDSM	Construction phase	Daily	6,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Loss of habitat	Appropriate landscaping programme to help in re-vegetation of part of the project area after construction shall be designed and implemented	UDSM	Construction phase	Monthly	1,000,000
Acceleration of soil erosion	i. Construction will be done as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant; ii. Maintain gravel fill and/or re-vegetate around the structures; iii. Unnecessary ground clearance and sensitive re-alignments shall be avoided; iv. Directing flow to properly designated channels; v. All excavation works shall be properly backfilled and compacted vi. Most of construction activities will be done during dry weather; vii. Mulching to stabilize exposed areas; viii. Designing channels and ditches for post-construction flows ix. Lining steep channel and slopes (e.g., use jute matting) and x. Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.	UDSM	Construction phase	Monthly	10,000,000
Generation of liquid waste	i. Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste;	UDSM	Construction phase	Daily	1,500,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	ii. Construction workers shall be provided portable/temporary toilets by contractor; and iii. Training on waste management shall be done for all personnel, operators and service providers.				
Generation of solid waste	i. The contractor shall have adequate facilities for handling the construction waste; and ii. Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping. iii. Training on waste management shall be done to all personnel, operators and service providers. iv. All materials which can be reused shall be reused. v. Materials that cannot be reused shall be sent to an authorised dumpsite. vi. The contractor shall have adequate facilities for segregating, handling and storing the construction waste. vii. Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.	UDSM	Construction phase	Daily	2,000,000
Air pollution	***Impairment of air quality due to emissions*** i. Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used; ii. Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use;	UDSM	Construction phase	Daily	6,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	iii. There will be routine inspection of equipment; iv. Turn off engines to reduce idling. ***<u>Impairment of Air Quality Due to Dust</u>*** **v.** Protect stockpiles of friable material subject to wind through wetting; **vi.** Cover loads with friable material during transportation; **vii.** Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone); **viii.** Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content **ix.** Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements **x.** Avoiding open burning of solid **xi.** Restrict speed on loose surface roads to 30 km/hr during dry or dusty conditions; and, **xii.** Douse with water work sites with loose open soil to reduce dust generation when necessary				
Contribution to climate change	i. Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used; ii. Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use;	UDSM	Construction phase	Daily	3,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	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				
Noise pollution	i. Avoiding or minimizing project transportation through community areas ii. Vehicles carrying construction materials shall be restricted to work during day time only; iii. Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and, iv. Construction equipment shall be selected, operated and maintained to minimize noise. v. UDSM shall include in tenders, employment contracts, subcontractor agreements and work method statements clauses that assure the minimization of noise and compliance with directions from management to minimize noise; vi. The Contractor shall be required to give preference to the use quieter technology or other mitigation measures rather than lengthening construction; vii. Regularly train workers and contractors (such as at toolbox talks) to use equipment in ways that minimize noise; viii. Ensure that site managers periodically check the site, nearby residences and other sensitive receptors for noise problems so that solutions can be quickly applied; ix. Avoid shouting, and minimize talking loudly and slamming vehicle doors;	UDSM	Construction phase	Daily	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	x. Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours and other relevant practices (e.g., minimizing the use of engine brakes and periods of engine idling).				
Generation of vibrations	i. Impact pile driving shall be avoided where possible in vibration sensitive areas; and, ii. Vibratory rollers and packers shall be avoided.	UDSM	Construction phase	Daily	N/A
Visual impacts	i. Locating parts of the development further away from the general public. ii. Avoid light pollution through choice of light fixtures when construction is done during the night	UDSM	Construction phase	Daily	N/A
Generation of hazardous waste	i. Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids, ii. Using impervious surfaces for refuelling areas and other fluid transfer areas iii. Training workers on the correct transfer and handling of fuels and chemicals and the response to spills iv. Providing portable spill containment and clean up equipment on site and training in the equipment deployment v. Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g., PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal	UDSM	Construction phase	Daily	2,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	vi. Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos containing flooring or insulation) and decontaminating or properly managing contaminated building materials vii. All hazardous materials shall be handled by registered personnel/company				
Land pollution	i. There should proper separation of materials and wastes, -selection (e.g. more environmentally friendly, etc.), less use, proper storage, etc. ii. An efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas. iii. Ensure proper waste segregation and introduction of waste disposal bins, and warning notices, posted at strategic points; iv. No, on-site burial or open burning of solid waste shall be permitted. v. There should be proper procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.	Contractor/ UDSM	Construction phase	Daily	10,000,000
Sub-total during construction phase			**72,000,000**		
OPERATION PHASE					
Increased incidences of diseases and ill health	i. A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever;	UDSM	Operation phase	Daily	200,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	ii. The project shall include information education and communication components (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence; iii. Environmental sanitation systems shall be regularly improved; and, iv. Adequate medical services shall be made available at the University dispensary for meeting the population demand.				
Increased pressure on social services/facilities and utilities	i. Use of water conservatively by instituting technologies (e.g., self-lock water taps) and awareness raising notices to users, etc.; ii. Construction of underground water reserve tank and introducing rainwater harvest system; iii. Link to mandated structures to support improvement of social and infrastructural services at UDSM 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.	UDSM	Operation phase	Daily	20,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
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.	UDSM	Operation phase	Quarterly monitoring and Verification Report	5,000,000
Gender discrimination	This project will ensure that there is involvement of women in project activities.	UDSM	Operation phase	Quarterly monitoring and Verification Report	5,000,000
Child labour	i. UDSM will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law. 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	UDSM	Operation phase	Quarterly monitoring and Verification Report	7,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Increased level of crimes	i. Establish community-based security in collaboration with village/ward leaders. ii. The community should be encouraged to participate in security matters by providing information on suspects iii. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.	UDSM	Operation phase	Quarterly monitoring and Verification Report	6,000,000
Increased runoff/stormwater	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	UDSM	Operation phase	Quarterly monitoring and number of complaints on health issues	20,000,000
Land pollution	i. Septic tank and soak away pits shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites (UASB); and ii. No, on-site burial or open burning of solid waste shall be permitted. iii. Wastes not suitable for incineration and general municipal waste dumping (e.g., plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate. iv. There should be proper procedure for handling hazardous waste such as oils, lubricants and non-combustible waste		Operation phase	Quarterly monitoring and Verification Report	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	v. Wastes not suitable for incineration and general municipal waste dumping (e.g., plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate.				
Surface and groundwater pollution	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.	UDSM	Operation phase	Quarterly monitoring and Verification Report	30,000,000
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	UDSM	Construction phase	Daily	20,000,000
Increased solid waste generation	i. UDSM management shall provide adequate waste handling facilities such as waste bins for temporarily holding waste before disposal. ii. A private cleanliness firm with an adequate number of staffs shall be commissioned to ensure cleanliness. iii. The skip buckets shall be emptied in authorized landfill twice a week.	UDSM	Operation phase	Quarterly monitoring and Verification Report	6,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	iv. All hazardous waste shall be handled by registered authorized dealers recognized by NEMC				
Increased liquid waste generation	i. The campus shall have liquid waste to collect the wastewater (sewage) to treatment facilities found at the campus ii. The collected sewage shall be disposed in septic tank systems before final disposal	UDSM	Operation phase	Quarterly monitoring and Verification Report	50,000,000
Visual impacts	i. Locating noise development further away from the general public. ii. Light pollution can be reduced by keeping lighting (e.g. of parking lots) to the minimum levels needed for safety, and through the careful choice of light fixtures such as the use of flat-glass lanterns in car parks	UDSM	Operation phase	Quarterly monitoring and Verification Report	3,000,000
Sub-total during Operation phase			**377,000,000**		
DECOMMISSIONING PHASE					
Loss of employment	Seminars shall be conducted on alternative means of livelihood after termination of the job	UDSM	Decommissioning phase		10,000,000
Loss of aesthetics due to haphazard disposal of demolished waste	i. The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work;	UDSM	Decommissioning phase	Daily	50,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	ii. All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors; and iii. Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.				
Noise and Vibration	i. Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance · ii. Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines. iii. Avoiding or minimizing project transportation through community areas iv. Water sprinkling shall be applied to open earth to reduce dust emission; v. Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions; vi. The demolition area shall be fenced with iron sheets; this shall prevent the dust at the ground to be picked up by the wind; vii. Public notifications shall be sent where appropriate especially in nearby residential areas likely to be impacted by dust; iii. Construction equipment, with noise sinks, shall be used;	UDSM	Decommissioning phase	Daily	50,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	ix. Machine operators in various sections with significant noise levels shall be provided with noise protective gear x. Construction equipment shall be selected, operated and maintained to minimize noise				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
4.1 Occupational Health and Safety	i. Training of workers in lifting and materials handling techniques in decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary ii. Planning work site layout to minimize the need for manual transfer of heavy loads iii. Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable workstations iv. Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks v. Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from footpaths vi. Cleaning up excessive waste debris and liquid spills regularly vii. Locating electrical cords and ropes in common areas and marked corridors iii. Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes ix. Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels	UDSM	Decommissioning phase	Daily	10,000,000
Sub-total during decommissioning phase			**120,000,000**		

8.4 Disaster Risk/Emergency Management plan

8.4.1 Disaster risks for the proposed project

University of Dar es Salaam-Kagera Campus shall be vulnerable to a range of disaster risks, which will pose risk to the students, teacher and other staff. The proposed project will be vulnerable to fire outbreak, disease outbreak, traffic accident, robbery, ICT appliance damage and data loss, and chemical explosion. Other disaster risks including; structural collapse and ammunition accident.

8.4.2 Disaster Risk Management plan

The disaster risk management plan is intended to provide efficient and effective operational procedures that will allow the university to save lives, minimize injuries, protect property, environment and preserve functioning campus in times of natural and man-made/technological hazards. In addition, it can be used to control hazards so as to reduce the vulnerability, to reduce the risk and the overall management of disaster risk to the proposed UDSM Kagera Campus. The plan provides the basic information on the action to be taken during the pre-disaster, the disaster phase (during the event) and post disaster phase. The plan describes the emergency and assigns the responsibilities for various emergency tasks, specifically to WHO does, WHAT, WHEN AND HOW.

8.4.3 Assumption made in the plan

The disaster risk management plan considers the following assumptions;

i. UDSM Kagera Campus will continue to be exposed to the impact of those Disaster risks identified and as well as others that may develop in the future because of climate variability, climate change and proposed future expansion in infrastructure.
ii. The possibility arises that an emergency or disaster may occur at any time.
iii. A major disaster or emergency can cause numerous losses of life and injuries, property damage, and disruption of normal life support.
iv. External services and resources may be necessary if an emergency exceeds the campus capability.
v. Departments and agencies from the local government, state, and national levels may provide help to protect lives and property.
vi. UDSM Kagera Campus will follow all state and local regulations for safety plan and procedure review and inspection.

8.5 Health and Safety Management plan

Health Safety Management Plan (HSMP) helps in implementation, maintaining and continually improving the Health and Safety management system in accordance with the requirements of Occupational Health and Safety Assessment Series (OHSAS) standards. It is therefore important that this is reflected in the UDSM Kagera Campus operations and responsibilities of every level of management. This plan shall help to implement the Safety and Health direction of the proposed

project components. It clearly states the requirements of donors, legislations, suppliers, management and employees in Safety and Health management.

8.5.1 Responsibilities

i. **UDSM Kagera Campus Management:** The management is committed to the principle of safe working and desires that on no account should any person ever be exposed to risk.
ii. **Supervisors:** It is the responsibility of the Supervisors to review and ensure awareness of emergency procedures among all the personnel.
iii. **Employees:** It is also the responsibility of all employees to continually familiarize themselves with the assembly procedures for their relevant areas of work.
iv. **General:** Any information being relayed about an emergency shall be clear and precise giving the exact location, the nature of the emergency and the seriousness of the emergency and contact numbers and names.

8.5.2 Training

Suitable training will be provided to all personnel during various stages of the project and when a new work force is added.

8.5.3 Awareness

Necessary posters and boards announcing action in case of an emergency will be put up at prominent places, and at all assembly areas.

8.5.4 Emergency coordination

All actions will be coordinated with the overall emergency plan operated by the Supervisor. The Campus Principal is overall responsible to coordinate all emergency procedures along with the Health & Safety Manager. All emergency telephone numbers and contact names shall be posted at strategic points on site.

Subsequent actions as listed below will be taken either as in instruction from the Supervisor.

i. Stop all work and report to the nearest evacuation area/ assembly area and await further instructions.
ii. Stop all equipment and vehicles.
iii. Contact the Health & Safety Manager and relay message to the Supervisor and General Manager.
iv. Ensure all personnel are aware of the emergency.

8.5.5 Assembly Point

In an emergency all personnel are to proceed in an orderly manner to the nearest safe assembly point.

8.5.6 Head Count

The Supervisor shall take a head count and check all employees' area at the assembly point. He /She shall also inform the General Manager of the result of the head count.

8.5.7 Rescue Team

For missing personnel, a rescue team will be formed in consultation with the Engineer and depending upon the type and status of emergency, all efforts will be made to rescue the missing personnel.

8.5.8 Fire Fighting

In case of a fire, after the alarm has been sounded, all efforts will be made to put off the fire by use of fire extinguishers, fire hydrants, hoses etc., until more professional help comes. Fire extinguishers will be available on site at strategic locations near stores, laydown areas, and electrical distribution cabinets.

All Clear

Normal work will be resumed only after a clear signal is received from the Supervisor. As such the supervisors shall make all arrangements to meet the concerned authorities.

Aspect		**Responder at UDSM**								**Responder outside UDSM**			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	RED CROSS	Police Force
1.0	**Fire outbreak**												
Steps to be completed in pre-disaster	Post directions on each building on how to utilize emergency equipment		**P**	**S**			**S**						
	Post locations of fire alarms and assembly points		**P**	**S**			**P**			**S**			
	Post locations of fire extinguishers		**P**				**P**			**S**			
	Train students, teachers and staffs on use of alarm systems and extinguishers at least once per semester (Refresh annually)	**P**	**P**		**P**								
	Train all campus community on, and exercise RACE procedures	**S**	**P**		**S**		**S**			**S**			
Steps to be done During event	During fire event, use the RACE procedure R - Rescue residents in immediate danger A - Sound nearest alarm if not already activated C - Close doors behind you to confine the fire	**P**		**P**	**P**	**P**	**P**	**P**	**P**				**P**

Aspect		**Responder at UDSM**								**Responder outside UDSM**			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	REDCROSS	Police Force
	E -Utilize fire extinguisher as situation permits or Follow evacuation procedures.												
	Call # 101 for assistance	**P**		**P**	**P**	**P**	**P**	**P**	**P**				
2.0	Disease outbreak												
Steps to be completed in pre-disaster	Ensure the students, teacher and other staffs Wash hands often	**P**	**S**	**S**	**S**	**P**		**S**					
	Provision of vaccination	**P**		**S**		**P**							
	Ensure availability of Ambulance	**P**				**P**	**S**						
	Ensure control of food security at cafeteria	**P**		**S**	**P**								
	Disinfect surfaces; clean and disinfect on the surface which are frequently touched in all buildings			**S**		**P**	**S**						
	Provide education for safer sex (training for sexually transmitted diseases (STDs)		**P**		**S**								
	In case of pandemic disease follow the government guidelines	**P**											
	Provide the location of first aid kit and the dispensary		**P**	**S**			**S**						

Aspect		**Responder at UDSM**								**Responder outside UDSM**			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	RED CROSS	Police Force
Steps to be done During event	Call # _____ (health officer) to the illness								**P**				
	Call#_____ambulance for emergency and serious illnesses								**P**				
	If its communicable disease, record the Number of new cases everyday								**p**				
	Ask for assistance from outside	**P**				**S**			**P**			**S**	
3.0	Traffic accidents												
Steps to be completed in pre-disaster	Provide all traffic signs required in a road and car parking	**P**	**S**					**S**					
	Control all random parking						**S**	**P**					
	Remove all unstable tree parts in car parking						**P**						
Steps to be done During event	Provide the first aid service to the victim					**P**							
	Report him/her to the dispensary or hospital depending to nature of injury								**P**				
	Report the accidents to nearby police station					**P**			**S**				

Aspect		**Responder at UDSM**								**Responder outside UDSM**			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	REDCROSS	Police Force
4.0	Chemical explosion												
Steps to be completed in pre-disaster	Maintain proper storage of all chemicals in laboratory		**P**	**S**									
	Ensure the proper uses of chemicals during experimental practical's			**P**		**S**	**P**						
	Ensure all laboratory rules are followed		**P**	**P**			**S**						
	Provide the first aid kit in all laboratory		**P**	**S**			**P**						
Steps to be done During event	Provide the first aid service to the victim					**P**			**P**				
	Report him/her to the dispensary or hospital depending to nature of injury								**P**				
	Ask for assistance from large hospital, when the case is serious					**P**							
	Sound the nearest alarm								**P**				
5.0	Robbery												
	Provide a good number of security guards		**S**	**S**			**P**	**S**					

Aspect		**Responder at UDSM**								**Responder outside UDSM**			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	REDCROSS	Police Force
Steps to be completed in pre-disaster	Provide light in open areas, buildings and all road within the campus	**S**					**P**						
	Insist students to walk in groups during the night	**P**			**P**			**S**					
	Insist student, teachers and all staffs to wear identification card within the campus	**P**	**S**	**S**				**P**					
	The campus should be full protected with fence	**S**					**P**						
Steps to be done During event	Call#_____(Police/security guards) to report the crime event	**P**							**P**				**P**
	Make noise to get assistance from nearby person								**P**				
	Report the event to security guards/policy								**P**				
6.0	Terrorist attack												
Steps to be completed in pre-disaster	The campus should be full protected with fenced	**S**					**P**						**P**
	Insist student, teachers and all staffs to wear identification card within the campus		**S**	**S**	**P**			**P**					
	Ensure the visitors registration	**P**					**P**	**P**					

Aspect		**Responder at UDSM**								**Responder outside UDSM**			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	RED CROSS	Police Force
Steps to be done During event	Call #_____ (Police/security guards) to report the event	**P**											**p**
	Report the event to police	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**				
	Follow the government rules and guidelines	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**				
7.0	ICT appliances damage and data loss												
Steps to be completed in pre-disaster	Provide a good number of maintenance personnel	**S**					**P**						
	Evaluate back-up generator needs. Consider power needs for critical safety and medical equipment, refrigeration, temperature control, etc.	**S**					**P**						
	Install the alternative source of power such as solar panel	**P**					**S**						
Steps to be done During event	Call the power supplier to report outage								**P**				
	Notify maintenance staff.								**P**				
	Evacuate the building if danger of fire.								**P**				
	Keep refrigerated food and medicine storage units closed to retard spoilage.								**P**				

Aspect		Responder at UDSM								Responder outside UDSM			
Key responsibilities		Principal office	Deputy Principal	Emergency management team	Students leaders	Health center	Estate manager	Security guards	Community	Fire and Rescue force	OSHA	RED CROSS	Police Force
	Turn off power at main control point if short is suspected								**P**				
	Turn off all the switch sockets								**P**				
	Disconnect all appliance from the electric power source								**P**				
8.0	**Building collapse**												
Steps to be completed in pre-disaster	Evaluate the campus for potential dangers and fix the problems		**P**				**S**			**S**			
	Remove potential fire risks		**P**	**S**			**S**						
	Train and exercise on “Drop, Cover and Hold”.		**P**	**S**						**S**			
Steps to be done During event	Provide the first aid service to the victim		**P**	**P**		**P**							
	Report him/her to the dispensary or hospital depending to nature of injury		**P**	**P**					**P**				
	Report the accidents to nearby police station		**P**	**P**		**P**			**S**				

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;**
  - UDSM 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. UDSM shall monitor landscape and cultural changes with time, in order to device 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. UDSM 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 UDSM 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 UDSM 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 responsibility for mitigation and monitoring during the operation phase will lie with the UDSM Estate Department. UDSM 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 9.1Monitoring programme during the construction phase

Parameters to be monitored	**Monitoring activities**	**Parameters to be monitored**	**Monitoring frequency**	**Targeted level /standards**	**Responsibility**	**Estimated Cost (TZS) per year**
Noise level	Noise levels measurement (within 500 m) *	Day and night noise levels	Quarterly	TBS	Contractor	3,000,000
Air quality	Measurement of ambient gaseous pollutants and dust**	Temperature, H_2S, SOx, NOx and Dust	Quarterly	TBS	Contractor	8,000,000
Health and Safety	Inspection; Voluntary testing;	-Availability and functionality of H & S facilities; -Functionality of sanitation facilities	Quarterly	TBS/WHO	Contractor/ Fire/OSHA	16,000,000
	Analyse records of accidents and incidents	Number and types of accidents and incidents	Monthly	TBS/WHO	Contractor/ UDSM	3,000,000
Grievance	-Analyse records of workers and community grievance	Number and types of grievance reported and solved	Monthly	TBS	Contractor/ OSHA/UDSM	1,000,000
	Total					**31,000,000**

Table 9.2Monitoring programme during operation phase

Parameters to be monitored	**Monitoring activities**	**Parameters to be monitored**	**Monitoring frequency**	**Targeted level /standards**	**Responsibility**	**Estimated Cost (TZS) per year**
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	TBS	UDSM	5,000,000
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)	TBS	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	TBS	UDSM	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 -Functionality, number and location of safety facilities on campus; -Availability of security guards and	Monthly	TBS	UDSM	5,000,000

Parameters to be monitored	Monitoring activities	Parameters to be monitored	Monitoring frequency	Targeted level /standards	Responsibility	Estimated Cost (TZS) per year
		lighting in proper areas.				
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 manufacturer's requirements	TBS	UDSM	3,000,000
Community Health	Inspection of available health facility in the dispensary;	-Availability and functionality of Health facilities; -Functionality of sanitation facilities;	Monthly	TBS/WHO	UDSM	4,000,000

Parameters to be monitored	**Monitoring activities**	**Parameters to be monitored**	**Monitoring frequency**	**Targeted level /standards**	**Responsibility**	**Estimated Cost (TZS) per year**
	Inspection of sanitation facilities and waste management facilities; Inspection of hygiene conditions in the cafeteria and dormitories	-Availability of clean and safe water; -Availability of waste management facilities;				
		Presence of fire safety management system, Environmental free from Safety and ergonomic hazards	Monthly	TBS	UDSM	
Monitoring of Health and Safety implementation by the workforce	Efficiency of treatment plant Waste generation rates	Physiochemical parameters, Number of dust bins,	Monthly	TBS/WHO	UDSM	3,000,000
	Increased solid waste and liquid waste generation during Operation phase					**23,000,000**

Table 9.3Monitoring programme during decommissioning phase

Parameters to be monitored	**Monitoring activities**	**Parameters to be monitored**	**Monitoring frequency**	**Targeted level /standards**	**Responsibility**	**Estimated Cost (TZS) per year**
Underground water	Monitoring of groundwater quality	Turbidity / Suspended solids Oil and grease	Weekly One month after direct interference	TBS	UDSM	5,000,000
	Identification and reporting of leakage events**	Number of leakage events caused during the construction	Continuous	TBS	UDSM	2,000,000
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	-	UDSM	2,000,000
Noise	Noise monitoring at direct interference (within 500 m)**	Day and night noise levels	Weekly	TBS	UDSM	2,000,000
Health and safety	Health and Safety (H&S) Monitoring and audits. -H&S Performance evaluation -Personal Protected	Total recordable incidents, lost time incidents and another H&S Indicators. Records verifying the conditions	Weekly	TBS/WHO	UDSM	5,000,000

Parameters to be monitored	**Monitoring activities**	**Parameters to be monitored**	**Monitoring frequency**	**Targeted level /standards**	**Responsibility**	**Estimated Cost (TZS) per year**
	Equipment monitoring	of Personal Protected Equipment				
	-Inspection of grievance mechanism -Analysis of workers and community grievance trends -Maintaining training records	-Recorder Grievance, accidents and incidents -Training records	Monthly	TBS/WHO	UDSM	5,000,000
	Total					**22,000,000**
	Note: **** Reference should be made to** TZS 845:2005 Air Quality – Specifications* *****Reference is made to EMDC 6 (1733): Limits for Environmental Noise)*** ****** Reference should be made to TZS 860:2005 Limits for municipal and industrial wastewaters*** ***All issues regarding to occupational health and safety should be monitored against the requirements of the OSHA Regulation, 2003***					

CHAPTER TEN

10.0COST-BENEFIT ANALYSIS OF THE PROJECT

10.1 Introduction

This chapter presents the cost-benefit analysis (CBA) of the proposed new building structures (administration block, student hostel, multipurpose classrooms, dispensary, and cafeteria) to be built at the UDSM Kagera 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 with the Tanzania Procurement Act, which prevents a detailed cost-benefits analysis from being exposed before the tendering process. In that case, the presented costs in this section are indicative and elementary qualitative descriptions of the costs and benefits. The total operation cost has considered the indicative costs for implementation of mitigation measures as well as the cost of monitoring. However, the total cost of the project will be stated later as project tendering is still in process.

10.2 Benefits related to the project

Benefits from the proposed building structures at the UDSM-Kagera campus project can be classified as direct benefits and indirect benefits to the university, neighbours and the government. Building construction projects may generate negative benefits though; they are usually minimal compared to the positive benefits. Some of those impacts are non-quantifiable and thus cannot be used in the benefit-cost analysis estimations. Generally, the benefits of the project will be experienced in all phases, from mobilization, construction, and operation to the decommissioning phase. To mention a 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 the local and national levels in terms of revenue generation and the multiplier effects associated with linkages with the local and national economies.

Direct benefits: The proposed project will create many job opportunities, provide a good aesthetic view around Karabagaine ward premises, provide good environments for students in their studies, and offer entrepreneurial opportunities to the surrounding community. It will also increase the number of skilled labourers due to the increase in enrolment and the presence of a conducive environment for studies. Most of the non-quantifiable impacts are directly beneficial to the project receptors.

Indirect Benefits: Indirect benefits from a proposed project mainly include increase in government revenue through different sectors like; TANESCO, BUWASA, 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 UDSM

The proposed project has positive impacts on UDSM-Kagera Campus 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 factors for increased number of students' enrolment thus in monetary cost its value has potential to increase annually. The completion of this project is anticipated to improve the university's financial capacity and sustainability. Further, the improved financial standing is not only going to promote enrolment but also good governance and efficient running of the University. Other benefits include a suitable environment for Teaching, Research and Public Service. The project will also have several intangible benefits to both UDSM-Kagera campus and the surrounding community which include improving the university's image.

10.2.2 Benefit to the Neighbourhood

The proposed construction of UDSM-Kagera Campus will lead to the increase in staff requirement that is technical, administrators and academicians. During and after the construction phase the project is going to provide additional employment opportunities for people surrounding UDSM-Kagera campus related to operation and maintenance. However, non-skilled labourers will benefit from the daily wages. The University will also create business opportunities in the 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 benefit 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 the 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).
- Boosting the infrastructure and economy of the country and Bukoba District Council in particular Karabagaine ward and surrounding villages.

10.2.3 Benefit to the Government

The project will benefit the government in different aspects. This includes budget saving due to the relative decrease in UDSM financial dependence on the government. It is anticipated that during the operation phase the project will improve UDSM 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 UDSM for other government development plans. Furthermore, the ability of UDSM in contributing towards the realization of National Policies such as Education Reforms through expansion of enrolment of students into various degree programmes is going to increase. The increase in the number of enrolments means an increase in the financial capacity of the institution.

However, the government will benefit from the increased number of experts in priority disciplines that will be graduating from the UDSM-Kagera campus and will create the potential for the government to use internal resources 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, and monitoring processes, as outlined in Chapters 8 and 9, is about 594,000,000 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 the construction phase, these costs 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 community activities will be disrupted. The UDSM is committed to mitigating 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 funds from the 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 per annum for environmental risks and impacts monitoring will be Tshs 10,000,000 during the construction phase and Tshs 5,000,000 during operation phase.

10.4 Project cost benefit analysis

As it has been mentioned in Chapters 6 – 9, 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 that the project had more benefits compared to the total cost of the project; this implies that the project is viable, and UDSM is encouraged to develop it.

CHAPTER ELEVEN

11.0DECOMMISSIONING

11.1 Introduction

Since decommissioning will take place in later years (Anticipated to last for 99 years). The specific conditions for mitigation are generally inherently uncertain. Due to this uncertainty, specific mitigation measures pertaining to the environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty. The document outlines an initial decommissioning plan. The plan aims to establish practical decommissioning approaches that can be executed safely, without endangering the public's health and safety, decommissioning personnel, or causing harm to the environment.

A detailed decommissioning plan that considers the proponent shall prepare environmental issues before the decommissioning works. Should it occur, decommissioning may entail a change of use (functional changes) or demolition triggered by the change of land use. Therefore, what is presented here is just a Preliminary Decommissioning Plan, which merely highlights what shall be done if the need for decommissioning arises.

11.2 Objectives of the Plan

The preliminary plan aims to ensure that the building and infrastructure designers are fully aware of decommissioning requirements right from the beginning of the project, throughout the design phase, and during the operation phase. The plan serves the following specific objectives:

- To identify the design options available for materials, system components, and component locations that can enhance decommissioning
- To identify the preferable decommissioning method, costs, schedules, and the operational impact on the infrastructure facilities.
- To identify the decommissioning techniques, expenses, timelines, and operational effects on decommissioning

11.3 Preliminary Decommissioning Plan

This Section describes a brief outline of the works required to demolish the proposed project components on the site in case it happens. This Plan shall 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 shall prepare a detailed Demolition Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site.

11.3.1 Project Removal Methodology

The Proponent is responsible for financing and carrying out all aspects of project decommissioning, including engineering, environmental assessment, permitting, construction, and mitigation activities related to removing the building facilities, as outlined in this Plan. The Proponent must also address the environmental impacts during and after the project removal by promptly responding to defined events during the monitoring phase. Furthermore, the university is obligated to safely remove the facilities and its accompanying structures in a manner that:

- Minimizes any adverse environmental effects;
- Meets the institution's obligations under the Environmental Management Act (2004);
- Restores the site to a condition suitable for various uses and
- Pays all outstanding dues to workers, the government, suppliers, and other relevant parties.

11.3.2 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. All construction elements, such as buildings, pillars, platforms, or ramps supporting machinery or equipment, will be dismantled and secured to ensure safety. The areas previously occupied by these structures will be restored and replanted with vegetation as necessary. Equipment that is no longer functional will be sold through an auction process to scrap dealers. Others include internal finishes, Service amenities including air conditioning, pipework and conduits. The future utilization of the water supply infrastructure (pipeline) will be determined in collaboration with the National and District Closure Committees.

11.3.3 Demolition Methods

The Contractor shall prepare a detailed Demolition Plan prior to the commencement of work on site, however, the indicative demolition methods shall be as follows:

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

11.3.4 Materials Handling

Materials handling shall be done by mechanical plant (including excavators and wheel loaders) loaded into trucks (bogie tippers and semi-trailers). The debris shall be hauled offsite to an approved waste facility or recycling centre. The contractor shall submit a Demolition Waste Management Plan to UDSM, which outlines the objectives of:

- Maximisation, reuse and recycling of demolition materials/wastes
- Minimisation of waste disposal and maximization of waste treatment such as composting organic demolition wastes
- Evidence of implementation for specified arrangements of waste management

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

11.3.5 Protection Measures

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

11.3.6 Traffic Management

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

11.3.7 Occupational Health and Safety

Detailed OH&S measures shall be provided by the Contractor prior to work commencement. A detailed Site Safety Plan shall be prepared for the specific project. The plan shall highlight important issues as stipulated in the IFC general EHS guidelines for project decommissioning.

11.3.8 Environmental Management Plan

The contractor shall provide a detailed Environmental Management Plan for demolition works prior to the commencement of the work.

11.4 Potential Impacts and Mitigation Measures

- Dust, Noise and vibration Pollution

The demolition activities for the remaining part (foundation structure) shall be accompanied by the emission of a lot of dust, noise, and vibration since the demolition works are expected to be carried out using conventional methods 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 shall prevent the dust at the ground to be picked up by the wind;
iv. Public notifications shall be sent 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
vii. Construction equipment shall be selected, operated and maintained to minimize noise.

- **Waste generation**

A lot of demolition waste is expected to be generated as a result of demolition of this project. Non-hazardous solid waste will include excess fill materials from grading and excavation activities. Hazardous wastes during decommissioning include the release of petroleum-based products, such as lubricants, hydraulic fluids, or fuels, during their storage, transfer, or use in equipment. These shall include blocks, concrete, reinforcements, pipes, etc. Most of the building materials shall be salvaged and recycled.

Mitigation Measures

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

- **Loss of Employment**

If the buildings have to be decommissioned, many people will lose their jobs, including members of staff (academic and administrative Staff), security guards, cleaners, service providers, etc.

Mitigation Measures

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

11.5 Proposed Sequence

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

- Rapid assessment
- Demolition Waste Management Plan
- Demolition Management Plan

In principle, the demolition process is undertaken in the reverse sequence as construction. Essentially, internal finishes shall be stripped out first. Service amenities, including air conditioning, pipework, and conduits, shall then be removed. The facades shall be removed where necessary, and the structure shall then be demolished using the larger plants and equipment. It is estimated that it shall take 3 months to demolish and clear the site. Detailed information regarding the decommissioning of the project and its associated impacts, as well as proposed measures to restore the site to its former state, are provided in Table 11.1. The estimated cost for the decommissioning plan is TZS 190,000,000, which is subject to change based on currency value and other economic factors at that time.

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Table 11.1 Decommissioning and Closure Plan

Activity	Closure Plan	Responsibility	Estimated Budget
Remove internal finishes and service amenities, remove all the equipment, and dismantle the structures.	• Take apart electrical devices such as air conditioners, generators, and other machinery. • Consult with TANESCO (Tanzania Electric Supply Company) to disconnect the power supply for the building project. • All concrete and metal structures, including offices, washrooms, and pavements, will be demolished. • Warning signs will be displayed, and a fence will be erected around all commercial buildings. • Qualified engineers will supervise all disassembling and demolition activities. • The Closure Committee will oversee and monitor all closure activities to ensure proper execution. Technical assistance during the closure phase will be sought by consulting relevant stakeholders.	UDSM and Closure Committee	100,000,000
Personal Protective Equipment (PPE)	During the closure phase, all workers must wear suitable personal protective equipment (PPE), such as a helmet, safety boots, dust mask, safety gloves, goggles, protective garments, and safety vest.	MU and Closure Committee	20,000,000

Waste Management	● During the closure phase, proper waste sorting will be implemented for efficient management. ● A review process will be established to regularly update the waste dump closure plan to adapt to changes in building plans, schedules, community standards, and recognized best practices. ● Instead of being dumped on land, debris can be utilized to fill feeder roads, providing an alternative use. ● Metal materials will be collected and transported to steel factories for recycling and subsequent metal production. ● All hazardous wastes discovered during the decommissioning of the building will be cleaned up and disposed of in accordance with regulations. The closure committee will ensure that no waste is disposed of in water bodies.	UDSM and Closure Committee	20,000,000
Rehabilitation of project site	● A suitable re-vegetation plan will be executed to restore the site to its original condition. ● Measures will be implemented during the vegetation period to control surface water runoff and prevent erosion. ● Regular monitoring and inspection of the area will be carried out to identify any signs of erosion, and necessary actions will be taken to rectify any occurrences. Fencing and signage will be installed to limit access and minimize disturbances in newly vegetated areas.	UDSM and Closure Committee	50,000,000

CHAPTER TWELVE

12.0 SUMMARY AND CONCLUSION

In conclusion, the Environmental and Social Impact Assessment (ESIA) report for the proposed UDSM-Kagera Campus underscores the immense socio-economic benefits that this project will bestow upon the local community, the region, and the global academic landscape. By fostering local employment, stimulating economic growth, and expanding educational access, the project is set to make a meaningful contribution to the betterment of society. Also, its potential for research, innovation, and cross-cultural exchange promises to have far-reaching implications beyond its immediate scope. While acknowledging the identified environmental impacts, UDSM is committed to implement the mitigation measures and monitoring protocols to ensure responsible and sustainable project development. The UDSM-Kagera Campus stands as a testament of the dedication to education, innovation, and environmental stewardship, serving as a beacon of progress and opportunity.

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APPENDICES

APPENDIX IA: CERTIFICATE OF OCCUPANCY FOR PLOT NO.2

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA ARDHI, NYUMBA NA MAENDELEO YA MAKAZI

Anwani ya Simu "ARDHI
Simu: 022 2121241- 9
Makao Makuu)

Simu 028 2502012 (Mwanza)

Ofisi ya MsajiliwaHati
Kanda yaZiwa
S.L.P 1101
kagera

Unapo jibu tafadhali taja: 4425/2
Kumb. Na. LR/KGR/T/......

Tarehe: 12-10, 20.22

Ndugu: THE UNIVESITY OF DAR ES SALAAM
P.O BOX 35091
DAR ES SALAAM

Yah: SHERIA YA USAJILI WA ARDHI (SURA 334)
HATI NA. 4425 **LR KAGERA L.O. NA.** 198249
KIWANJA NA. 2 **KITALU** A
KANGA BUSHARO BUKOBA DC

Hapa na fungasha hati yako ya kumiliki ardhi iliyo tajwa hapo juu. Tafadhali saini fomu Na. L.R: 53 iliyoambatanishwa na hati yako, pia unaombwa usibadilishe chochote kile au kuifanyia lamination bilaridhaa ya ofisi ya Msajil lwa Hati.

Wako ndugu,Mtumishi mtiifu,

Kny: MSAJILI WA HATI MSAIDIZI
MKOA WA KAGERA

Date of Issue: 06-10-2022
Title Number: 4425
Land Office Number: 198249
Land: PLOT NO.2BLOCK "A" KANJANSHARO [illegible] DISTRICT COUNCIL
Term: [illegible] YEARS ([illegible])

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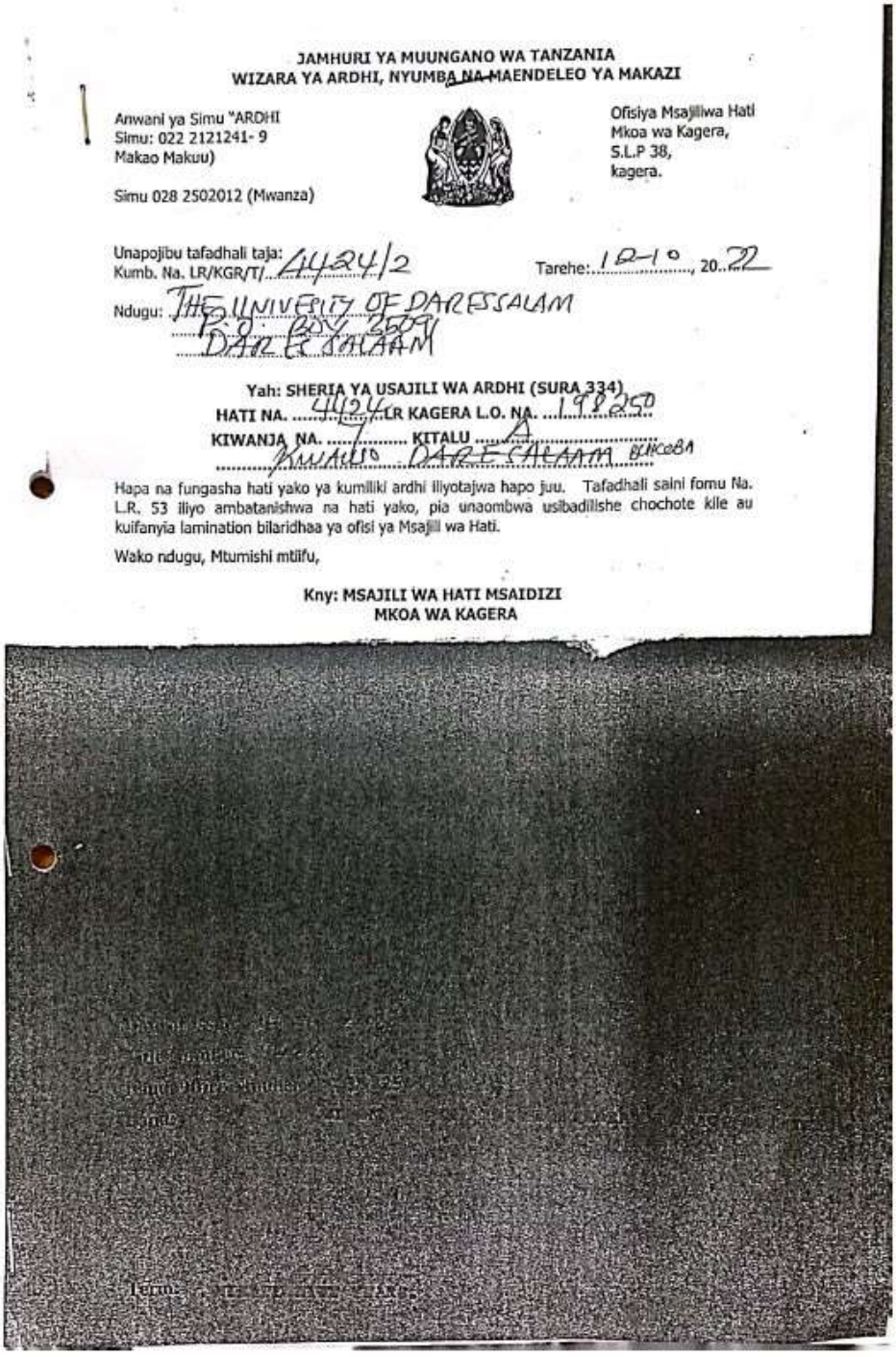
APPENDIX IB: CERTIFICATE OF OCCUPANCY FOR PLOT NO.7



JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA ARDHI, NYUMBA NA MAENDELEO YA MAKAZI

Anwani ya Simu "ARDHI
Simu: 022 2121241- 9
Makao Makuu)

Simu 028 2502012 (Mwanza)

Ofisiya Msajiliwa Hati
Mkoa wa Kagera,
S.L.P 38,
kagera.

Unapojibu tafadhali taja:
Kumb. Na. LR/KGR/T/ 4424/2 Tarehe: 12-10, 2022

Ndugu: THE UNIVERSITY OF DAR ES SALAM
P.O. BOX 35091
DAR ES SALAAM

Yah: SHERIA YA USAJILI WA ARDHI (SURA 334)
HATI NA. 4424 LR KAGERA L.O. NA. 198250
KIWANJA NA. 7 KITALU A
KWAMSIO DAR ES SALAAM BUKOBA

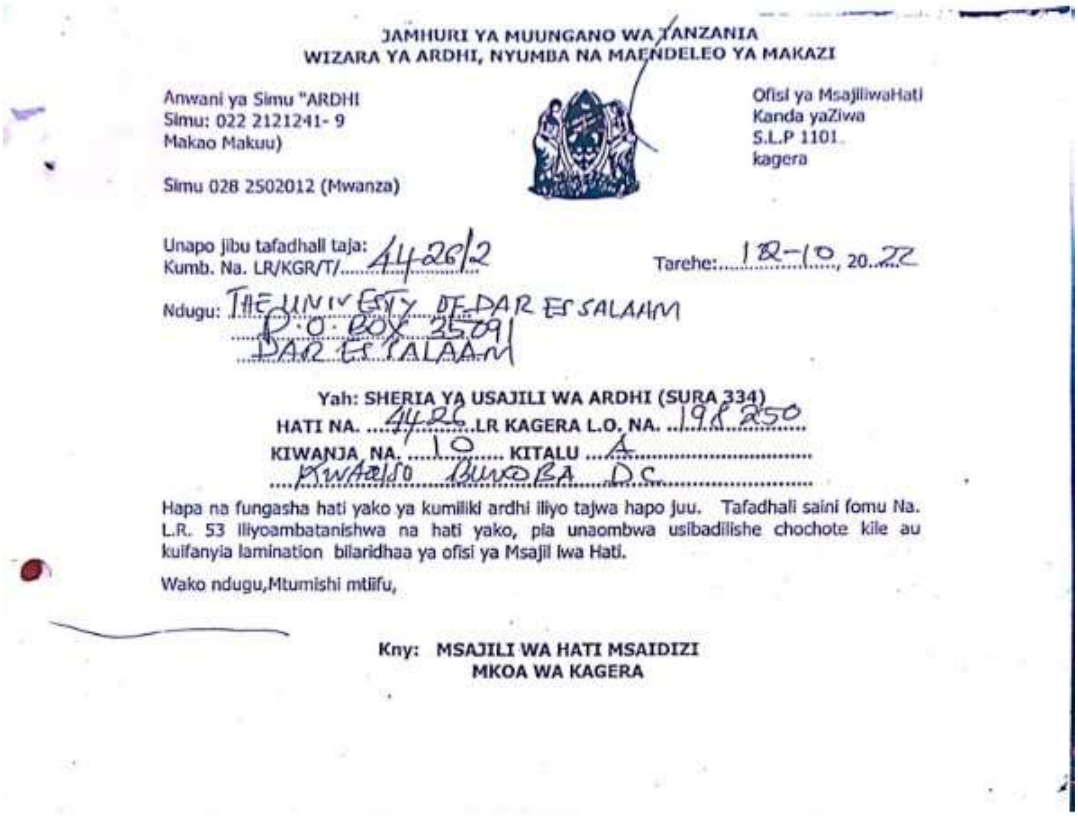
Hapa na fungasha hati yako ya kumiliki ardhi iliyotajwa hapo juu. Tafadhali saini fomu Na. L.R. 53 iliyo ambatanishwa na hati yako, pia unaombwa usibadilishe chochote kile au kuifanyia lamination bilaridhaa ya ofisi ya Msajili wa Hati.

Wako ndugu, Mtumishi mtiifu,

Kny: MSAJILI WA HATI MSAIDIZI
MKOA WA KAGERA

Scanned with CamScanner

APPENDIX IC: CERTIFICATE OF OCCUPANCY FOR PLOT NO.10



JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA ARDHI, NYUMBA NA MAENDELEO YA MAKAZI

Anwani ya Simu "ARDHI
Simu: 022 2121241- 9
Makao Makuu)

Simu 028 2502012 (Mwanza)

Ofisi ya MsajiliwaHati
Kanda yaZiwa
S.L.P 1101
kagera

Unapo jibu tafadhali taja:
Kumb. Na. LR/KGR/T/ 4426/2

Tarehe: 12-10, 2022

Ndugu: THE UNIVESTY OF DAR ES SALAAM
P.O. BOX 35091
DAR ES SALAAM

Yah: SHERIA YA USAJILI WA ARDHI (SURA 334)
HATI NA. 4426 LR KAGERA L.O. NA. 198250
KIWANJA NA. 10 KITALU A
KWAASO BUKOBA DC

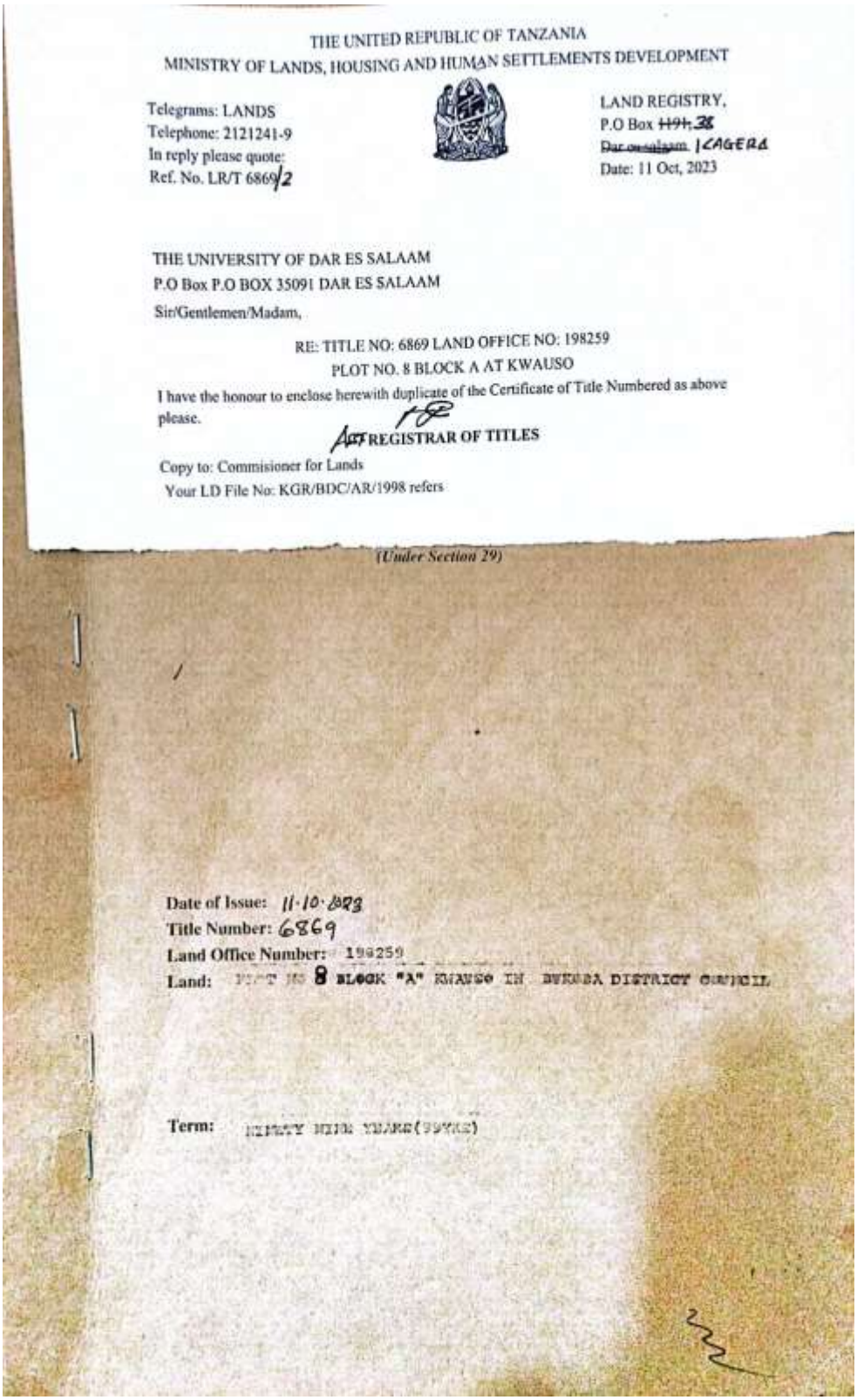
Hapa na fungasha hati yako ya kumiliki ardhi iliyo tajwa hapo juu. Tafadhali saini fomu Na. L.R. 53 iliyoambatanishwa na hati yako, pia unaombwa usibadilishe chochote kile au kuifanyia lamination bilaridhaa ya ofisi ya Msajil lwa Hati.

Wako ndugu,Mtumishi mtiifu,

Kny: MSAJILI WA HATI MSAIDIZI
MKOA WA KAGERA

Scanned with CamScanner

APPENDIX ID: CERTIFICATE OF OCCUPANCY FOR PLOT NO.8



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF LANDS, HOUSING AND HUMAN SETTLEMENTS DEVELOPMENT

Telegrams: LANDS
Telephone: 2121241-9
In reply please quote:
Ref. No. LR/T 6869/2

LAND REGISTRY,
P.O Box ~~1191.38~~
~~Dar es salaam~~ ICAGERA
Date: 11 Oct, 2023

THE UNIVERSITY OF DAR ES SALAAM
P.O Box P.O BOX 35091 DAR ES SALAAM

Sir/Gentlemen/Madam,

RE: TITLE NO: 6869 LAND OFFICE NO: 198259
PLOT NO. 8 BLOCK A AT KWAUSO

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

~~A/T~~ REGISTRAR OF TITLES

Copy to: Commisioner for Lands
Your LD File No: KGR/BDC/AR/1998 refers

(Under Section 29)

Date of Issue: 11-10-2023
Title Number: 6869
Land Office Number: 198259
Land: PLOT NO 8 BLOCK "A" KWAUSO IN BUKOBA DISTRICT COUNCIL

Term: NINETY NINE YEARS(99YRS)

APPENDIX II: WATER ANALYSIS REPORT

UNITED REPUBLIC OF TANZANIA
MINISTRY OF WATER
BUKOBA WATER QUALITY LABORATORY

BACTERIOLOGICAL REPORT

Lab Ref **BKB/B03/2023/2024**
Client Ref
Client name **University of Dar es Salaam**
Collected by **BKWQL Staff**
Sampled on **19-Jul-23**
Reported **1-Aug-23**

Samples number **5**
Pages **3**
Type of Samples **Raw Water**

Telephone/Mobile Number **t +255754817734**
Email ire@udsm.ac.tz

Copy

Notes

Test Method's Deviation **NO DEVIATION**

BUKOBA WATER QUALITY LABORATORY P.O BOX 81 BUKOBA - TANZANIA WATER QUALITY MANAGER

Authorisation

Signature ....
Name Joseph P. Iryondeja Sanya M. Ramadhani
Tittle **Reporting officer** **Water Quality Manager**

The results in this bacteriological report pertain to the samples Collected by staff of this laboratory for preparation and/or analysis as requested by the client.
BKWQL General Conditions of Service apply

This report may not be reproduced except in full,without written permission of the Laboratory

Kitakere Road, Bukoba, P.O. Box 81, Kagera, Tanzania.
t +255 (0)28 2220544 f +255 (0) 28 2220544

BKWQL-QF 7.8.2 | Prepared:BKWQL Staff | Effective date: March,2023
Rev 004 | Approved: WQM | page 1 of 3

Lab Ref BKB/B03/2023/2024
Client Ref
Client name University of Dar es Salaam
Reported 1-Aug-23
Type of Samples Raw Water
Status
Page 3 of 3

BKWQL-QF 7.8.1
Prepared: BKWQL Staff
Approved: WQM
Effective date: March, 2021

Sample Batch No.	Sampling Point	Total Hardness	Phenol alkalinity as $CaCO_3$	Total alkalinity as $CaCO_3$	Sulphate	BOD	Nitrate	Total Suspended Solids (TSS)	Orthophosphate	COD	Nitrite - Nitrogen
BKB/B03/01/2023/2024	Itahwa midle Stream	***10.0***	0.00	3.0	NR	0.12	NR	0.03	NR	0.18	NR
BKB/B03/02/2023/2024	Kangabusharo side	***12.6***	0.00	4.2	NR	0.10	NR	0.01	NR	0.15	NR
BKB/B03/03/2023/2024	KIWAUSO Secondary School Dp	***30.2***	0.00	13.0	NR	0.02	NR	0.01	NR	0.03	NR
BKB/B03/04/2023/2024	At the source (Kilele I)	***13.2***	0.00	4.8	NR	0.23	NR	0.06	NR	0.34	NR
BKB/B03/05/2023/2024	At the source (Kilele II)	***11.6***	0.00	10.8	NR	0.11	NR	0.04	NR	0.16	NR
Method Code		BKWQL-WI-7.2.011	BKWQL-WI-7.2.007	BKWQL-WI-7.2.007	BKWQL-WI-7.2.022	BKWQL-WI-7.2.002	BKWQL-WI-7.2.014	BKWQL-WI-7.2.004	BKWQL-WI-7.2.019	BKWQL-WI-7.2.003	BKWQL-WI-7.2.018
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Detection Limit		0.476	0.20	0.20	0.01		0.01	0.01	0.002		0.004
EAS 12: 2018		600 NPW	NM	NM	400	120	45	1.5	2.2	180	0.9
Analysis Date		21-Jul-23	21-Jul-23	21-Jul-23		20 - 24/07/2023		27-Jul-23		20 - 24/07/2023	
REFERENCE		APHA	APHA	APHA	APHA	APHA	MERCK	APHA	APHA	APHA	APHA

NA- not analysed | - element not determined | I.S. insufficient sample | L.N.R. label not received
BDL Below Detection Limit NR Not Requested NPW Natural potable water
(T) Subcontracted EAS East African Standard
Accredited parameters are 14 fonts, bolded and italic

REMARKS :- The sources of water have acceptable hydrogen potential, with low amount of dissolved minerals.

RECOMMENDATIONS:- All sources of water are not polluted, but water sources are dynamic it can change anytime if it will be polluted or contaminated.

Authorization

Signature	[signature]	[signature]	Signature	[signature]
Name	VERONICA J. MUMBA	Joseph P. Lupondeja	Name	Sanya M. Ramadhani
Title	Technical Signatory	Technical Signatory	Title	Water Quality Manager

END OF ANALYTICAL REPORT

UNITED REPUBLIC OF TANZANIA
MINISTRY OF WATER
BUKOBA WATER QUALITY LABORATORY

ANALYTICAL REPORT

SADCAS

TEST-5 0057

Lab Ref **BKB/B03/2023/2024**
Client Ref
Client name **University of Dar es Salaam**
Collected by **BKWQL Staff**
Sampled on **19-Jul-23**
Reported **1-Aug-23**

Samples number **5**
Pages **3**
Type of Samples **Raw Water**

Telephone/Mobile Number **t +255754817734**
Email ira@udsm.ac.tz

Copy

Notes

Test Method's Deviation **NO DEVIATION**

BUKOBA WATER QUALITY LABORATORY P.O. BOX 81 BUKOBA - TANZANIA WATER QUALITY MANAGER

Authorisation

Signature			
Name	VERONICA J. MUUMBA	Joseph P. Lupondya	Sanya M. Ramadhani
Tittle	**Technical Signatory**	**Technical Signatory**	**Water Quality Manager**

The results in this analytical report pertain to the samples collected by staff of ***this laboratory for preparation and/or analysis as requested by the client.***
BKWQL General Conditions of Service apply

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Accredited parameters are 14 fonts, bolded and italic

Kitekere Road, Bukoba, P.O. Box 81, Kagera, Tanzania.

Lab Ref: BKB/803/2023/2024
Client Ref:
Client name: University of Dar es Salaam
Reported: 1-Aug-23
Type of Samples: Raw Water
Status:
Page: 3 of 3

SKWQL-QF 7.8.2
Prepared: SKWQL Staff
Approved: WQM
Effective date: March,2023

CRITERIAN FOR DOMESTIC AND INDUSTRIA PURPOSES

Parameter		CRITERIA			
		Excellent		Satisfactory	Unsatisfactory
Plate count at 37°C		Not detectable		1_60	61 and above
Plate count at 22°C		Not detectable		1-100	101 and above
Escherichia Coli		Not detectable		Not detectable	1 and above
Faecal coliform		Not detectable		Not detectable	1 and above
Total coliform		Not detectable		Not detectable	1 and above
Clostridium perfringens		Not detectable		Not detectable	1 and above
Enterococcus		Not detectable		Not detectable	1 and above

Authorization

Signature		Signature	
Name	Joseph P. Lupendeja	Name	Sanya M. Ramadhani
Title	Reporting officer	Title	Water Quality Manager

BUKOBA WATER QUALITY LAB. P.O BOX 81 BUKOBA - TANZANIA QUALITY MANAGER

END OF BACTERIOLOGICAL REPORT