ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR PROPOSED CONSTRUCTION OF THREE STOREY SCIENCE LABORATORY BUILDING AT PLOT NO. 4/2/1, OLORESHO MTAA, OLASITI WARD IN ARUSHA CITY, ARUSHA REGION, TANZANIA.

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EXECUTIVE SUMMARY

Introduction

The Open University of Tanzania (OUT) is a Public Higher Learning Institution established by an Act of Parliament No. 17 of 1992. The was replaced by the Open University of Tanzania Charter, effectively from January 1st, 2007, which is in line with the University Act No.7 of 2005. The OUT is currently a single comprehensive and dedicated Open Distance Learning university in Tanzania and the East Africa region. It operates through 28 regional centers, and 6 coordination centers in the country as well as 62 examination centers scattered inside and outside the country.

The OUT is one of the universities which has benefited from the Higher Education for Economic Transformation (HEET) (P166415) project. HEET is a five-year project, which is financed by the World Bank through the Ministry of Education, Science and Technology (MoEST). The HEET project aims at promoting higher education as a catalytic force for the new industrial based economy of Tanzania. Thus, the project is designed to revitalize and expand the capacity of universities to contribute to key areas for innovation, economic development, and labour market relevance, by investing in requisite infrastructure for modern and effective teaching and research.

Thus, the OUT has set aside the fund for construction of multipurpose science laboratories in seven regions of Tanzania namely Pwani, Dodoma, Mwanza, Arusha, Kigoma, Njombe and Mtwara. The laboratories will be used as zonal science laboratories for science students, researchers, secondary schools and community in the project's priority areas. The laboratory buildings will also include ICT facility, pantry for hospitality and tourism hands-on practical's and also stores, and office for the laboratory staff. Each building will be built with partitions for six (6) laboratories in the discipline of;- Botany and related disciplines; Chemistry, environmental and related disciplines; Physics, energy and related disciplines; Food product development and pantry for Tourism and Hospitality; ICT, e-Learning, e-Teaching and data management and Zoology, biotechnology and related disciplines

In Arusha Region, the laboratory building will be of three storey that will be constructed at Plot No. 4/2/1, Oloresho Mtaa, Olasiti Ward in Arusha City. The OUT is having title deed of the three adjoining plots with a total area of 12,129 square meters. The designated land use of the plots is offices for an organization/institution hence compatible with the proposed development. The building will consists of four laboratories of Zoology, Chemistry, ICT Multimedia and Food science as well as Food product development and pantry for Tourism and Hospitality. Also there will be Conference room, Library and offices (Director and staff offices) and other supporting facilities i.e. sanitary areas and circular ramp for people with physical disabilities. The built up area will be 14% of the total area while the other area will be left for future development, lawn area and parking space.

The construction of new building will involve various site activities including clearance of vegetation and excavation. Building construction and associated activities will have environmental, social and economic impacts, which need to be identified and mitigation measures put in place for ensuring sustainability of the project. The World Bank Environmental and Social Frameworks (ESF) and Standards (ESSs) as well as the Environmental Management Act of 2004 of Tanzania require project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation.

In fulfilment of the above, the OUT undertook groundwork and prepared EIA application documents which included Scoping Report and Terms of Reference (TOR) as a first step in the environmental

assessment process. The documents were submitted to the Council (NEMC) and the TOR were approved. The ToR provided guidance under which the environmental and social assessment was done. The Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and the World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study. In addition, this ESIA has been guided by the Project Appraisal Document (PAD) and Project Operational Manual (POM) both of 2021.

Policy and legal framework

Tanzania is committed to attaining sustainable development goal. Some of the national laws policies and legislation relevant to this project have been discussed in the report in Chapter 3.

Furthermore, 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;
iii) WB relevant Environmental and Social Standards. This ESIA study has applied 5 relevant standards out of 10 Environmental and Social Standards (ESSs), which are:

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

Description of the Environment

The project site is undeveloped area partly covered by remnants of maize crops after being grazed by livestock. The other surrounding area is almost bare with remains of scattered patches of ground level grasses and few scattered bushes. The area has been affected by livestock grazing activities. Likewise the large part of the surrounding area is undeveloped one while further towards Northern side are farms under the Tanzania Prison Service. The nearby developed area is Arusha Girls Secondary school located some 200 meters to the eastern side of the site. The terrain of the area is almost flat inclined towards southern side. The overland flow towards the same southern side to join with the stream that joins with Pangani River that flow towards Indian Ocean. The soils are mainly black cotton soils and most parts are quite loose due to grazing activities. The vegetation of the area gives the indication for habitat for fauna and based on the vegetation condition of the area there was no indication for presence of large wild animal. Few species of birds were observed in the area while some small reptiles, and insects are expected to be present in some parts of the general area. Thus, there was no identified specie with significance conservation status (i.e. threated or endangered as per IUCN guidelines/CITES List) in the area.

Stakeholder Engagement

Stakeholder consultations were carried out, including interviews and meetings with officials from Government departments and Local authorities. Officials from Arusha City Council, the Olasiti Ward and Oloresho *Mtaa* Offices as well as the community around were involved in the ESIA process. Other stakeholders involved include GCLA, OSHA, and AUWSA. A multidisciplinary team including environmental experts considered all aspects of the project that can cause environmental or socio-economic changes at a public and stakeholders' consultation and meetings. The team evaluated the significance of each aspect of the project in terms of defined criteria, which take account of the scale, extent, duration, the potential to implement mitigation measures and controls and the likelihood and timescale of environmental recovery.

Consultation with stakeholders indicate that the proposed science laboratory building is generally viewed as positive development for provision of better educational services for students of the area. Further, some stakeholders were worried of some issues/impacts associated with the project during construction and operation activities and specific identified issues are integrated in the ESMP as outlined in the summary below.

Environmental and Social Management
The ESIA study identified a number of environmental and social impacts for the entire life cycle of the project. The assessment followed specific procedures set by the Environmental Impact Assessment and Audit (Amendment) Regulations 2018 and as indicated in the ESIA Terms of Reference. Further World Bank Environment and Social Framework (ESF) and the project's Environmental and Social Management Framework (ESMF) were observed in the study. The significant impacts and measures to mitigate the negative impacts are summarized below:-

Mobilization/Construction Phase
Environmental Negative Impacts
Loss of vegetation ▪ Clearance will be restricted to areas with physical structures and supporting facilities only to avoid spill over effect to other unintended areas. ▪ After construction the OUT shall plant ornamental trees and other vegetation as part of beautification of the area.
Accelerated soil erosion ▪ Major earth work shall be done during dry season when there is no run off to act on the nude site. This will also simplify the machinery work other than working in wet environment with machines. Should there be a need to conduct civil works between March and May during construction phase, the contractor's employed shall take appropriate mitigation measures to prevent accelerated soil erosion to include creation of temporary drainage to direct water to flow towards intended area and putting sediment traps to reduce soil removal. ▪ The contractor shall ensure that backfilling is done adequately, compacted, and the site restored. The backfilling operation will be performed in such a manner so as to prevent washing away of soil. ▪ Putting gravel materials or murrum soil to areas used by trucks and with loose soil and hence more vulnerable to soil erosion.
Air pollution due to dust emission ▪ All trucks carrying the fine earth materials will be enclosed during transportation to the construction site to prevent dust generation along the route. Trucks used for that purpose will be fitted with tailgates that close properly and with tarpaulins to cover the materials. ▪ Measures to suppress dust shall be applied to include watering the area vulnerable for dust including routes/earth roads ▪ Washing of Trucks each morning to remove mud on mudguard and tires to reduce dust on routes ▪ Watering on dry excavated areas to reduce fugitive dust ▪ Speed limits will be instituted to drivers and especially in routes passing in community centres. ▪ Covering stockpile that have potential to generate fugitive dust at site
Air pollution due to exhaust emission ▪ Equipment maintenance to be undertaken in accordance with manufacturer's instructions and at the specified maintenance interval to reduce exhaust emission; ▪ Equipment operators will be trained in and will follow equipment operational procedure.

- Load limit shall be specified to type of vehicle to avoiding overloading that causes excessive exhaust emission.
- Timely maintenance of the trucks through regular inspection on the need for maintenance.

Noise pollution and Vibration

- Construction activities will be restricted to daytime hours only.
- Vehicles and machines will be maintained and serviced as required to ensure they do not generate excessive noise. Among others shall have properly functioning exhaust mufflers.
- Installation of portable barriers to shield compressors and other small stationary equipment shall be done
- Enforced vehicle load restrictions to avoid excess noise emissions from engine overloading shall be done.
- Speed limits will be instituted to drivers and especially in routes passing in community areas.
- No huge compactors that generate excessive vibration shall be used at site.
- Training to drivers on safe driving habits that also control noise levels shall be done

Land degradation at source of construction materials

- Earth nature construction materials will be obtained from authorized/permitted sources
- The contractor will be encouraged to make use of premix concrete suppliers for those major construction works requiring concrete.

Land and water pollution from construction wastes

- A site waste management plan shall be prepared and followed. This will include designation of appropriate waste storage areas, collection and removal schedule, and a system for supervision and monitoring.
- The contractor shall provide different waste bins for segregation on site and to discourage uncontrolled waste disposal.
- No, on site burial or open burning of solid waste shall be permitted at the project site.
- The contractor will make use of the existing solid waste disposal and collection system by approved contractors by the City Council.
- All the waste will be managed within the fenced area before collection

Public Health Hazards due to Liquid Wastes

- A temporary pit latrines will be established for the construction workers at the site to include for both male and female.

Occupational health and safety hazards

Relevant health and safety requirements (OHS Act, 2003) including the provision of Personal Protective Equipment's (PPE), reasonable working hours and good working conditions and facilities shall be complied. Specifically; -

- Accidents will be minimized through proper maintenance of the machines, protecting or guarding the cutting edges, and awareness of the people including workers on the dangers and make them understand how to protect themselves and others.
- The supervisors shall ensure that safety procedure and measures are in place and are enforced (implemented) including appropriate safety gears (PPEs) e.g. eye glasses and dust masks will be ensured in order to reduce risks associated with dust.
- The contractor shall provide adequate training to workers on the OHS of the construction works
- Approved working hours shall be observed in order to avoid careless mishandling due to fatigue.
- Medical checks pre & post-employment as well as mandatory once a year checks shall be done
- Undertake site specific risk assessment and developing mechanism to avoid or reduce the risks. This shall be done per each new work to be undertaken and a safety procedure shall be

developed and implemented by dedicated project HSE officer.

- The contractor shall also prepare Health and Safety Management Plan for implementation of OHS issues at site.

Contamination of land and water from accidental spills and leakages of hydrocarbon

- Re-fueling and services for vehicles will be done off site.
- Spill control measures such as storage and handling of hydrocarbons such as oil shall be done to include storage on impervious areas (such as concrete surfaces with bund wall).
- Heavy equipment will be checked for lubricant leaks before starting the work,
- workers will be trained on proper storage of hydrocarbons.
- Emergency response measures will be put on site in case of accidental oil spill that will include having absorbent materials, sand kits at site, and alike.

Social Negative Impacts

Traffic accidents

- Only qualified drivers with appropriate driving license shall be engage.
- Induction course shall be done to all drivers prior starting driving
- Drivers shall be sensitized on maintaining speed limits for main roads and on access roads.
- Promoting safe drive with specified hours for long drive to avoid fatigue
- Provision of road and safety signs at site or access roads shall be done.

Public Health Hazards (HIV/AIDs and STDs spread)

Awareness raising on the dangers of the HIV/AIDS within the project premises especially to those who are vulnerable and to empower women for they compose one of the most vulnerable groups. When the need arises OUT and Contractor will seek for professional assistance from organizations working in the field of public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace. The contractor shall also prepare HIV/AIDS Management Plan for implementation of HIV/AIDS issues at site.

Increased local population due to labour influx

Semi-skilled and unskilled labour required by the project will be sourced locally to provide communities with employment and the opportunity to earn an income during the construction phase. Local communities will be given prior information through llocal government offices on available employment opportunities and required qualifications. A special clause that requires local peoples to be employed as labourers during construction will be included in the contract.

Risks and hazards associated with child labour

The OUT and Contractor will comply with the provisions in the Employment and Labour Relation Act,2004 and the ILO Convention No. 182. OUT will develop transparent human resources policies and procedures for recruitment process, working conditions, terms of employment wages, worker-employer relations, non-discrimination policy, monitoring, roles and responsibilities. The OUT expects its contractors to adhere to the principles set forth in the Contract which will cover inter alia, standards related to Labour and prohibition of Child Labour.

GBV/SEA/SH related incidences

The OUT will draft, approved and implemented a GBV Action Plan and will assess the SEA/SH risks associated with the project based on existing data and input from key stakeholders. This will include identification of risks to workers and communities during construction as well as risks to students within operating institutions. The GBV requirements and expectations will be defined in the bid documents including codes of conducts (to be signed by workers), training, awareness raising for workers and the community, GBV responsive GRMs and approach to GBV case management.

Gender inequity in employment

Women and men will bee given equal employment opportunities during recruitment and job postings. Regular sensitization and awareness campaigns to the workers will be done to promote gender

equity in employment during the construction works and during operation. Gender disaggregated data, separate bathing, changing room, sanitation facilities for men and women will be provided.

Social Positive Impacts

Employment opportunity

The employment impact could be turned into a positive impact if the contractor constructing the building is both encouraged to and committed to hiring local labour, particularly when only semi-skilled or unskilled labour is required. This could be made clear during the tendering process for construction of the building. One way of promoting this would be for the Contractor to train local people to acquire the skills needed by these contractors to carry out the work.

Benefit to local producers and suppliers of goods and services

The proponent/contractor shall strive to procure the required service and products from local supplied and producers.

Operation Phase

Environmental Negative Impacts

Public health hazards from solid wastes

- Designated area for wastes collection shall be established.
- Provision of wastes receptacles and labeling of these receptacles according to the type of wastes will be done.
- Only authorised waste collection agency by the Municipality will be engaged for collection of the waste.

Public health hazards from liquid wastes

- The OUT will design and construct a septic tank and soak away pit system for sewage management on site. The design will consider the full operational capacity of the building.

Public health hazards from hazardous wastes

The OUT will design a waste water retention structures for the laboratory effluent. Two on series retention ponds will be designed for dilution of the effluent before final discharge to the open environment. The effluent on the retention ponds will be monitored to ensure it is safe for final disposal.

Fire Hazards

There will be enough exit doors for evacuation in case of fire incidence. The corridors will be of sufficient widths and dimensions to enable easy and speedy evacuation. Provision will be made under the plumbing installation, for fire-fighting system. Further; -

- The OUT shall install with firefighting system among others portable fire extinguishers for emergency especially in the office side.
- Staffs will be trained on how to operate the firefighting equipment.
- Drawings shall be submitted to fire department for scrutiny and guidance on fire safety designs and shall adhere to the requirement(s).

Occupational health and safety hazards

The final designs of the science laboratory building shall adhere to the required standards taking into account the nature of operations. Some of the key aspects to be considered include the ventilation of the chemistry laboratory, location of the gas to be involved in the process, storage room of chemicals requirements. Further, in order to mitigate the potential impacts due to laboratory fumes from complex chemical reactions the chemistry laboratory shall be equipped with fume hood built-in with scrubber which is acid and organic resistant to withstand the acid and organic fumes from the chemistry laboratory operations. Also, before operations of the laboratory building baseline risk assessment should be done in line with OHS Act of 2003 to identify OHS risks and hazards and

thereafter to formulate the mitigation measures to be implemented during the operation.
Social Positive Impacts
Employment opportunity The employment impact could be turned into a positive impact if the proponent is both encouraged to and committed to hiring local labour. This could be made clear during the employment process to involve local community through local government offices for information sharing.
Benefit to local producers and suppliers of goods and services The proponent shall strive to procure the required service and products from local supplied and producers. This could also be advertised through local offices for information sharing for service providers within the local area.
Social Negative Impacts
Risk of SEA/SH The OUT will draft, approved and implemented a GBV Action Plan and will assess the SEA/SH risks associated with the project based on existing data and input from key stakeholders. This will include identification of risks to workers and communities as well as risks to students within operating institutions. The GBV requirements and expectations will be defined in the bid documents including codes of conducts (to be signed by workers), training, awareness raising for workers and the community, GBV responsive GRMs and approach to GBV case management. Also, GBV measures needed to protect students at the national level and the institutional level including the need for institutions to develop GBV policies to address SEA/SH, training and awareness raising, GBV responsive GRMs, educator/ staff codes of conduct (to be signed), student agreements, referral pathways etc., will be defined. The OUT will identify and create a partnership with a local organisation to report workers' misconduct and complaints/reports on GBV or harassment through the GRM.
Health Hazards due to social interaction among workers and users The project proponent will support already existing and new initiatives to sensitize/educate the people around the project on the HIV/AIDS pandemic. Also, the proponent will provide HIV/AIDS training/awareness campaign programmes to its employees and will encourage workers who know they are infected and receive care to break through the denial about HIV by talking with their fellow workers, friends and neighbours and reducing the discomfort associated with the subject. When the need arises, the OUT will seek for professional assistance from organizations working in the field of public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace.
Non-user-friendly building for Persons with Disabilities (PWDs) The building will be designed and built with ramps and other special facilities such as toilets to facilitate access and use by PWDs. Detailed consultation with the PWDs community will be undertaken during the design process to ensure key access and user-friendly facilities are designed and constructed.

Monitoring and Auditing

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

Cost Benefit Analysis

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

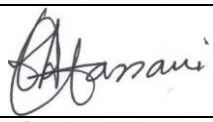
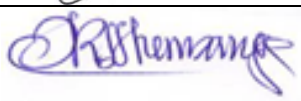
Decommissioning

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

Conclusion

Based on the findings, it is evident that development of the proposed three storey laboratory building will greatly contribute towards provision of quality education by the OUT to students for country socio-economic development. The study indicates that, the potential negative impacts can be easily mitigated without any major effect to the environment and social components as the project will be implemented within the area fully owned by OUT, designated for institution/organization offices, isolated from human settlements and previously used for farming. The study concludes that a number of environmental and social impacts have been identified and assessed; none of these are considered to be that severe after mitigation as to prevent the further planning, design and construction of the proposed science laboratory building in the area. Thus, the project development in the area can be considered suitable subject to the implementation of the mitigation measures as indicated in the Environmental and Social Management Plan.

THE NAMES OF ESIA TEAM

S/N	NAME OF CONSULTANT	POSITION/AREA OF EXPERTISE	SIGNATURE
	Certified Experts		
1.	Mr. Abel Sikaona (Reg No. NEMC/EIA/0052)	Environmental Management/Water Resources	
2.	Mr. Bashiru Abdul Hassani (Reg No. NEMC/EIA/0034)	Lead Consultant, Environmental Planning and Social Economist	
3	Eng. Sam Shemsanga	Environmental Engineer	
4	Mr. Sengerema Thomas	Natural Resources Management	
	Other Experts		
5	Sesilia Jeremia	Gender/GBV Specialist	
6	Ms. Nasra Abdul	Sociologist	

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ACKNOWLEDGEMENT

This ESIA Report for the proposed Three Storey Science Laboratory Building at Plot No. 4/2/1, Oloresho Mtaa, Olasiti Ward in Arusha City, Arusha Region, Tanzania was carried out by TRES Consult (T) Limited on behalf of the Open University of Tanzania. The report was written mainly based on field work and secondary data from various reports and documents which are cited in this report. The Open University of Tanzania wishes to extend special thanks to the National Environment Management Council (NEMC) for reviewing the report. This has enabled the Consultant to address pertinent issues of the project. Also the University wishes to extend thanks to TRES Consult (T) Limited for carrying out this study. We further register our gratitude to the various stakeholders (listed in appendix 3) consulted during the stakeholders consultation for their invaluable contribution, support and cooperation. Their input contributed enormously towards successful completion of the study.

LIST OF ABBREVIATIONS AND ACRONYMS

ACC	Arusha City Council
AUWSA	Arusha Urban Water Supply and Sanitation Authority
CBD	Central Business District
CBO	Community Based Organisation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CRB	Contractors Registration Board
dBA	Decibel
DOE	Division of Environment
EIA	Environnemental Impact Assessment
EM	Environmental Management
EMA	Environmental Management Act
EMP	Environmental Monitoring Plan
ERB	Engineers Registration Board
ESF	Environmental And Social Framework
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and social standards
FGD	Focused Group Discussion
FIFO	First in First Out
GBV	Gender-based violence
GCLA	Government Chemist Laboratory Authority
GDP	Gross Domestic Product
GN	Government Notice
HEET	Tanzania Higher Education for Economic Transformation
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
HSE	Health, Safety and Environment
IFC	International Finance Corporation
IUCN	International Union for Nature Conservation
NBS	National Bureau of Statistics
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGOs	Non-Governmental Organisations
ODL	Open and Distance Learning
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Authority
OUT	The Open University of Tanzania
PM	Particulate Matter
PPE	Personal Protective Equipment
SEA	Sexual Exploitation and Abuse
SEP	Stakeholders Engagement Plan
SH	Sexual Harassment
STDs	Sexually Transmitted Diseases
TAC	Technical Advisory Committee
TANESCO	Tanzania Electric Supply Company
TCU	Tanzania Commission for Universities
TMA	Tanzania Metrological Authority

ToR	Terms of reference
TTCL	Tanzania Telecommunication Company Limited
TZS	Tanzania Shillings
UNESCO	United Nations Educational, Scientific and Cultural Organization
URT	United Republic of Tanzania
USD	United States Dollar
VAT	Value Added Tax
VPO	Vice President Office
WB	World Bank
WHO	World Health Organisation
WSP	Waste Stabilization Ponds

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Open University of Tanzania (OUT) is a Public Higher Learning Institution established by an Act of Parliament No. 17 of 1992. The Act became operational on 1st March, 1993 by publication of Notice No. 55 in the official gazette. The Act No.17 of 1992 was replaced by the Open University of Tanzania Charter, effectively from January 1st, 2007, which is in line with the University Act No.7 of 2005. The OUT offers its certificate, diploma, degree and postgraduate courses through the Open and Distance Learning (ODL) system which includes various means of communication such as face-to-face, broadcasting, telecasting, correspondence, seminars, e-learning as well as a blended mode which is a combination of two or more means of communication. The OUT's academic programmes are quality-assured and centrally regulated by the Tanzania Commission for Universities (TCU). It operates through 28 regional centers, and 6 coordination centers in the country as well as 62 examination centers scattered inside and outside the country.

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Thus, the OUT has set aside the fund for construction of multipurpose science laboratories in seven regions of Tanzania namely Pwani, Dodoma, Mwanza, Arusha, Kigoma, Njombe and Mtwara. The laboratories will be used as zonal science laboratories for science students, researchers, secondary schools and community in the project's priority areas. The laboratory buildings will also include ICT facility, pantry for hospitality and tourism hands-on practical's and also stores, and office for the laboratories staff. Each building will be built with partitions for six (6) laboratories in the following disciplines:-

i) Botany and related disciplines
ii) Chemistry, environmental and related disciplines
iii) Physics, energy and related disciplines
iv) Food product development and pantry for Tourism and Hospitality
v) ICT, e-Learning, e-Teaching and data management
vi) Zoology, biotechnology and related disciplines

In Arusha Region, the laboratory building will be of three storeys that will be constructed at Plot No. 4/2/1**,** Oloresho *Mtaa*, Olasiti Ward in Arusha City. The OUT is having title deed of the three adjoining plots with a total area of 12,129 square meters (see appendix 2).

The construction of these laboratories must abide to the Environmental Management Act of 2004 of Tanzania which requires the project developers to carry out Environmental and Social Impact Assessment prior to project implementation. The First Schedule of the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018, categorize major urban projects including multistorey buildings as type B1 project (borderline project), which may or may not require ESIA study and upon screening the Council will guide the course of the study. Likewise the

World Bank's Environmental and Social Standards requires the borrower to identify, assess and manage potential environmental and social impacts and risks associated with the project. In view of the above, OUT carried out this environmental and social impact assessment (ESIA) for the proposed multipurpose science laboratories in the project areas while adhering to World Bank's Environmental and Social Frameworks and Standards and Policies for Investment projects financing.

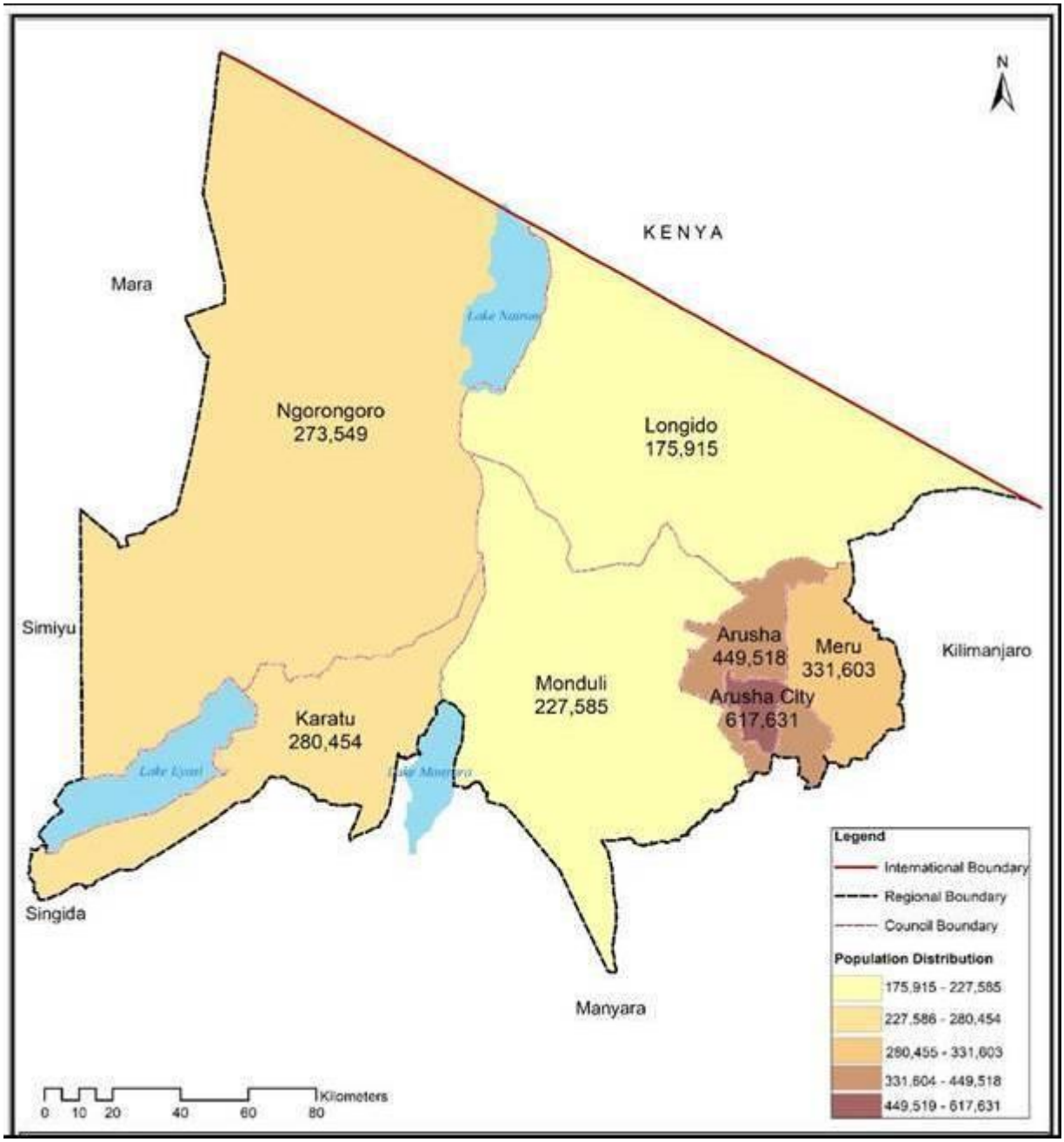

Figure 1.1: Map of Arusha Region showing Arusha City where the project is located

Source: URT, 2022

In fulfilment of the above, the OUT undertook groundwork and prepared EIA application documents which included Scoping Report and Terms of Reference (TOR) (appendix 1) as a first step in the environmental assessment process. The documents were submitted to the Council (NEMC) and the project was registered and allotted Project Reference No. EC/EIA/2023/0687 as well as an approval of Terms of Reference (ToR) for undertaking ESIA study was made (Appendix 4). The approval was communicated through a letter of 06/12/2023 with Reference Number HF.88/145/104/02 (Appendix 4).

These ToR provided guidance under which the environmental and social assessment was done. The Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study. In addition, this ESIA has been guided by the Project Appraisal Document (PAD) and Project Operational Manual (POM) both of 2021.

1.2 PROJECT RATIONALE

The OUT due to lack of science laboratories, it has been hiring services for conducting practical sessions at Sokoine University of Agriculture (SUA), University of Dar es Salaam (UDSM) and Saint John's University of Tanzania (SJUT) in Dodoma. This exercise has become so costly to the OUT and at the same time denying its faculty members an opportunity to enhance their practical skills towards their academic career in general. Also, the Tanzania Commission for University (TCU) technical accreditation team, strongly recommended for the establishment of science laboratories during the assessment of the faculty's operations in 2007. The generation of competent professionals who are well prepared to move the country forward in terms of science and technological development relies strongly on good and regular hands-on experience in the course of learning. The setting up of science laboratories will create a much more convenient learning environment for the OUT students; promote training in practical and conceptual skills in different scientific sub-disciplines and at the same time reduce the burden placed to our sister universities in handling the OUT students. Further, the involvement of the OUT academic staff in running practical sessions will enhance their professional skills through in-house exposure to knowledge and as well promote individual involvement in research activities.

The implementation of this HEET project will cut down the ever-rising costs that the OUT has been incurring for over the years through outsourcing the facilities and at the same time build capacity of its faculty members in scientific research and investigations. It is the anticipation of the OUT that the HEET project will further create a breakthrough to more students towards accessing Science education at a more affordable cost. The laboratories will also be accessible to neighbouring Secondary School students; teachers and researchers thus stimulate and attract more students to pursue Science subjects. Thus, through HEET project, OUT will produce sufficient numbers of trained scientists who will safeguard the Industrialization agenda towards realizing the Country 2025 Vision.

1.3 OBJECTIVES OF THE HEET PROJECT

1.3.1 HEET Project main objective

According to Project Appraisal Document (PAD) of 2021, the main developmental objective of the HEET project is to strengthen the learning environment and labour market alignment of priority programs at beneficiary higher education institutions and improve the management of the higher education system. The project is geared towards meeting the following strategic objectives (i) to increase enrolment in priority disciplines, (ii) to improve the relevance and quality of programs at universities to meet the conditions and standards of the current and future labour market, (iii) to strengthen system-level coordination, management, and regulations to ensure quantity, quality and relevance of higher education in Tanzania, and (iv) to increase the rate and extent of graduate employability through improving the relevance of curricula and create new and demand driven programs.

1.3.2 Specific Objectives for OUT – Arusha Zonal Laboratory Building project

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

i) Construction of Science Laboratories buildings and associated facilities;
ii) Updating curriculum and introducing innovative pedagogical methodologies
iii) Promoting applied research and innovation capacity.
iv) Promoting product/service development and or practical learning through partnership with private sector
v) Enhance Moodle learning platform and digital technology applications
vi) Promoting self-generating income
vii) Building capacity of academic staff and university leadership

1.4 THE SCOPING STUDY

The Scoping study ensures that relevant key environmental and social economic issues are identified before the EIA is conducted to ensure that the study is focused and covers all important issues. The objectives of the scoping study for the proposed construction of Laboratory building were therefore to document key issues that are likely to be important during the EIA study and to identify and involve key stakeholders in the EIA process. This process afforded opportunity to the stakeholders to express their views and concerns to be included in the EIA study. The scoping study also involved:-

- Identification of project alternatives;
- Identification of EIA study boundaries;
- Identification of information requirements;
- Development of effective methods of approaching the EIA study;
- Defining the terms of reference for the EIA study.

The consulted stakeholders and the issues raised are presented in chapter 5 of this report.

1.5 THE ESIA STUDY

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

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

v. To establish and assess impacts that are likely to affect the environment before a decision is made to authorise the project;
vi. Propose mitigation and socio-management procedures aimed at managing the proposed mitigation of the identified potential impacts and that will form part of the overall ESMP for the project operations.
vii. To enable information exchange, notification and consultations between stakeholders;

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

1.6 METHODOLOGY OF THE ESIA STUDY

The ESIA study applied different participatory methods to involve all the concerned stakeholders. The methodology used in this study is commensurate with the Environmental Management Act, Cap 191 and the Environment Impact Assessment and Audit (Amendment) Regulations, 2018). The study was undertaken based on checklists complimented by the Consultants' experience and through discussion with the OUT staff, local government officials and communities in the vicinity of the project site. ESIA study was done both as a desktop study and field work. It involved the review of literature/documents including Environmental and Social Management Framework (ESMF) report, OUT Project background reports, socio-economic profiles and field studies at the project site to gather information and data on various aspects of the project. The environmental assessment required consultations with a number of stakeholders, including responsible government agencies, Local Government Authorities (Arusha City Council), etc. The study adopted the following approach:

1.6.1 ESIA Team

A multi-disciplinary team of experienced scientists and environmental and social professionals was assembled to carry out the required resource assessment, generation of baseline data, determination of potential impacts and recommendation of mitigation measures. An interactive approach was adopted among the environmental team members and other project professionals.

The team utilized the checklist for data gathering, analysis, and presentation. The team members conducted the reconnaissance investigations to determine the critical elements for analysis and the issues highlighted for the design and planning process. Team meetings were held to discuss the progress of investigations and analyses and facilitate data integration toward an understanding of the systems at work in both the natural and built environment. Baseline data for the study area were collected using a combination of:-

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

1.6.2 Communication with Stakeholders

Identification of stakeholders
The stakeholders were identified based on the role and relevance of an organization, group or individual to the proposed project. Some of the stakeholders including Arusha City Council, Olasiti Ward

and Oloresho Mtaa offices, Government Chemist Laboratory Authority (GCLA), Occupational Safety and Health Authority (OSHA) and local community have been pre-determined based on the nature and location of the project, while others and potential affected groups in the vicinity of the proposed project site and area of influence were identified during the field visit. A list of stakeholders identified is found in chapter 5.

Involvement of stakeholders
The study team, in collaboration with the OUT officials visited the proposed area for the proposed project and later on visited neighbouring community. Physical observations and stakeholders' interviews were conducted in order to collect baseline data and issues of concerns. The ESIA study applied different participatory methods to involve all the relevant stakeholders. Public meeting dominated in the *Mtaa*, one-to-one interviews with individuals based upon a list of general topics or questions and partly based on an open discussion, were conducted. Focused group discussions were also used to gather stakeholder's views and concerns.

In establishing the views of the public concerning the proposed project, the consultants provided introduction letter addressed to each stakeholder, briefing the project, need for ESIA and asking the stakeholder to freely raise their concerns to the Consultant. During the public meetings the consultants introduced the project and elaborated to the stakeholders the project objectives and purpose and envisaged project activities so as to give a good understanding for stakeholders to be able to air their views.

Identification of stakeholders' concerns
The stakeholders pointed out a number of issues and concerns. An issue raised by one individual or a group of people was cross-checked by discussing it over with other groups (triangulation). Key issues raised by each stakeholder group were summarized and further analysed. Details of stakeholders consulted, names and signatures of people consulted and record of main issues raised are integrated in Chapter 5 and Appendix 3 of this report accordingly.

1.6.3 Physical Environment

Information was gathered on the existing physical environment, particularly as related to topography, soils, drainage and hydrology in general.

Climate, soils and topography,
Information on the climate, geology, topography, soils, was obtained by compiling data from existing reports, and source agencies. Maps were also examined to obtain some of the data such as topography of the general area. Field work was carried out to augment and verify existing information relating to topography and soils and to obtain first-hand knowledge of the other physical aspects.

Hydrology and drainage
Surface and ground water characteristics were assessed using field investigation as well as maps and data from previous reports.

Noise and Vibration
Spot measurements were done on site to determine the current noise levels and vibration at the project site. Sound level meter device was used to record noise at the four corners of the project site (north, south, east and west) as prescribed in ISO 19961:2003 and ISO 3095:2001. On taking measurements, the meter was set to the "A" weighed measurement scale, which enables the meter to respond in the same manner as the human ear. The meter was held approximately 1.5 m above the ground and at least 0.5 m away from hard reflecting surfaces such as walls.

Ground vibrations were measured using a vibrometer data logger, which is designed to measure ground vibrations according to European standard EN 14253:2003. The meter has an accuracy of ±5%, acceleration of 200 m/S^2, a wide frequency range of 10 Hz to 1 kHz for capturing almost all possible ground vibrations. On taking measurements, the accelerometer transducer was mounted on the ground to record both ambient and peak vibrations. To produce accurate results, the transducer was secured in direct contact with the ground. The same point used for noise measurements were also used for vibration.

Air quality
Spot measurements were done on site to determine the current ambient air quality in terms of particulate matter and pollutant gases at the project site. Particulate matters were measured at site in terms of TSP, $PM_{10,}$ $PM_{2.5}$ by using Dust Monitor, that measures dust particles of different dimensions (microns of 10, 5.0, 2.5, <1.0, 0.3 and >10). The equipment complies with the EMC Directives.

Ambient pollutant gas concentrations (i.e. CO, NOx, NO_2, SO_2, H_2S, and VOC) were measured using "Aeroqual series 500 monitor (S-500)" at four points. Different sensor heads were used depending on the type of gas that was measured at a particular time. The ambient gases were measured in accordance with the manufacturer's procedure that meets ISO 9001:2008 protocol. The device was elevated at a height of 1.5 meters above the ground; once the device is switched ON, it performs an automatic calibration for three minutes by pumping in fresh air into the sensors so as set the toxic sensors to zero.

1.6.4 Biological Environment

The status of the flora and fauna of the study area was determined by a review of literature relevant to the area and field investigations. The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species. The vegetation was identified and described for their property. Information on fauna was gathered from existing literature on reported species as well as observations in the field. Observations were made particularly to assess the presence of birds in the general area. Information also was obtained from locals in the area about the presence of any significant specie.

1.6.5 Socio-economic Environment

To determine the cultural and social factors associated with the construction and operation of the proposed project, members of the communities in the general vicinity of the project were interviewed and a review of economic and social literature was conducted. Further, rapid field appraisal techniques in conjunction with desk research were employed to investigations of the socio-economic considerations within the project area. These were undertaken to ascertain information to satisfy the following factors as outlined in the approved terms of reference provided:

i) Population and settlement characteristics
ii) Land uses and livelihoods
iii) Community structure, employment and income
iv) Developments underway
v) Infrastructure in place
vi) Water supply and other utilities
vii) Waste management practices
viii) Recreational activities
ix) Energy supply

x) Public health and safety
xi) Access to and delivery of health, education and social services

1.6.6 Review of project documents and literature

This involved reviewing available information on the project to gain a basic understanding of the components and their operation. The documents consulted are presented in the list of references and bibliography of this report.

1.6.7 Policy, Legal and Institutional Arrangement

Policy, legal and institutional arrangement were compiled from review of documents: policies, legislation, guidelines and standards. Information and data on local by-laws, institutional structures and mandates/authority were obtained from Arusha City Council.

1.7 REPORT STRUCTURE

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

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

1. Introduction
2. Project description
3. Policy, administrative and legal framework
4. 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

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND ACCESSIBILITY

The proposed project site is specifically located at Plot Number 4/2/1 Mateves area of Oloresho *Mtaa*, Olasiti Ward in Arusha City, Arusha Region (see Map of Figure 2.2 and Google Earth Map of Figure 2.1 below). The site is outskirt of Arusha Central Business District (CBD) area towards West Southern side and it is about 2 Kilometers south of Arusha Airport. The specific coordinates of the site are 03^0 23' 13" South and 36^0 37' 30" East.

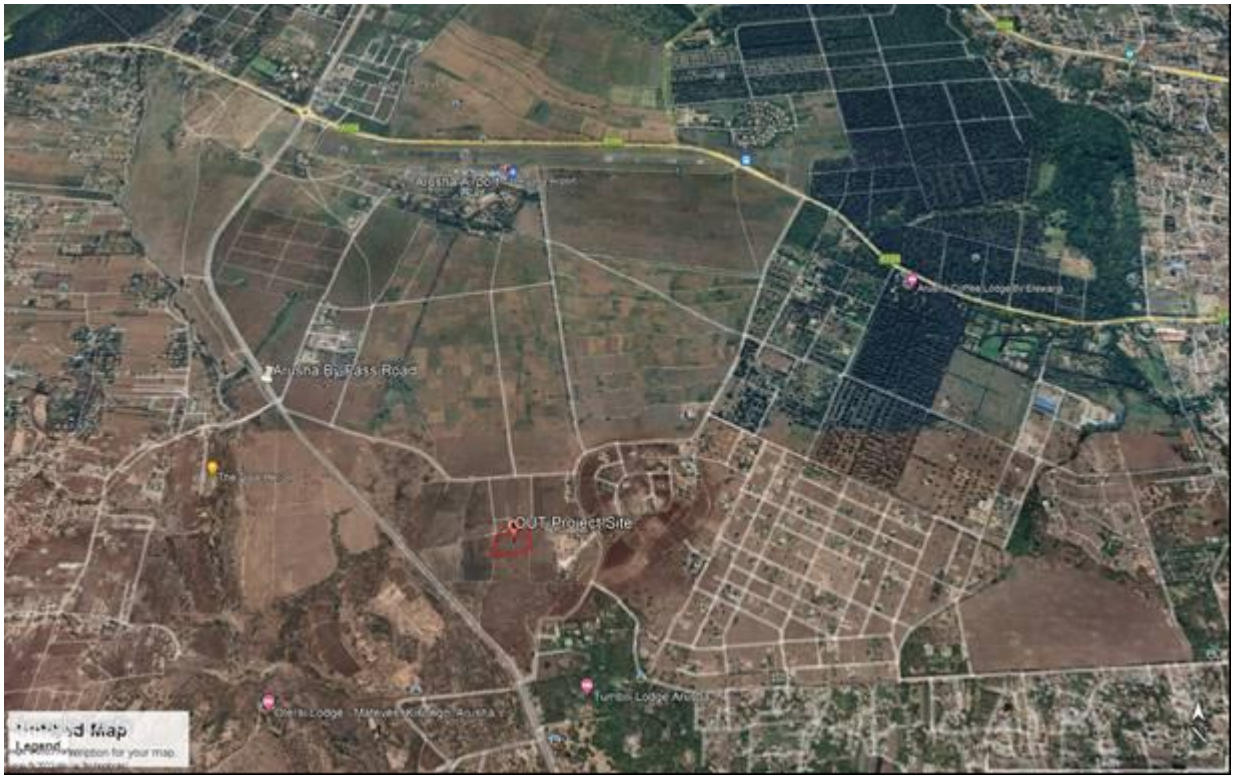

Figure 2.1: Google Earth Map showing the project site and its accessibility

The site can be accessed by East Africa by-pass road and it is 3.5 kilometers from Kisongo junction/round-about towards Kwamrombo area/southern side. The access road to the specific site is yet to be developed but the distance is 280 meters from the same road. It can also be accessed by Airport road that emanates from Arusha-Babati road and joins with the by-pass road. From Arusha – Babati road to the access road towards the site is about 2.47 kilometers and the access earth road is 260 meters via Arusha Girls Secondary School.

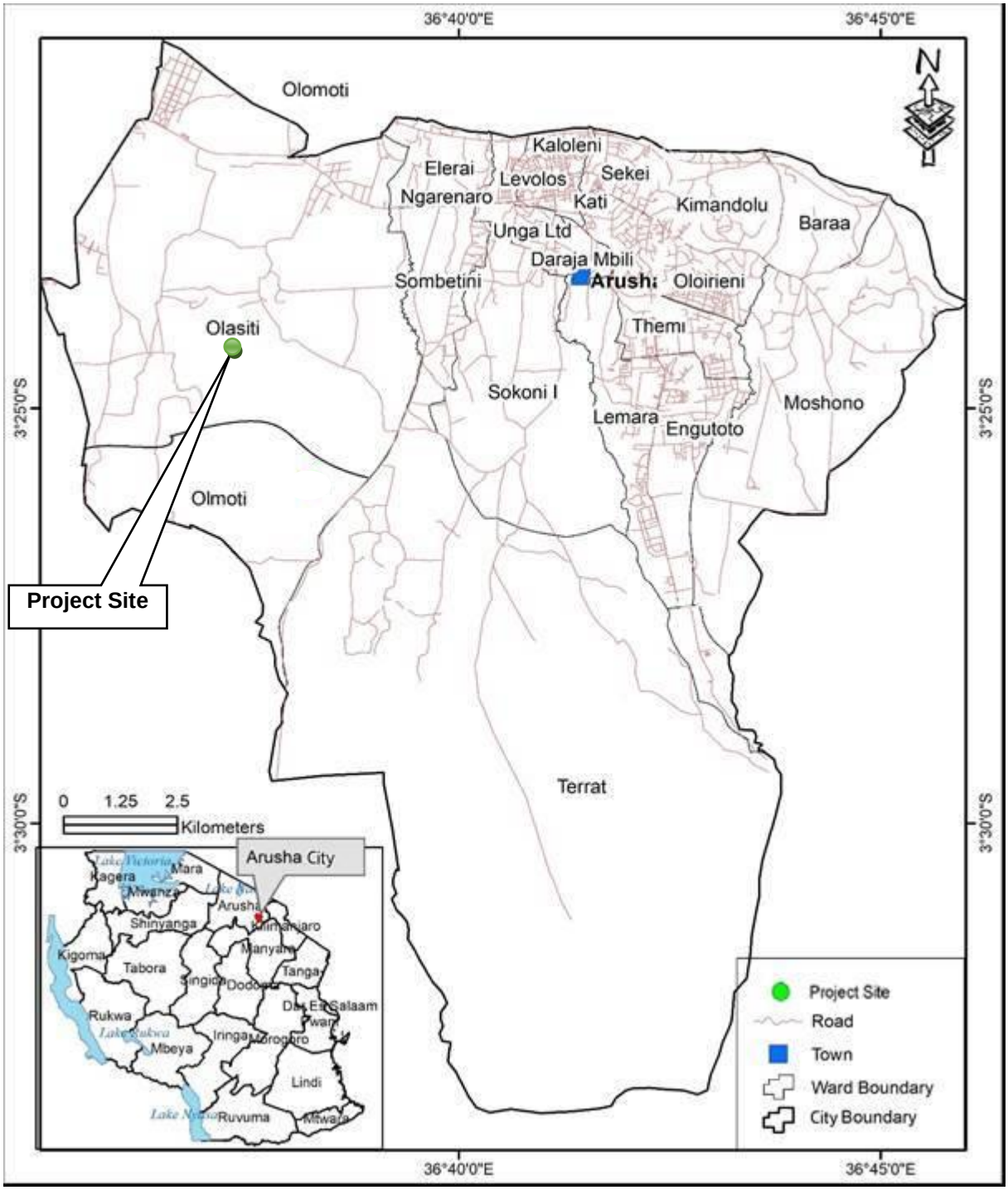

Figure 2.2: The Map of Arusha City showing the location of the Project Site

Source: TRES Consult (T) Limited, 2023

2.2 LAND OWNERSHIP AND USE

The Open University of Tanzania is the registered owner of the three adjoining plots with No. 4/2/1 under Title Number 7873, with a total area of 12,129 square meters (see appendix 2). The land use of the plots is designed for an organization/institution, Use Group G Use Class (b) as per Urban Planning (use Groups and Use Classes) Regulations, 2018. Hence the development in the area is compatible with the designed land use of the title. Likewise, the nearby areas are stated to be planned for offices for institutions while the existing nearby neighbor is Arusha Girls Secondary School.

2.3 SITE DESCRIPTION / FEATURES

The earmarked site is undeveloped area partly covered by remnants of maize crops after being grazed by livestock. The other area is almost bare with remains of scattered patches of ground level grasses and few scattered bushes. The area has been affected by livestock grazing activities. Likewise the large part of the surrounding area is undeveloped one while further towards Northern side (more than 500 meters) are farms under the Tanzania Prison Service. The nearby developed area is Arusha Girls Secondary school located some 200 meters to the eastern side of the site. The terrain of the area is almost flat inclined towards southern side. The overland flow towards the same southern side to join with the stream that joins with Pangani River that flow towards Indian Ocean. The soils are mainly black cotton soils and most parts are quite loose due to livestock tramping on land. The features of the surrounding area is not different from the site with almost bare land. Photos of plate 2.1 below shows the features of the project site.

Plate 2.1: Features of the project site
Source: Field visit, September, 2023

The vegetation of the area gives the indication for habitat for fauna and based on the vegetation condition of the area there was no indication for presence of large wild animal. Few species of birds were observed in the area while some small reptiles, and insects are expected to be present in some

parts of the general area. Thus, there was no specie with significance conservation status (i.e. threated or endangered as per IUCN guidelines/CITES List) identified in the area.

2.4 ADJACENT FEATURES/DEVELOPMENTS

As noted in previous section the immediate area after the project site is undeveloped and have similar features with the project site. The nearby developed area is Arusha Girls Secondary school which is about 200 meters on the eastern side (plate 2.2 below). About 600 meters to the North is farmland under the Tanzania Prison Services and actual prison is about 1.7 Kilometers on the same side after which is the Arusha Airport. To the west about 380 meters is East Africa by-pass road and after the road is Mateves primary school and Peace House Secondary School. To the south and south east after the Airport road is the Compound and garden of Tumbili Lodge Arusha. The local communities are more than a kilometre to the east and eastern south (Figure 2.3).

Plate 2.2: Distant view of Arusha Girls Secondary school from the site
Source: Field visit, September, 2023

Figure 2.3: Google Earth Map showing the project site neighbourhoods

2.5 PROJECT COMPONENTS AND DESCRIPTION

The proposed Laboratory building will be of three storeys consisting of four laboratories of Zoology, Chemistry, ICT Multimedia and Food science as well as Food product development and pantry for Tourism and Hospitality (see figure 2.4 – 2.5 below). The laboratories (each) will have preparation rooms and technician offices. Also there will be modern Conference facilities, Multipurpose / examination halls, Mini - Library and OUT Arusha Regional Center director and staff offices). The building will have sanitary areas and circular ramp for people with physical disabilities up to the second floor. Dedicated sanitary areas for people with disabilities will also be provided. The total built up area will be 1701.16 square meters of the total area which is 14% of the total area. The other area will be left for future development; lawn area and parking space (see the site layout plan on figure 2.6 below).

The design of the building shall accommodate the infrastructures to enhance low energy use, rainwater harvesting, storm water management, adequate natural ventilation and lighting, and maintaining a significant green spaces, as part of adaptation to climatic change as covered in subsequent sections.

Figure 2.4: Front side view

Figure 2.5: Rear view

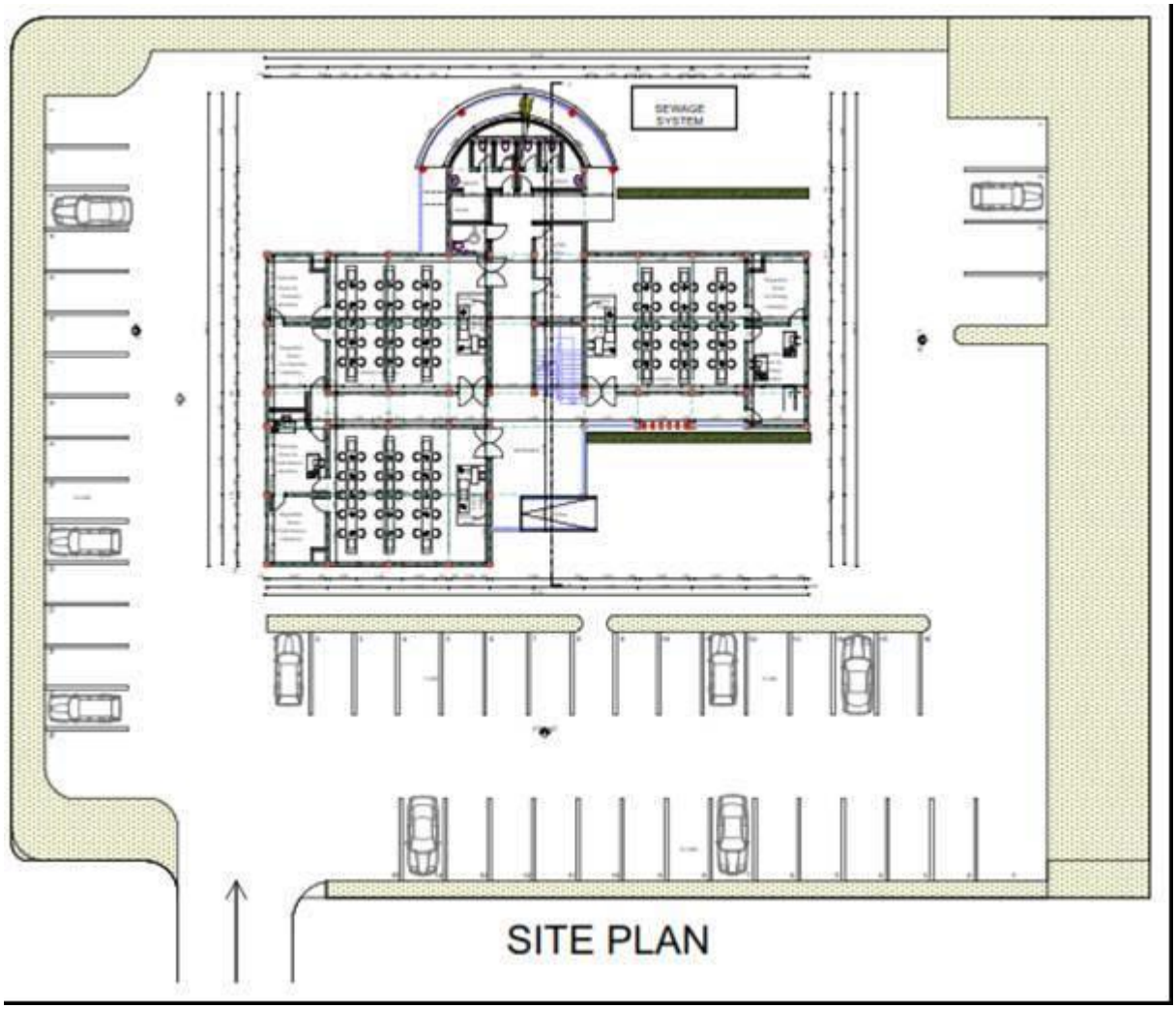

Figure 2.6A: Site Layout Plan

Figure 2.6B: 3D - Aerial view of the Site Layout Plan

2.6 THE PROJECT ACTIVITIES

2.6.1 Site Preparation and Mobilization

2.6.1.1 Site Preparation

The proponent and the contractor will ensure all necessary permits are in place to allow the work(s) to take place to include having construction permits from the planning authority i.e. Arusha City Council as part of compliance to the legal requirement. Necessary safety measures will be put in place to include securing the construction site by putting iron sheets around the site. Also the contractor will establish a small temporary site office for construction activities. The office will also include material store and pit latrines for both sex.

2.6.1.4 Mobilization for construction works

The mobilization phase will mainly involve deployment of required tools and machinery for the construction work and recruitment of the construction crew for the work. Also, the phase will involve deployment of construction material and their transportations from the point sources to site. However most materials will be brought time to time as required. About 40 staff will be required for the project; however, they might be required at different stage of project development depending on their area of specialization/work. A Contractor will be responsible for this phase with supervision from the proponent project management team.

2.6.2 Project Construction

The few present vegetation at site will be required to be cleared to pave a way for development of the proposed building project. The first step, the contractor will involve site preparation/setting, excavating site to the required level these will happen after clearance and accumulation of overburden materials and their eventual transportation to the disposal site. Under second phase, the works will involve the building erections/construction up to completion of the second storey.

Some of the overburdens/top-soils to be generated from excavations will be used for backfilling and resurfacing of the area. Once civil works is done mechanical and electrical works will finalise the buildings. Landscaping of the area and pavements lying will be among of the final activities of the construction phase.

The project will use local available building materials. The construction materials such as sand, stone, gravel and clay are expected to be obtained from authorized quarries in Arusha. However, concrete mix company will be contracted to supply concrete and thus other earth materials will be required in small quantities. Building materials such as cement, tiles, pavement, sanitary ware and steel mostly will be procured from various shops in Arusha.

The contractor will be responsible for transportation of all construction materials and equipment from point source to the site mainly by using the East Africa by-pass road, Arusha Babati road and Airport Road. Most of the construction material such as cement, steel, wood, sand, stones and aggregates etc. will be brought from places whenever possible near the project site.

2.6.3 Operation of the Project

The building will be used mainly for academic purposes for teaching students through practical's in the noted laboratories. In this case chemicals will be used occasional especially in the chemistry laboratory, organic matter involving both flora and fauna will be used in the biological laboratories. Typical office works will be involved as there will be staff offices and conference rooms as well as library. The conference room will be used for meetings and seminars and multipurpose hall for examination activities. Total number of estimated staffs after completion of the laboratory building is 20 maximum. As noted earlier the OUT offers training through online system and thus students will not be full time present at site. Only during practical and exams, the aspect of which will be once in a while. Likewise, the laboratory will be used as zonal centres and thus science students in the zone will be attending the practical and thus are not expected to be many (about 40 at full capacity). Other associated activities are related to utilities as covered below;-

2.6.3.1 Utilities

Water supply

Water will be required for laboratory works and general usage for cleaning and in sanitary areas. Normally laboratories are not intensive water users. Based on estimated number of staffs at site and occasional students visitation an estimation of water usage has been done. About 1.6 m^3 of water will be required for staffs per day (80l/c/d). Students visitation is estimated at an average of 40 people at full building capacity that will be occasionally and will consume about 3.2 m^3 per day. Thus, a total of 4.8m^3 per day might be experienced during students visitation at full capacity. The area is served with the water supply system from Arusha Urban Water Supply and Sanitation Authority (AUWSA). The pipeline runs along the road of Arusha Airport (about 350 metres) and thus the project will connect to the existing municipal water supply network. The AUWSA Management confirmed to the consultant team that there is public water supply network at the area. The 4.8m^3 per day can be supplied by the authority without a challenge. Further, the laboratory will also include a full set of facilities to harvest rain water, whereby pipes and a well-built storage tank of about 25m^3 that will be installed.

Electricity
The area is served with the National Grid under TANESCO and the nearby powerline is about 350 meters from the site. The project will connect to the TANESCO Grid. Further, a full set of solar power system will be installed and that will control the use of excessive power from the national power grid as part of measures to adapt to climate change.

2.6.3.2 Solid waste management

Construction related wastes will be generated to include debris/spoil materials, lumber, plastic remains, cans, tins, grass, and plastic packaging wastes like Cardboard boxes, wooden drums and empty cement bags. Also, domestic wastes will be generated due to presence of construction workers at site to include food remains, plastic bottles, paper and related wastes.

The contractor will designate an area for waste collection where wastes will be placed according to its nature. Further Municipal approved waste contractor will be engaged for waste removal.

During operation various kind of wastes will be generated mostly will be general wastes from offices, laboratory and pantry areas. These will include papers wastes, packaging materials, plastics, and organic wastes (food wastes). Based on number of staffs to be fully station at site less than 7kg of

wastes will be generated per day. The potential for hazardous waste generation exists from the laboratories the aspect of which is covered under subsequent sections.

The OUT will provide waste bins in strategic areas for collection of wastes at source and centralized waste collection point within the premises for collection by contracted agent. Collection point will be designed at one of the corners close to the gate for easy collection of the same without major nuisance during collection to other users of the area. A municipal approved contractor will be engaged for waste collection and disposal.

2.6.3.3 Liquid waste management

During construction, a pit latrine toilets will be established to serve construction crew. Supporting sanitary facilities will be provided to include water for required hygiene for users. Likewise, facilities will consider gender aspects i.e. both men and women toilets.

The network of centralised sewer system under AUWSA is about 850 meters when Crow is flying and thus will not be able to connect to the system. The project will explore the use of onsite sewer management system such as septic tank and soak pit for management of the sewage during operation. As per Water Supply Design Manual issued by the Ministry of Water - Guidelines from the Water Supply and Waste Water Disposal Design Manual, third Edition of March, 2009 eight percent (80%) of supply becomes waste water. Thus, with the demand of $1.6m^3$ per day will generate $1.28m^3$ per day during the usual days. During peak days when students will be at full capacity the demand will grow to $4.8m^3$ per day and the waste generated is calculated at $3.84m^3$ per day. This amount can be realistically managed properly with onsite system of septic tank and soak away pit proposed provided it is well designed and constructed.

During operation also there will be waste water from Laboratory operation. This will have separate management system from the sewage system. The OUT will design a waste water retention structures for the laboratory effluent. Two on series retention ponds will be designed for dilution of the effluent before final discharge to the open environment. The effluent on the retention ponds will be monitored to ensure it is safe for final disposal.

2.6.3.4 Hazardous materials/waste management

The main type of hazardous waste to be involved at site during construction include hydrocarbons such as used oil and diesel for running diesel powered machines at site. Also, there will be remaining paint containers. A proper temporary storage room will be constructed with bund wall to contain leakage or spillage in case of incident. After accumulation of large amount of used oil or at the end of construction during demobilization the oils and other type of hazardous wastes will be handled over to the authorised agent to handle such kind of wastes.

During operation there is potential for generation of hazardous wastes to include expired chemicals if due care is not taken. Chemicals in liquid or solid form might expire and require proper handling and disposal to avoid human health risks and environmental pollution. The OUT lab team will establish a system for management of chemicals to include ordering only the amount required for a short period of time to avoid accumulation and expiring. The system will also include First -In First Out (FIFO) to ensure old chemicals is consumed first and hence to reduce chances for expire of chemical before usage. In case there will be expiring of chemicals, they will be stockpiled properly as per its nature and shall engage certified agent for of disposal.

2.6.3.5 Security, health and safety

During construction, as noted earlier, the construction site will be secured by enclosure with single point of controlled entry and exit for public safety and security purpose. The site will have 24 hours and 7days security guards for safety and security purpose. All occupational health and safety issues as per requirement of the OHS Act, 2003 shall be adhered by the contractor to include

2.7 CAPITAL INVESTMENT

The project total investment costs is estimated at Tanzania Shillings One Billion Eight Hundred Twenty Six Million Three Hundred Forty Eight Thousand Sixty Two and Fifty Cents only (TZS. 1,826,348,062.50) which is equivalent to USD. 731,250.00.

3 POLICY, LEGAL AND INSTITUTION FRAMEWORK

3.1 INTRODUCTION

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

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

3.2 RELEVANCE POLICIES

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

3.2.1 The National Environmental Policy (URT, 2021)

This Policy serves as a national framework for planning and sustainable management of the environment in a coordinated, holistic and adaptive approach taking into consideration the prevailing and emerging environmental challenges and national and international development issues. The effective implementation of this policy requires mainstreaming environmental issues at all levels, strengthening institutional governance and public participation in the environmental management regime. The long-term vision of this policy is geared towards the realization of environmental integrity, assurance of food security, poverty alleviation and increased contribution of the environmental resources to the national economy. The key objectives of the policy are to:

- Enhance environmentally sound management of land resource for socio-economic development.
- Promote environmental management of water sources.
- Strengthen conservation of wildlife habitats and biodiversity.
- Enhance conservation of aquatic system for sustained ecological services and socioeconomic wellbeing.
- Enhance conservation of forest ecosystems for sustainable provision of environmental goods and services.
- Manage pollution for safe and a healthy environment.
- Strengthen the national capacity for addressing climate change impacts.
- Ensure safety at all levels of the application of modern biotechnology.
- Promote good governance in environmental management at all levels.
- Enhance predictable, accessible, adequate and sustainable financial resources for environmental management and promote gender consideration in environmental management.

The policy advocates using other relevant approaches in environmental management such as economic instruments, environmental standards, indicators and legislation. In carrying out this project, this study being among of the environmental management approaches the proponent is in line with the policy requirements and will observe the provisions of other approaches as noted above.

3.2.2 The Land Policy (URT, 1997)

The National Land Policy of 1995 (revised in 1997) emphasizes the importance of undertaking EIA for the management of land based development. Additionally, the policy advocates the protection of land resources from degradation for sustainable development. The policy addresses several environmental issues; of relevance to this project is land use planning. Land use planning takes into consideration the land capability, ensures proper management of coastal/urban/rural land resources, promote resource sharing and multiple land use techniques in area of conflicting land use, and lastly advocates the involvement of community in resource management, land use and conflict resolution.

The OUT legally owns the project land as per landownership documents of appendix 2. The title of plot No. 4/2/1 is designed for Office of an Organization, Use Group G Use Class (b). Therefore, relevant issues pertaining to land policy are observed and are hereby further complied with by undertaking this study.

3.2.3 The Water Policy (2002)

The National water policy is intended to protect the water quality and quantity. Relevant to this project is the section on avoiding polluting surface as well as ground water. The National water policy recognises the following:

i. There is a growing scarcity, misuse and wastage of water resources in many places of Tanzania, which may become a serious threat to sustainable availability of the resource.
ii. Existence of uncontrolled abstraction of water resources from different water basins.
iii. The state of the quality of water resources is not comprehensively known and no regular monitoring is done due to inadequacy of resources and institutional capacity.
iv. Inadequate linkage between water and land development thus resulting in pressures on water resources. With the on-going liberalisation there is need to have co-ordination mechanism to facilitate smooth the linkage. Water Rights shall not be tied to any land, and they shall not be transferable with land transfer.

The OUT by undertaking this study is in line with the policy requirements. Further the study shall observe other requirements of the policy *inter alia* proper water usage, proper waste water management from the project and advise on proper procedure to secure abstraction permit for a borehole.

3.2.4 The National Health Policy (URT, 2008)

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

3.2.5 The National Construction Policy (URT, 2003)

This policy promotes among other things, application of cost effective and innovative technologies and practices to support socio-economic development including utilities and ensure application of practices, technologies and products which are not harmful to both the environment and human health. This study is undertaken to ensure that the proponent uses technologies and products not harmful to both the environmental and human health by providing feasible alternatives and appropriate mitigation measures.

3.2.6 The National Employment Policy (2008)

The major aim of this policy is to promote employment mainly of Tanzania Nationals. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and section 10.1 is particularly focusing on industry and trade sectors (ii) 10.6 which deals with employment of special groups i.e. women, youth, persons with disabilities and (iii) 10.8 which deals with the tendencies of private sectors to employ expatriates even where there are equally competent nationals. The proponent and contractor shall promote this policy by employing many Tanzania of relevant qualifications with priority to the community around and special groups as stated by the policy especially during development phase.

3.2.7 The National Energy Policy (URT, 2015)

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

3.2.8 The National Women and Gender Development Policy (2000)

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

3.2.9 The National Policy on HIV/AIDS (2001)

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

and employers alike shall be part of HIV/AIDS intervention in the workplace. Establishment of the proposed project might result into social interactions among workforce and local community therefore the company will adhere to the policy.

3.2.10 The Tanzania Education and Training Policy, (2014)

This Education and Training Policy of 2014 is the outcome of the review and finally repeal of the Education and Training Policy (1995), Vocational Education and Training Policy of (1996), National Higher Education Policy (1999) and ICT Policy for Basic Education of (2007). This policy was prepared to provide education and training direction in the country, taking into account economic, social, scientific and technological changes and education and training challenges nationally, regionally and internationally to increase opportunities, efficiency and the quality of education and training in the country and attain the human resource standards of a medium-income economy country by 2025.

The proposed project is in line with the policy's objectives as it will provide competent human resources from the infrastructure and facilities for training the same for the country and the regional market.

3.3 LEGAL FRAMEWORK

In addition to the above policies, there are a number of legal and regulatory frameworks that the proposed project must comply with and which this study has taken into consideration. The Environmental Management Act (No. 20), 2004 is the principal legislation governing all environmental management issues in the country. Within each sector, there are sectoral legislations that deal with specific issues pertaining to the environment. Some of the relevant legislation and regulations that are relevant in the management of the environment include the following:-

3.3.1 The Environmental Management Act, Cap 191

The Environmental Management Act (2004) introduces a concept of right of Tanzanians to clean, safe and healthy environment and right of Tanzanians to access various segment of environment for recreational, educational, health, spiritual, cultural and economic purposes (Section 4 (1) and (2)). The Act imposes an obligation on developers to;-

- Comply with license conditions including the EIA certificate (S.201). The act requires the developer to conduct an EIA prior to the commencement of the project to determine whether the project may/or is likely to have, or will have a significant impact on the environment.
- As land user and occupier to protect, improve and nourish the land and using it in an environmentally sustainable manner, (S. 72)
- Abstain from discharging any hazardous substances, chemicals, oils or their mixture into waters or into any segment of the environment (S.110)
- Comply with environmental quality standards (S.141)
- Control, manage and dispose in a sound manner waste including litter, liquid, gaseous and hazardous wastes (Part IX).

By conducting this study, the proponent complies with the requirement of the Act and will further comply to various sections noted above through this report and eventual its implementation.

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

The basic principles of the Land Act 1999 are adopted from Land Policy 1995. The Act contains provisions of critical environmental importance. One of important fundamental principles of the Land Act

is "*to ensure that land is used productively and that any such use complies with the principles of sustainable development*". The project activities will be conducted in consent with this principle in order to preserve the environmental integrity of the area. Further, the Acts seek to control land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. Since the site is legally owned by the OUT the issue of land ownership conflicts do not arise, this is not discussed further. Further, on land use the proposed project site is designated for office of an organization, Use Group G Use Class (b) hence compatible to the stated land use of the area.

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

The Water Resource Management Act 2009 is a principal legislation dealing with the protection of water resources and control of water extraction for different uses. According to section 39 (1) of this act, owner or occupier of land on which any activity or process is or was performed or undertaken, or any other situation exists which causes has caused or is likely to cause pollution of a water source, shall take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. In general, the Water Resource Management Act provides the legal basis among others for:

(i) Water resources management at National and Basin levels.
(ii) The administration to legalize, grant, modify and diminish water rights to the use of water by those entrusted with responsibilities for water resources management.
(iii) To protect water rights for all legitimate water users, hence monitoring the quality and quantity of water sources.
(iv) Water use conflict management.
(v) Water pollution control and other related issues like water supply and any related infrastructure construction

Under section 9 the Act requires any development in water shed or water resource area to carry out EIA study in accordance to EMA, 2004. The proponent by undertaking this study complies with the requirements of the Act and further will comply with other provisions of the Act.

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

This Act makes provisions for the safety; health and welfare of persons at work places. Also provides for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work. It specifically requires the employer to ensure the safety of workers by providing safety gear at work place. This Act is relevant to the developer in view of the expected construction works with many associated risks. The proponent shall ensure the contractor for construction register the work place to Occupational Safety and Health Authority during construction phase and shall further consult the authority on occupational health and safety issues to ensure it is in line with the requirement of the Act.

3.3.5 The Contractors Registration Act No. 17 0f 2008

The Act establishes the Contractors Registration Board (CRB). CRB has a mandate to register contractors, regulate the conduct of the contractors and for related matters. Among other things CRB is required to take legal action against unregistered contractors who undertake construction; installation, erection or alteration works; ensure that all construction sites are hoarded; and labour laws, occupational health and safety regulations in the construction industry are adhered to. The Proponent shall comply to the Act by contracting the registered contractor for the project. Further the project shall

be registered with CRB. The OUT together with the contractor thereof shall also adhere to other relevant sections of the Act.

3.3.6 The Engineers Registration Act, 2007

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

3.3.7 The Employment and Labour Relation Act No. 6 of 2004

Generally, the Act among other things intends to provide the legal framework for effective and fair employment relations and minimum standards regarding conditions of work. For example, it prohibits employment of children under 18 years of age; stipulated types of contracts that can be entered with employees; the maximum number of ordinary days or hours that an employee may be permitted or required to work; remuneration; leaves; unfair termination of employment; establishment of trade unions branches in workplaces; etc. The proponent shall observe these and other relevant provisions in this Act.

3.3.8 The Workmen's Compensation Act, Cap 263 of 2008

Generally the Act provides for the employment accident and occupational disease benefit. The employment injury schemes provide medical care and cash benefits to workers, who are injured on the job or develop occupational diseases. Eligibility is provided on a no-fault basis and may be coupled with restriction on workers legal right to sue for damages. In operating its activities, the OUT and the contractor shall observe the provisions of this Act.

3.3.9 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 the functions of those authorities and for other matters connected with or incidental to those authorities.

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

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

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

3.3.10 The HIV and AIDS (Prevention and Control) Act of 2008

The HIV/AIDS Act (Act No. 28/08) calls for prevention, treatment, care, support and control of HIV and AIDS for promotion of public health in general. It also calls for appropriate treatment, care and support by using available resources to people living with or at risk of HIV and AIDS and to provide for related matters. Apparently, for the Project the risk of population living in or nearby project area contacting HIV/AIDS during construction and operation phases is high and thus, the Act provides legal guidance to the cause. Of particular importance to this project is found in part II, section 6 (1), titled Roles of Sectors, which states that: 'every ministry, department, agency, local government authority, parastatal organization, institution whether public or private, shall design and implement gender and disability responsive HIV & AIDS plans in its respective area, and such plans will be mainstreamed and implemented within the activities of such sector.' The OUT and contractor shall adhere to the requirements of the Act.

3.3.11 The Fire and Rescue Force Act No. 14 of 2007

This Act provides for the better organization, administration, discipline and operation of fire and rescue brigade services. Tanzania Fire and Rescue purpose is to enhance community safety, quality of life and confidence by minimizing the impact of hazards and emergency incidents on the people, environment and economy of Tanzania. The Force manages fire emergencies in Tanzania's major cities and towns and responds to rescues, hazardous materials incidents and possible terrorist activities across the country. The Force work with other government agencies to minimize the impact of bushfires, storms, floods, landslides, building collapses, motor vehicle accidents and other emergencies. It is the obligation of the project owner to register the project with fire and submit drawings for fire safety scrutiny and approval before starting construction. The project proponent shall comply with all provisions of the Act.

3.3.12 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, construction and operation.

3.3.13 The Child Act of 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.

3.4 SUBSIDIARY LAWS UNDER THE EMA CAP 191

3.4.1 The Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018

These regulations have provided the list of projects which require an Environmental Impact Assessment study. Since such a project is likely to have some adverse environmental impacts. An in-depth study is required to determine the scale, extent, and significance of the impacts and identify appropriate mitigation measures. Furthermore, the regulation provides explicitly procedures and guidelines for carrying out the Environmental Impact Assessment in Tanzania. This report has been prepared in line with the procedure and requirement of these regulations.

3.4.2 The Environmental Management (Registration and Practice of Environment Experts) (Amendment) Regulations GN. NO. 500 of 2022.

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

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

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

3.4.4 The Environmental Management (Air Quality Standards G. N. No. 237) Regulation, 2007

These regulations' objective is to set baseline parameters on-air and emissions based on many practical considerations and acceptable limits; enforce minimum air quality standards prescribed by the National Environmental Standards Committee. This is to help developers keep abreast with environmentally friendly technologies; and ensure the protection of human health and the environment from various sources. The Second Schedule of the Regulations specifies the highest permissible quantity for emissions and the acceptable test methods. Under Regulation 28, any holder of a permit, owner or occupier of premises is required that all incidences of inadvertent or accidental emissions or pollution in contravention of these standards shall report the incident within seven (7) days. The standards as laid down by these regulations shall be adhered to accordingly by the project as indicated in the monitoring plan of this report (chapter 9).

3.4.5 The Environmental Management (Water Quality Standards G. N. No. 238) Regulation, 2007

The Water Quality Standards Regulations' objective is to protect human health and conservation of the environment, enforce minimum water quality standards prescribed by the National Environmental Standards Committee. The committee would assist in determining water usage for purposes of establishing environmental quality standards and value for each usage, and ensure 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. Thus the OUT shall adhere to these standards as stipulated in Chapters 8 and 9 of this report.

3.4.6 The Environmental Management (Soil Quality Standards) Regulation 2007

These Regulations specify the soil parameters to be adhered to by different operating industries/facilities as standards. The objective of the Soil Quality Standards Regulations is to protect human health and conserve the environment. The OUT shall adhere by monitoring the key parameters as detailed in chapter 9 of this report.

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

The regulations are made from the Environmental Management Act Cap 191. The objective of the regulations is to maintenance of a healthy environment for all the people in Mainland Tanzania, the tranquility of their surrounding and their psychological wellbeing by regulating noise and vibration levels. It further prescribes the maximum permissible noise and vibration levels from a facility or activity to which a person may be exposed to. It also sets baseline parameters on noise and vibration permissible levels based on a number of practical considerations and acceptable limits. The OUT shall comply to the limits of this standard as noted under EMP of chapter 9 to this document.

3.4.8 The Environmental Management (Solid Waste Management) Regulations, 2009

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

3.5 WORLD BANK ENVIRONMENTAL AND SOCIAL FRAMEWORK

3.5.1 Objective of the Environmental and Social Framework

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

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

3.5.2 World Bank Environmental and Social Standards

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

The standards are expected to: (a) support Borrowers in achieving good international practice relating to environmental and social sustainability; (b) assist Borrowers in fulfilling their national and international environmental and social obligations; (c) enhance non-discrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement. The proposed project will apply the ESF. The proposed project will apply the ESF and Table 3.1 below describes the application of the ESSs to the project.

Table 3.1: Application of World Bank's ESSs to the proposed project

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

		as well as operation and maintenance plans.
ESS 4: Community Health and Safety	Yes	The project will not have substantial risk to community health and safety. Only localized negative impacts (like dust emissions noise pollution etc.) to sensitive receptors will need to be managed along the route for collection of construction related materials. Also, community safety especially is an issue of concern due to the influx of the project workers, and later on participants of the project, which might lead to GBV/ SEA/SH, as well as transmission of HIV/AIDs and other communicable diseases. Guidance on HIV/AIDs, COVID-19, GBV/SEA/SH and HEET project GRM shall be followed.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	No	This ESS is not relevant to the proposed Three Storey Science Laboratory Building at Plot 4/2/1 in Arusha City.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	The project is not located inside or near protected areas and sensitive habitats. In case the project will purchase natural resources commodities such as timber, it will be important to establish the source area and to have a mechanism in place to ensure that the Primary Suppliers are not significantly impacting sensitive ecosystem or degrading natural habitats.
ESS 7: Indigenous People/ Sub- Saharan African Historically Underserved Traditional Local Communities	No	This standard is not considered relevant as the project will mainly be implemented in areas where communities that meet the requirements of ESS7 are generally not available in the area.
ESS 8: Cultural Heritage	No	This ESS is not relevant as the project area has already being developed.
ESS 9: Financial Intermediaries	No	This ESS is not relevant to the project.
ESS 10: Stakeholder Engagement and Information Disclosure	Yes	The proponent will provide stakeholders with timely, relevant, understandable and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination and intimidation. As part of ESIA study stakeholders engagement has been done in line with the requirement of the ESS10.

3.5.3 World Bank Group ESHS Guidelines

The World Bank Groups Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. Specific guidelines which will be used is Environmental, Health, and Safety (EHS) Guidelines: Environmental Waste Management. As stipulated earlier the guidelines will be used together with the Environmental, Health, and Safety General Guidelines.

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

3.6 INSTITUTIONAL FRAMEWORK

3.6.1 Introduction

The Tanzania ESIA practice gives different functions and responsibilities to all parties involved in the ESIA process of any proposed development undertaking to which ESIA is obligatory. The EMA, Cap 191, gives NEMC a mandate to undertake enforcement, compliance, review and monitoring of EIAs and a role in facilitating public participation in environmental decision-making, generally supervising and coordinating all matters relating to the environment. The EMA empowers NEMC to determine whether a proposed project should be subjected to an ESIA, approve Consultants to undertake the ESIA study and invite public comments, and also grants NEMC the statutory authority to issue the certificates of approval via the Minister responsible for environment. NEMC is currently the designated authority to carry out the review of ESIAs, including site visits and handling Technical Advisory Committee (TAC) meeting, monitoring and auditing of environmental performance of the Project. Table 3.2 lists key institutions of potential relevance to the proposed Project.

Table 3.2: Key Institutions to the ESIA Process

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

Level	Institution	Role and Responsibility
	National Environnent Management Council (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 environment impact statements • Enforce and ensure compliance of the national environmental quality standards • Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur; • Undertake in co-operation with relevant key stakeholder's environmental education and public awareness; • Render advice and technical support, where possible to different stakeholders
	Ministry of Lands, Housing and Human Settlements Development	• Land use planning • Issuing of Right of Occupancy • Valuation and compensation
	Ministry of Education Science and Technology	• Issuing policy guidance • Providing legal frameworks • Issuing licences, provisions of certificates of compliances • Enforcement of laws and regulations • Monitoring and reporting on compliance with the ESMF/ ESMP under the established National Project Coordination Unit (NPCU). • Ensure compliance with the various regulations, guidelines and procedures issued by the Minister responsible for the environment
	Occupational Safety and Health Authority (OSHA)	• Registration of the construction site, registration of workplace and inspection. • Issuance of OSHA Compliance certificate. • Inspection on OSH related aspects. • Enforcement of Occupational Health and Safety Act, 2003 (Act No. 5/2003).
Project Proponent	OUT	• Carrying out EIA study • Project implementation including mitigation measures • Carrying out regular environmental monitoring and internal auditing • Further details see section 3.6.2 below

Level	Institution	Role and Responsibility
Regional level	Arusha Regional Secretariat Office	• Oversee and advice on implementation of national policies at Regional level • Oversee enforcement of laws & regulations • Advice on implementation of development projects and activities at Regional level
Council level	Arusha Municipality Executive Director Office	• Chief Executive Officer for all development activities in the Municipality level • Baseline data on social and economic conditions • Extension services • Plan and coordinate activities on community-based natural resource and environment management • Enforcement of laws & regulations • Coordinate environmental matters at the Municipal level • Municipal Environmental Officer (MEMO) is responsible for project monitoring on environmental issues.
Ward Level (Olasiti)	Ward Development Committees – (Ward Councillor, WEO, WDC)	• Oversee general development plans for the Ward. • Provide information on local situation and Extension services • Technical support and advice • Project Monitoring
Mtaa Leadership (Oloresho)	Mtaa Chairman / MEO, Environment Committee): and Other leaders	• Information on local social, economic, environmental situation • View on socio-economic and cultural value of the sites and plant operations. • Rendering assistance and advice on the implementation of the project • Project Monitoring (watchdog for the environment, ensure well-being of residents
	Nearby community and Institutions	• Information on local social, economic, environmental situation • View on socio-economic and cultural value of the sites and on proposed expansion project operations.

3.6.2 Institutional Capacity for implementing Environmental and Social issues

The OUT responsibility is to ensure that the implementation process of the ESMP and Mitigation measures are line with the relevant national policies and legislations and World Bank Environmental and Social Standard 1. The OUT has the Project implementation Unit (PIU) with 18 people responsible for supervision and monitoring the implementation of the project construction activities. The management of all project activities during operation is under the PIU, in collaboration with other departments and units depending on the nature of the activity. In general, the PIU falls under the management of the OUT executing day-to-day activities in the project. The PIU is guided by management meetings that are chaired by the Vice Chancellor. The management meetings provide support, guidance and oversight of the progress of the PIU. Further, among the PIU staffs, 3 are working as EEnvironmental and Social Safeguard Specialists (i.e Gender specialist, Social Specialist and Environment Specialist) who will monitor the environmental and social activities of the project during all project phases. The Environment specialist holds a PHD in environment technology and management, Social specialist holds BA in Sociology and Gender specialist holds a PHD in Management Science and Engineering and is a focal gender person of the OUT. Further the OUT shall commissioning the consulting engineer to supervisor the contractor during construction among others

on Environmental and Social Issues. The roles and responsibility on environmental and social issues is covered on table 3.3 below;-

Table 3.3: Institutions responsibility at the project level

Institution	Roles and responsibility
World Bank	• Project financing • Ensures that the project is carried out to the highest environmental standards strictly in accordance with the ESMF and ESIA project report and the mitigation measures set out therein. • Also requires that environmental and social impacts are managed in accordance with the World Bank ESF and its ESS. • Provide second line of monitoring compliance and commitments made in the ESMPs through supervision.
PS-MoEST	• E&S monitoring and surveillance of all project components investments that will be undertaken by project. • The ministry will report results of this monitoring to the World Bank.
NPIU Environmental and Social Team	• Coordinate different activities to ensure that, the project meets the country legal and World Bank requirements with regard to Environment and Social Framework
Implementing institutions (OUT - PIU) Environmental and Social Team	• Maintaining the PIU chaired by the Deputy Vice Chancellor and assisted by qualified and experienced staffs in adequate numbers and under terms of reference as outlined in the Project Operational Manual (POM). • The PIU is vested with the responsibility of the day-to-day implementation of the project activities including financial management, procurement, environmental and social risk management, governance and anti-corruption, monitoring and evaluation, and reporting; • Coordinate specialist/consultants for any support missions or attend different meetings and provide any guidance in the bid to ascertain that the different challenges identified for each sub-project/activity are duly covered from risk. • Support the procurement officer at OUT in making sure that the bidding documents clearly cover the health, safety and environmental component with appropriate provisions of the same for the contractors to bid. • Coordinate preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP). • Ensure that contractors have an Environmental Health and Safety Officers (EHS), who are familiar with the compliance requirements, including WB EHS guidelines
Consultant (Environmental and Social Team)	• Work with the NPIU//UPIU to understand the requirements of the environmental and social assessment; • Conduct initial site visits with the UPIU to understand the sub-project setting and site-specific requirements; • Prepare the ESIAs and ESMPs based on the procedures described in the ESMF including carrying out an alignment walk, alternatives analysis and baselines studies, identifying the E&S risks and impacts, developing mitigation measures and monitoring plans incorporating EHS requirements; • Cost all the mitigation and management measures proposed in the ESMPs and SSEMPs • Propose a capacity building plan for the implementation of the sub-projects

Institution	Roles and responsibility
	(where necessary) • Carry out public consultations; • Assist the UPIU in preparing documentation to obtain certification from NEMC for the ESIAs and ESMPs.
Contractors (Environmental and Social Team)	• Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements; • Work within the scope of contractual requirements and other tender conditions; • Prepare CESMPs based on the ESMP in the bidding documents and contracts; • Train workers about EHS (including relevant WBG EHS Guidelines) and the site specific environmental and social measures to be followed; • The EHS officer of the contractor will participate in the joint site inspections with the UPIU and Environmental Supervision Engineer/consultant; • Immediate notification of the NPIU and supervision engineer of any significant social or environmental health and safety incident linked with the project, and indication about the measures taken or that are planned to be taken to address the incident as well as propose any measures to prevent its recurrence. • Carry out any corrective actions instructed by the Supervision Engineer/consultant; • In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; • Propose and carry out corrective actions in order to minimize the environmental impacts; • Send weekly reports of non-compliance to the Supervision Engineer/consultant; • Send monthly progress reports to the Supervision Engineer/consultant

4 BASELINE DATA AND INFORMATION

4.1 INTRODUCTION

This chapter provides a description of relevant environmental, economic and social characteristics of the project core area (site specific), and areas in the immediate vicinity of the project which is Oloresho Area as well as broad description of the area of influence i.e. Olasiti Ward, Arusha City for the proposed project. The Consultant relied on secondary data and information found in literature covering the project area and observation at the site. The level of details in the various sections depends on the interactions between the project activities and the particular environmental or socio-economic aspect.

4.2 PHYSICAL CHARACTERISTICS

4.2.1 Project Location

The project site is administratively located in Oloresho Mtaa, Olasiti Ward, Arusha City Council, Arusha Region. Arusha region has six district councils namely, Arusha, Karatu, Longido, Meru, Monduli and Ngorongoro; and one City Council namely, the Arusha City. The Arusha City is the headquarters of Arusha Region located in northern Tanzania between latitude 2º and 6º south and longitudes 34.5º and 36º east (URT, 2023). It has a unique character of being surrounded by Arumeru District Council in all directions. The City is located about 50 km West of Kilimanjaro International Airport on the great North Road, halfway between Cape Town and Cairo.

4.2.2 Climate

The project site lies in the outskirts of Arusha City area along the slopes of Mt. Meru. This area is characterized by temperate regional climatic zone due to the influence of Mt. Meru. The area experiences two seasons, one being hot and rainy between September to May and the other one being cold, temperate, and dry, between June to August. Seasons in Tanzania are controlled primarily by northward and southward yearly of the sun. The sun is approximately overhead in Arusha at the end of January/February and again at the end of August/September.

The range of temperatures is small, about 4°— 6° centigrade between the coldest month of July (at approximately 19°C, and the warmest month of February (at approximately 24°C). The annual rainfall averages 1,000 mm per year, which is concentrated in two seasons comprising long and short rains. The short rain season has storms of limited duration during November and December. The long rains fall in heavy downpours, often accompanied by thunderstorms.

4.2.3 Terrain and Drainage

Arusha City Council is located on the Southern slopes of Mount Meru and situated between 1450 and 1160 meters above sea level. The slopes of Mount Meru are transformed by volcanic activity, which are form isolated peaks, breaking down the gently sloping plains. These hills include Themi and Suye. The City is composed of rivers and numerous small streams which have their headwater on the slope of mount Meru or on the slopes on the above mentioned hills. Such rivers include Burka, Engarenaro, Naura, Themi and Kijenge all of which coverage to join Themi River to the Southern part of the City. The project area is part of gentle sloping plain located on Southern slopes of Mount Meru. The terrain of the specific site is almost flat inclined towards southern side.

4.2.4 Soils and Geology

The project site is characterised with loose loamy clay soils (black cotton soils) with moderate drainage. The parent materials for the soils around Arusha City are generally lavas and ashes from volcanic activities which characterized the formation of the area. In particular, the area to the south west of the Council has extremely extensive black cotton soils. During dry seasons it shrinks leaving cracks and the ground surface of up to 50mm wide and 1 .5 deep.

4.2.5 Air Quality

A spot baseline air quality survey was conducted to ascertain the concentration of respirable particulates and pollutant gases in the project area prior to the construction and operation of the proposed project. The dust levels in terms of particulate matter (TSP, PM_{10} and $PM_{2.5}$) were measured on site and pollutant gases concentration were also measured. The results for particulate matters and table 4.2 are results for pollutant gases measured on site. Generally the project area is not degraded in terms of air quality condition as all measured parameters were within the allowable limits of the local and international standard limits.

4.2.6 Noise and Vibration

The noise and vibration at the project site were also measured to establish the baseline condition before commencement of construction activities. Based on site assessment there is no continuous noise emission in the vicinity of the project site. The only source of noise is due to movement of vehicles along the East Africa Road. However, the noises were not disturbing as the road is located relatively far from the project site to experience higher disturbing noise. The results based on the measurement in which average noise ranged between 45 dBA and 56 dBA. The average noise levels were within the allowable standard limits of both local and international standards.

The ground vibration levels measured were compared with Occupational Safety and Health (Working Environment) Regulations, 2016 limit of 5 mm/s PPV. Also, the results were compared with British Standard of 0.3mm/s and 0.15 mm/s PPV (Peak Particle Velocity) as levels that human beings and/or animals can detect or may experience stress resulted to vibrations. As seen in Table 4.4 above, the highest ground vibration of 0.005 mm/s. The vibration of the area is insignificant as it did neither exceed the 0.15 mm/sec PPV criteria established to evaluate the extent that can easily be detected by human nor exceed 5 mm/sec PPV criteria established for conducive working environment for a person at work.

4.3 BIOLOGICAL FEATURES

4.3.1 Flora

Since the project area is being used for agricultural most of the land has been cleared of natural vegetation/ ground cover. Much of the indigenous vegetation in the area has long been cleared off to give way to other land uses previously practiced on the area. Remnants of scattered bushes can be observed in the area while thick vegetation cover is observed further south of the project site. The specific project area was also subjected to agricultural activities and thus there are only remnants of maize stalk from livestock grazing. The other immediate nearby areas are almost bear with remains of scattered patches of ground level grasses and few scattered bushes.

4.3.2 Fauna

The nature of the area of the project site and the general surrounding does not indicate the presence of big wild animals. However, further south to the thick vegetation cover some small mammals are present to include monkeys i.e. *Tumbili* which could also be visiting the area especially during set season when vegetation cover regain in the area. Other small animals present include birds while some small reptiles and insects are expected to be present in some parts of the general area. Thus, there was no specie with significance conservation status (i.e. threated or endangered as per IUCN guidelines/CITES List) identified at site or the site neighborhoods.

4.4 SOCIO-ECONOMIC SET-UP

4.4.1 Demographic characteristics

The project area and area of influence is located in the Arusha City. In the 2022 Census, the City was found to have a population of 617,631 (292,771 males and 324,860 female) with average household size of 3.4. The average size of a household was 3.4 persons. Table 4.5 present demographic data of the Arusha Region, Arusha City Councils and Olasiti Ward where the project will be located.

Table 4.5: Population of Arusha Region, Arusha City Councils by Sex Average Household Size and Sex Ratio

Name	Population (Number)			Sex Ratio	Average household size
	Total	Male	Female		
Arusha Region	2,356,255	1,126,616	1,230,639	92	4.0
Arusha City Council	617,631	292,771	324,860	90	3.4
Olasiti Ward	53,557	24,950	28,607	87	3.7

Source: URT, 2033

The ethnic group of Arusha is somehow mixed, founder inhabitants of the city were mainly from the Maasai tribe. However, the composition of the current population is getting more cosmopolitan due to the influx of workers, businessmen and migrants from different regions of Tanzania, as well as from outside the country. Nevertheless, the City has five main ethnic groups which Pare, iraqw, Masai, meru and chaga. The majority of Maasai occupy the largest part of the council area which covers all wards, followed by Chaga occupying some parts of the city wards as well as the Meru and iraq. In addition, the city is also occupied by other small ethnic tribes including Pare, Rangi, Nyeramba, and Nyaturu.

4.4.2 Land Rights and Tenure

Most of the land in Arusha region was purchased by individuals from earlier occupants. Land acquired by purchasing passes into the individual buyer's ownership, i.e. during the owner's lifetime, he/she may dispose of it to anyone he pleases, by sale, pledge, gift or disposition by will without restriction. Presently in Arusha land often changes hands in commercial transactions, especially in the newly settled area where the owners, being original purchasers, still have full powers over their land.

Under existing land laws, (Land Act, 1999 and Village Land Act, 1999) there are no restrictions on access to land. Any person, citizen or foreigner can apply and be allocated land for any type of use. Tenure rights to land can be held by individuals and by communities. Holdings of individuals can be (i) by leasehold right of occupancy for varying periods e.g. 33, 66, or 99 years which must be confirmed by a certificate of occupancy; (ii) by customary right of occupancy that is supposed to be confirmed by certificate (Hati ya Ardhi ya Mila) and has no term limit. Major land use pattern in the project area is

farming and pastoralist activities with small herds of cattle. At Village/Mtaa level, land tenure is based on the customary land rights. Rights to hold land are mainly vested in the clan elders who pass it on to their children. Hereditary rights appear to be patrilinear for both farmland and for other properties such as herds of cattle. The head of the household who is a male normally organizes distributions of tasks within members of households.

4.4.3 Economic Activities

Agriculture
The Council is surrounded by rich agricultural and grazing land. Both commercial and subsistence farming are carried in Arusha City Council. The staple crops grown include maize, millet, paddy, potatoes and beans. Cash crops grown include coffee, sunflower, wheat and floriculture. Agricultural production in some area is carried out on estate or large scale farms. Other crops grown include fruits, vegetables, pulses, cassava, sugarcane, bananas etc. Horticulture sector has become strong with increased exportation and high end value related products which has also increased the use of greenhouses.

Tourism
Arusha is visited by thousands of tourists every year as it happens to be the gateway to the famous northern safari circuit proud of its unique world-renowned national parks. Before tourists depart either to the famous Serengeti National Parks, Mount Kilimanjaro or back to their homelands they usually stay in Arusha town for a few days. The residents' hospitality, the conducive weather, the attractive hotels and the beautiful Mount Meru in the background all have special appeal to the tourist. So many people secure employment in the tourist hotels, restaurants, Camp Sites and courier shops in town. Tourism in Arusha is therefore a large contributor to the National economy.

Livestock keeping
Livestock keeping is the second an important economic activity for a large part of the project area population. The rural community relies on livestock to fulfil their social as well as their economic needs. The livestock kept include cattle, goats, sheep and donkeys. Most of the livestock products are for domestic market and are source of manure, hides and skins. Important exports are live animals, hides and skins. Cattle grazing are widely spread around the project site.

Natural resources
Natural resources, which include forestry, wildlife, and bee keeping is another sector in which people are engaged for their livelihood. Products such as timber, logs, poles, wildlife, honey, and beewax are locally harvested.

Industrial Development
There are a number of new established factories in the Arusha City including the giant A to Z factor located at Olmoti ward, a textile mills for manufacturing of bed nets to fight malaria. Other major industries found in the City are situated in Unga Limited, Themi, Lemara and Sombetini areas. Other industries in Arusha include meat processing, oil mills and garages. Parallel with the establishment of large and medium scale industries more than 200 small scale industries have been established in various areas not compatible to existing land-use, hence creating environmental hazards. These include grain milling machines, garages, carpentry workshops etc.

Minerals
Arusha region is endowed with a diversity of mineral resources. It is estimated that the region has more than 50 types of minerals, including the famous tanzanite. There are mining activities of Gemstones, such as tanzanite, ruby, garnets, emerald, modelite, aquamarine, almadate and amethyst. Furthermore,

industrial minerals include phosphate, graphite and sodium carbonate. In addition to that, there are other minerals such as Sodium chloride, meerschaum, bentonite, carbonate and magnesite.

Employment
Unemployment for the economically active population is a serious problem facing the area. Farming which engage about 90% of total labour is the principle source of employment, but of very short duration and subjected to unpredictable weather. Thus, the youth and other economically active population become unemployed for a good part of the year.

4.4.4 Economic infrastructure

Roads
Project site is accessed from the Arusha-Babati road via the famous East Africa by-pass road. The road links the site with Arusha City and other parts of the Country. It also links with local roads in the Olasiti Ward and other Wards. Arusha-Babati Road is a trunk road which connects the Arusha City with the Singida Region and Mara District through Ngorongoro Conservation Area and Serengeti National Park. The road is under jurisdiction of the Tanzania Roads Agency (TANROADS) hence construction and maintenance future plans are to widen and tarmac the road. Transportation of goods, service and travel trips to work, business to Arusha City and all other cities/towns are all done through the Arusha-Babati Road.

Air Transport
Arusha has a moderate national airport, used for domestic routes by Precision Air, Air Tanzania and chartered flights to and from the game parks around the vast Arusha region. Kilimanjaro International Airport (45 minutes' drive away) caters for regular flights by KLM, Ethiopian Airlines, Kenya Airways and Air Tanzania connecting Arusha with Europe and other parts of Africa. There are regular domestic flights taking off and landing from both the Arusha and Kilimanjaro International Airports. Main domestic destinations are Dar-es-salaam and Mwanza on almost daily basis.

Communication Network
In Arusha City Council land-line based telephone services are provided by Tanzania Telecommunication Company Ltd (TTCL), Courier services are provided by DHL and EMS and mobile services are operated by Airtel, Zantel, Tigo, Vodacom and Halotel. However, some areas located far-way from town centres have no telephone connection.

Railway services:
The Arusha Region is served with a single railway line which connects the region with Kilimanjaro, Tanga, Coast and Dar es Salaam Region. Its importance has however declined in favor of road transport.

Electricity
The electricity supply from Tanzania Electrical Supply Company Limited (TANESCO) is available in the area. The electricity is received from the National Grid system and there are two supply lines. The first one is Kidatu-Chalinze – Hale- Kiyungi – Njiro. This is a 132 KV line. The second is the Mtera – Dodoma – Singida – Njiro line. This is a 220 KV line.

4.4.5 Social Services Infrastructure

Water Supply:
Rural areas of Arusha City Council are supplied with water from 10 piped schemes while in urban areas are supplied with water from 14 borehole schemes, Olesha - Masua Springs and Ngareudaly springs.

Olasiti ward has a piped water supply scheme supplied by Arusha UWASA. It is estimated that only 50% of the population have access to clean and safe water.

Education and Training sector
Arusha region is served with a wide range of education facilities ranging from pre-school services to vocational colleges and universities. There are a number of tertiary education institutions on hotel management, tour operations and travel agencies. Arusha region is among the few regions in the country with adequate and sound training institutions.

Health facilities
In Arusha City Council, there are 2 public hospitals with one private owned. Further, there are 4 public health centers as well as 72 dispensaries out of which 69 are private owned. According to the performance of medical service provision, the government health centres and dispensaries operate below the National standards. A large number of patients are served by private sector and traditional herbalists.

The most common diseases in the area include water-borne diseases, severe malnutrition and poor hygienic conditions. Malaria is still the number one killer, closely followed by AIDS. The project will provide first aid facility and for major illness/accidents, the project will seek assistance from Mt. Meru Hospital (Regional Hospital) which is located about 10 km from the project site.

Sanitation
According to Arusha region profile, 62% of people in Arusha City Council use pit latrine while 11.2% use refuse disposal pits. Also there are people with no toilet and use haphazardly open areas for defecation. In Olasiti ward the supply of water is still a problem and very small percentage is connected to water supply as a result most people in the area use pit latrines as a means of the site sanitation.

4.4.6 Waste management

Solid waste
In Oloresho Mtaa there is no formal system for collecting or managing solid waste. Littering is common and combustible wastes are disposed of by burning. Solid waste disposal is the sole responsibility of the owners of the facility/building. The Arusha City Council or a private collector collects and transports the waste to the landfill.

Sewerage system
The network of centralised sewer system under AUWSA has reached at A1 Hotel and Resort area which is about 850 meters when Crow is flying. The AUWSA noted that there is no immediate plan for extending the network to the project area. Further, large part of the area is not covered with the network and the common practice is mainly septic tanks and soak away pit system. When tanks are full are emptied for disposal to the public waste stabilization ponds under the AUWSA. There are specialized vehicles for emptying and transportation to the WSP area.

5 STAKEHOLDERS ANALYSIS

5.1 INTRODUCTION

The objective of stakeholder consultations for the proposed construction of three storey science laboratory building at Plot No. 4/2/1, Oloresho *Mtaa*, Olasiti Ward in Arusha was to identify and involve key stakeholders in the environmental assessment process. The integration of public participation/involvement of stakeholders in the environmental assessment process is essential in terms of its implication for sound decision making, the sustainability of development activities and form part of best practice. Accordingly, the Environmental Management Act cap 191 and Environmental Management (EIA and Audit) (Amendment) Regulations, 2018 both documents provided procedures for the involvement of stakeholders and the public in the environmental assessment process and review of proposed undertakings. The Stakeholders Engagement Plan (SEP) for the Higher Education for Economic Transformation (HEET) was developed early to define a program for stakeholder engagement, including public information disclosure and consultation, throughout the entire project cycle. The SEP outlines the ways in which project team will communicate with stakeholders and includes a mechanism by which people can raise concerns, provide feedback, or make complaints about HEET project and any activities related to the project. The SEP stressed that involvement of the local population is essential to the success of the project(s) in order to ensure smooth collaboration between project staff and local communities and to minimize and mitigate environmental and social risks related to the proposed project activities.

With respect to the proposed project at Oloresho *Mtaa*, Olasiti Ward in Arusha, the process afforded opportunity to the stakeholders to express their views and concerns in order to be included in the environmental assessment. The Consultants informed the local people, leaders, and key stakeholders about the proposed project through consultative meetings, key informant interviews, email communication, public meetings and telephone calls. During the consultation process, the stakeholders were taken through the proposed project, including its objectives, implementation technologies, and possible impacts of the project's implementation. Stakeholders were then given an opportunity to ask relevant questions regarding the proposed project to enable the consultants to clarify any issues they may not have adequately understood. Further, opportunity to air their views and concerns was given.

During the engagement, the team had a chance to conduct Focused Group Discussion (FGD). The FGDs were mostly conducted at local level to discuss various issues related to the project and potential positive and negative impacts. The FGDs were conducted separately considering gender, activities and project interests to allow free expression since some of the topics targeted a specific group because of socially constructed norms. FGD was led by a qualified sociology expert and particular questions concerning issues of employment opportunities, health and safety, GBV issues, risks, and advantages of the project were discussed.

5.2 GOAL OF THE CONSULTATION PROCESS

The overall goal of the consultation process is to disseminate project information and to incorporate the views in the design of the mitigation measures and environmental management plan. It is done to ensure the quality, comprehensiveness, and effectiveness of the impact assessment to ensure that various groups' views are adequately considered in the decision-making process to avoid conflict at a later stage. Consultation with the stakeholders was aimed at positively conveying information about the proposed project development, clearing up misunderstandings, allowing a better understanding of relevant issues. Also, how they will be dealt with, and identifying and dealing with controversial areas to

clarify matters and make adjustments accordingly while the project is still in its design stage. Stakeholders and public involvement were therefore aimed at assisting the Consultant in:

i) Improving project design and, thereby, minimize conflicts and delays in implementation;
ii) Determining the scope of the environmental assessment.
iii) Deriving specialist knowledge about the site.
iv) Clarifying any misconceptions, misunderstandings, myths and the like, that may have arisen from misinformation about the project or local species beliefs
v) Increasing long term project sustainability and ownership;
vi) Reducing problems of institutional coordination; and
vii) Gathering the information needed to complete the assessment

5.3 THE STAKEHOLDERS IDENTIFIED

The ESIA study benefited from extensive stakeholder consultations with a broad cross-section of the community. A stakeholder analysis was used to identify stakeholders that should be involved in the environmental assessment process. Their relevance informed the basis of inclusion of these in terms of their activities within the area and whether they are residents of the area. The Stakeholders were categorized into two groups for this study. The first group consisted of institutional stakeholders and the second consisted of community stakeholders. The institutional stakeholders were drawn from government ministries and departments and various agencies with roles within the project area. On the other hand, community stakeholders were community representatives drawn from various community governance structures within the project area. Details about the stakeholders consulted are presented as appendix 3:

- Central Government: Ministries, Departments and Agency. These include Division Vice President's Office (NEMC, Division of Environment); - these are statutory body with regard to EIA approval process and thus will be automatically involved.
- Occupational Health and Safety Authority (OSHA) under the Ministry of Labour and Employment - who are responsible with health and safety aspects of the workers at work place.
- Government Chemistry Laboratory Authority (GCLA) – who are responsible for registration of laboratories, control and management of industrial chemicals in the country.
- Fire Department – responsible for fire and rescue services in Tanzania and in particular has a role to approve structure drawings on fire safety before construction.
- AUWSA – responsible for water supply and sanitation services in Arusha City
- Local Government Authorities, who are daily responsible for overseeing social economic and developmental activities are undertaken in harmony with the community, environment and the legal aspects within their area of jurisdiction. Authorities include Arusha City Council and key personnel include the Municipal Environmental Management Officer; Municipal Social Welfare Officer, Olasiti ward and key staff include Ward Executive Officer and Oloresho Mtaa and key staff include Mtaa Executive Officer and Mtaa chairman.
- Project Proponent – OUT as client and the Contractor for the project - are responsible for provision of all necessary information for environmental assessment as well as implementation of measures stipulated in the project brief report.
- Local Community – Local communities that surround the project area that might be impacted by the Project, either positively or negatively, including the neighbours and members of the Oloresho *Mtaa*.
- Other stakeholders might be identified in the course of involvement if will be seen to be important for the project

5.4 STAKEHOLDERS' VIEWS AND CONCERNS

The study has identified main concerns and issues raised by the different stakeholders. Generally stakeholders view the proposed laboratory building as positive development for improving service delivery of the Open University of Tanzania to the public. Further, stakeholders noted some aspects for consideration during development and operation phases of the project. These are noted in subsections below while more details of stakeholders views are presented as appendix 3 of this report.

5.4.1 Employment opportunities

Stakeholders at local levels were optimistic with the project hoping that there will be employment opportunities directly or indirectly from the project development as well as presence of it in the area. Direct employment from construction activities were noted while other noted to capitalize on the needs of the workers/students during operation. Further it was plead for contractors to give priority to the locals especially to those jobs do not require very specialized skills.

5.4.2 Waste management

Stakeholders advised for the project to have proper solid waste management system including waste sorting on site and those considered to be general wastes to be hauled to authorized dumpsite by the authorized contractors. The wastes that are categorized as hazardous it was advised to be handled by registered agent for hazardous waste management.

5.4.3 Noise pollution

Some stakeholders noted that construction activities sometimes is associated with emission of excessive noise. Thus it was advised to ensure the noise levels is minimized to avoid disturbance to the student and teachers of the nearby Arusha Girls High School.

5.4.4 Air pollution from laboratory fumes

Air pollution in terms of chemical fumes when doing some of the experiments was noted by some stakeholders. On this it was advised for chemical laboratory to be equipped with fume hood built-in with scrubber which is acid and organic resistant to withstand the acid and organic fumes from the laboratory operations. The fume hood will prevent or minimize air pollution due to chemical fumes.

5.4.5 Liquid waste management

It was noted that the area is not served by the public sewer network and nearest area with the network is around 800 meters from the site and there is no near future plan to extend the network to the project area. Thus, the project will need to have its own system for management of the sewage. Further stakeholders advised to have an independent system for management of effluents from laboratory especially chemical and treatment should be done before final disposal to the open environment. It was noted the common treatment method for academic institution laboratory is pH neutralization.

5.4.6 Health Facility

Stakeholders at local level requested the Open University to also consider building a health facility for public use at local level as currently there is no such kind of facility despite the pressing need. This was

elaborated by the Open University team that as a public institution the request is taken and will be forwarded to the higher authority.

5.4.7 Gender Based Violence issues

Stakeholders during consultation also acknowledged the presence of GBV issues or incidences in general in Arusha City Council. The noted common issues include spousal physical abuse, child neglect, childhood pregnancies, and sexism. The stakeholders also noted that there are measures in place to address the GBV issues to include having the GBV committees at various levels of the government from Village/Mtaa, Ward to City Council level as well as at National Level. The committees meets on quarterly basis to discuss on the GBV issues. The committees from the level levels are meant to address the GBV issues at the appropriate levels in terms of preventive approach where by education and awareness if provided to different groups of people to include in schools and in all public meetings. Also, the committee is responsible to tackle the incidences appropriately by either assisting the victims to get required support. Stakeholders, noted that the project should collaborate with these committees or other organisation at lower level in terms of provision of awareness to construction workers as preventive measures at the work place against GBV issues.

5.4.8 Legal and Procedural aspects

Before starting construction the project proponent/contract will require to liaise with the Municipal council to secure building permit, Occupational health and safety Authority for approval of the drawings on OHS aspects, registration of work premises and adherence of OHS aspects in the course of project implementation. Also Government chemistry laboratory Authority for registration of the laboratory and for management of chemicals under the authority mandate. Others will include Fire and rescue department for approval of project drawings for fire safety aspects.

5.5 ADDRESSING THE STAKEHOLDERS' CONCERNS

The study has provided a variety of views and opinions on what are considered to be the main concerns and issues of different stakeholders. Based on the raised issues/concerns, an analysis was carried out and recommendations were given for those issues that required attention in the study. The recommendations are covered in the mitigation chapter of this document as indicated in chapter 7. Other chapters also provide some good clarifications on the issues raised. Table 5.1 shows the response table with specific sections where the issue is addressed.

Table 5.1: ESIA recommendations for issues raised by stakeholders

Issues	ESIA Recommendation(s)
Employment opportunities	6.3.17, 6.3.18, 6.4.6, 6.4.7, 7.2.17, 7.2.18, 7.3.6, 7.3.7
Solid waste management	2.6.3.2, 6.4.1, 6.5.4, 7.3.1,
Noise Pollution	6.3.5, 7.2.5,
Air pollution (fumes)	6.4.5, 7.3.5
Liquid waste management	2.6.3.3, 6.4.2, 7.3.2,
GBV issues	6.3.15, 6.3.14, 6.3.13, 6.4.10, 7.2.15, 7.2.14, 7.2.13, 7.3.8,
Legal and procedural aspects	Chapter 3, 3.3.4,

6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1 INTRODUCTION

In previous chapters descriptions of both the project and the environment where the project will have footprint have been covered. Based on the project activities and areas covered the impacts of the project on the environment and social components as well as on human health are identified. Thus, this chapter presents the identification of potential impacts and their analysis to determine significance level. Treatment of the impacts is covered in the subsequent chapters of the report.

6.2 ASSESSMENT METHODOLOGY

The team members conducted literature reviews of available information related to the site conditions and with respect to similar laboratory building project operations prior to visiting the site. Most of the members of the team visited the project site in September/October 2023 for the study accordingly. The team spent the time on site gathering information through field studies. The combined site visit by all specialists assisted in integration of ideas and findings between the specialists.

The role of each specialist was to collect sufficient data to assess the environmental impacts. In order to achieve this, the ESIA team assessed the environment as it existed at project area and secondary data from published and unpublished sources.

6.2.1 Environmental impact rating scale

To ensure a direct comparison between various ESIA team studies, a standard assessment methodology was used to assess the significance (the importance of the impact in the overall context of the affected system) of the identified impacts. The criteria that were considered in the determination of the impact significance are:

- **Severity/Benefit**: the importance of the impact from a purely technical perspective;
- **Spatial scale**: extent or magnitude of the impact (the area that will be affected by the impact);
- **Temporal scale**: how long the impact will be felt:
- **Degree of certainty**: the degree of confidence in the prediction of the impact;
- **Likelihood**: an indication of the risk or chance of an impact taking place;

To ensure integration of social and ecological impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g. vegetation, fauna) is assessed first. Thereafter, each impact is assessed within the context of time and space, and the degree of certainty in the prediction is indicated.

The impact is then assessed in the context of the whole environment to establish the “significance” of the impact. This assessment incorporates all social, cultural, historical, economic, and ecological aspects of the impact. Thus, the severity or benefit of an impact within a specialist discipline is first assessed before the significance of the impact is evaluated in a broader context. Consequently, two

rating scales are required, one to determine the severity or benefit, and one to determine environmental significance.

6.2.2 Severity / benefit

Severity is based on the professional judgement of the various specialists to evaluate the extent to which negative impacts would change current conditions, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party (for social impacts). The severity of impacts can be evaluated with and without mitigation order to demonstrate how serious the impact is when nothing is done about it. The word mitigation means also ideas of containment and remedy. For beneficial impacts, optimisation means anything that can enhance the benefits. Mitigation or optimisation must be practical, technically feasible and economically viable.

6.2.3 Spatial scale

The spatial scale defines the extent or area over which the impact will take place.

Table 6.1: Spatial scale

Localised	A few hectares in extent. The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	Includes the entire Oloresho area.
District	Includes area within Arusha City Council
Regional	The impacts will be of such a nature that it may affect the Arusha Region and nearby Regions.
National	The impacts will be of such a nature that it may affect the entire Tanzania.
International	The impact would affect resources and processes up to outside the border of Tanzania

6.2.4 Temporal scale

The temporal scale defines the times over which the impacts would continue to occur.

Table 6.2: Temporal scale

Temporal scale	Explanation
Short term	Less than a year.
Medium term	Between 1 and 5 years
Long term	Between 5 and 15 years, and from a human perspective essentially permanent
Permanent	More than 15 years, and resulting in a permanent and lasting change.

6.2.5 Significance ratings

Significance ratings based on synthesis of the above criteria above (only for negative impacts) are:

- Not significant/Negligible: Impact not of significance hence no mitigation action, should not influence the decision to approve the proposed development.
- Low: No mitigation action required. Impact should not influence the authorisation decision. However, monitoring of such impacts may be necessary to make sure they remain low over the lifetime of the project.

- Moderate: Mitigation action is required. Impact should influence the decision to authorise the development.
- High: Mitigation action is required. Impact should influence the decision for authorisation. Authorisation granted only when effectively mitigated.

6.3 MOBILIZATION / CONSTRUCTION PHASE

A. Environmental Impacts

6.3.1 Loss of vegetation

Vegetation has a great effect on the general and localized environment and normally can modify micro-climate. Usually, the flora creates a good environment for habitats and thus the two may go together more often than not. Site preparation to give a way for construction works to commence is usually associated with removal of existing vegetation covers and topsoil. In consequence, de-vegetation may result to negative effects on the flora and fauna.

The site earmarked for development of the proposed laboratory building is within the area designated for offices for organization and the nearby stated use are of similar nature. The natural vegetation and features on site and its vicinity has long been cleared. The current vegetation condition of the site is quite poor due to human activities to include grazing and farming. Currently there are remains of maize stalks from cattle grazing at site and few patches of remaining ground level grasses and scattered bushes. Therefore, the development of the proposed laboratory building will not displace any natural feature of significant ecological value. *The impact is considered negative, long-term and of low significance.*

6.3.2 Accelerated soil erosion

As noted in the previous chapters, the site is covered with few patches of vegetation and has been highly influenced by livestock grazing activity and thus the soil is loose. The civil work involving removal of the vegetation and top soil will be done for the project development. Heavy trucks will further loosen the soil cover. Leaving these excavated or nude areas might cause soil erosion if rain and moving water act on these areas Accelerated soil erosion might also occur due to earth work to be involved at the site(s) such as excavation of the area. This might become quite significant during rainy season. Soil erosion might propagate beyond the source point to affect other nearby areas. Bearing the loose soil cover and the inclination of the site if care is not taken the erosion might become real. *The impact is considered negative, short term and of moderate significance.*

6.3.3 Air Pollution due to dust emission

As noted in previous section the construction will involve earth work at site. These activities inevitable will cause generation of dust into atmosphere. Likewise, dust will emanate from moving vehicles with construction materials such as sands and gravel for construction works on the earth roads. Likewise dust might be emitted from moving vehicles with uncovered construction materials. Dust generated will impair local atmospheric condition. The impact receptors are likely to include site workers and nearby community as well as people/community centres along the route. In this case the immediate nearby community will be the Arusha Girls Secondary School which also is a boarding school. *The impact is considered negative, cumulative, short term and of moderate significance.*

6.3.4 Air pollution due exhaust emissions

As a rule of thumb whatever uses fossil fuel generates exhaust emission into the atmosphere and thus contributing to the local air pollution as well as to the global air pollution. Thus, the trucks and earth moving equipment to be used will emit exhaust fumes which are unwanted atmospheric pollutants. Atmospheric pollutants from engines of vehicles/machinery include SO_2, NOx, CO_2 and particulate matters. Main impact is impairment of local air quality, the extent of which will depend on quantities emitted, duration and prevailing atmospheric conditions. However, scale of the contribution of pollutants due to construction activities to be involved will be still on lower scale from the usage of fossil fuel-based vehicles and machines at site. *The impact of air pollution due to exhaust emission is considered negative, cumulative, short term and of low significance.*

6.3.5 Noise pollution and vibration

The amount of disturbance/annoyance felt by people from the noise created is mainly subjective and related to a wide range of human behavioral and social factors. The context in which the noise is heard is also important, as this can affect its relative acceptability. Noise at a particular level is generally more disturbing at night, when people are trying to sleep, than during the daytime. New noise sources introduced to quiet areas are also likely to be more disturbing to people than the same level of noise introduced into a noisy area. Noise is also more disturbing when people are engaged in complex tasks that require concentration like education.

Noise is measured in decibels and is considered to be a nuisance when the combined expected maximum noise level exceeds 70dB (A); the relevant noise is at least 1.0dB above the prevailing noise level and the contribution to the increased noise level of the new or altered development is at least 1.0dB (A). The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations (2015) stipulates maximum permissible day time noise levels of 70 dBA for industrial area and 60dBA for residential and industry/small scale production and commerce. Likewise, the stipulated WHO/IFC guidelines require noise emission levels in the working areas should be less than 70dBA.

During the mobilization stage of the project, noise and vibration associated with equipment working on site will be generated, which will affect the nearby receptors and also the working personnel. Noise and vibration generation will essentially result from the operation of the plant and equipment involved on the construction site, namely excavators, concrete mixers and lorries. Vibration might become significant when huge compactors are used on site. Vibration related impacts could be development of cracks on walls and buildings neighbouring the site. Based on the site condition the public receptors are not quite close to experience excessive noise from normal construction activities of lower scale. Noise might become an issue due to moving trucks passing through the school area and other far area depending where the materials are sourced. Also noise might be an issue to the site workers, the aspect of which is covered under the occupational health and safety hazards section *The impact is considered negative, cumulative, short term and low significance.*

6.3.6 Land degradation at source of construction materials

Conventional constructions materials such as aggregates and sand will be obtained from existing borrow pits within Arusha Region. Most borrow pits in in the country shows signs of rampant and haphazard exploitation methods and depletion with no plans for restoration of any of these sites. Other areas had to be closed down due to rampant and haphazard exploitation methods that posed pollution

risks to the environment. In some instances, sand are extracted from riverbeds. Most of these areas are declared by the government as a danger zones and exploitation is prohibited.

Pollution risks include sediment overload to water bodies during rainy season and contamination by oils from trucks, excavators and loaders while also the activity exacerbate degradation. The project proponent shall not encourage suppliers of these materials to use closed down burrow pit or sand extracted from river bed. Hence, environmental impacts associated with extraction of materials for construction works is a matter of indirect and cumulative effect because it will be contributing to a problem that has other root causes. *The Impact is considered Secondary or indirect, negative impacts, cumulative, long-term and of moderate significance.*

6.3.7 Land and water pollution from construction wastes

Main sources of construction waste will be from site preparation, earth moving works, and domestic waste from construction crew. Also large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, excavated materials, used paper bags, empty cartons, empty paint and solvent containers, broken glass among others. Solid wastes if not well managed and disposed off at unapproved site would negatively impact the site and surrounding environment. In addition, have a potential of causing disease outbreaks due to their presence providing suitable breeding conditions for vectors of certain diseases such as cholera and typhoid. Unmanaged construction wastes might also end up in channels and block the normal flow of storm water and hence causing flooding during wet season. Outbreak of diseases such as Malaria could also be exacerbated by the presence of water pool caused by blockage of normal flow of water for breeding of anopheles mosquitoes. *The impact is considered negative, short term and of moderate significance.*

6.3.8 Public Health Hazards due to Liquid Wastes

Workers working on site during development phase definitely will generate some wastes in solid and liquid form including human wastes. Unmanaged site wastes might end up to the nearby water bodies and thus polluting the water that is flowing downstream. This might result into sanitary related diseases such as cholera, dysentery and alike. Depending on the number of construction workers and the season when work will be done the impact might become significance. *The impact is considered negative, short term and of moderate significance.*

6.3.9 Occupational Health and Safety Hazards

When human and machinery are involved at work always there are potential occupational health and safety hazards. Some of the hazards are obvious which require some management; issues like exposure to excessive noise levels from the machinery, excessive dust emission from earth works. Injuries to construction workers may result from moving equipment. According to the National OHS Act of 2003 causes of accidents in construction sites includes but not limited to poor site layout; poor erection and improper use of scaffolds; falling objects from high level such as poles; improper method of lifting; sharp edges; improper use of Personal Protective Equipment (PPE); inadequate provisions of PPE; falling through uncovered openings especially at upper floor levels and carelessness of workers. *The impact is considered negative, short term and of high significance.*

6.3.10 Contamination of land and water from accidental spills and leakages of hydrocarbon

The machines on site during construction may contain moving parts, which may require continuous oiling to minimize the usual corrosion or wear and tear. Likewise, moving vehicles on construction sites

may require oil and other lubricants change. Possibilities of such oils spilling and contaminating the soil and water within the construction sites are possible. However, no maintenance will be carried out at the project site, all contractor vehicles will be services at the proper designated garages designed for this purpose which can substantially contain these dangers. *The impact is predicted to be negative, short-term duration and of low significance.*

B. Social Impacts

6.3.11 Traffic accidents along the main and access roads

The construction activities as indicated in previous sections will involve transportation of construction materials to the site. Accidents involving both the construction workers and the general public can be expected to occur during the mobilisation/construction stage if precautions are not taken. Drivers might cause accident to children in the nearby schools or along the route while collecting or delivering construction materials. Based on small scale of construction few vehicles (about 3 to 4) and low frequency will be involved at site. *Thus, the impact is considered negative, short term and of moderate significance.*

6.3.12 Increased of diseases transmission including HIV/AIDs and STDs

During construction about 30 workers will be involved at site. Some workers will come from other places apart from Oloresho Mtaa/Olasiti Ward. This might result into social interactions and intermingling. In this case social interactions cannot be avoided which can result into spread of HIV/AIDs and other STDs. As noted in the background GBV there are early pregnancies cases, child neglect cases without appropriate measures there is likelihood for HIV/AIDs and STDs spread. *The impact is considered negative, short term and of moderate significance.*

6.3.13 Potential risk and hazards associated with labour

The project will require construction workers during construction phase. Presence of the construction crews could potentially create a source of social challenges as a result of interaction of local people with project workers. The influx of people may result into social conflict between foreign workers and locals; use of alcohol and substance abuse among workers leading to anti-social behavior; pressure on existing infrastructure; and feel of unrest for local women as a result of workers moving to the area. Due to the scale and nature of the project, it is not expected that there will be large workforce required for the project. Estimated that 30 people will be required during the construction phase. Also, the presence of construction workforce will be temporary and therefore the demographic effects are not expected to cause significant long-term impacts. Once construction is completed, many foreign workers and contractors will leave the project area. *The impact is predicted to be negative, short term but of low significance.*

6.3.14 Potential risks and hazards associated with child labour

Due to high prevalence of child labour and forced labour in Tanzania there could potentially be impacts associated with lack of work contracts, long hours with no pay and children working at supplier's sites. Given the relatively small scale of the project with small number of expected work force there will be less risk associated with child labour and forced labour within supply chain. *The impact is predicted to be negative, long term but of moderate significance.*

6.3.15 Potential GBV/SEA/SH related incidences

The GBV/SEA/SH are acknowledged as a social issue in Arusha City. The proposed project is expected to employ about 30 construction workers at one time from local communities and outside the community. There will be no campsite and this will lead the workers to be hosted in the nearby facilities. The presence of workers increases the risk of SEA/SH (GBV) towards members of the community in particular female students. Some potential GBV/SEAH related incidences during construction phase include: denial of resources, opportunities or services; physical assault; requests for sexual favors'; psychological and physical abuse; exploitation of vulnerable position, differential power or trust for sexual purposes; actual or threatened physical intrusion; unwanted sexual advances; and sexual physical contact. Gender discrimination may limit women's access to resources, opportunities, and public services necessary to improve the standard of living for themselves and their families. As a result, the livelihoods of women affected by the project may be disproportionately impacted if not managed appropriately. *The impact is predicted to be negative, short term but of moderate significance.*

6.3.16 Gender inequity in employment

There is a potential risk that gender inequality might be perpetuated during project construction through unequal distribution of work, discrimination against women, and unequal pay for women, among others. Women are likely to be least favoured in the employment opportunities in the project area. This is because the nature of jobs available during construction is perceived to be done mainly by men. *The impact is predicted to be negative, long term but of moderate significance.*

6.3.17 Employment opportunities

During mobilization and construction of the proposed project, there will be employment opportunities for both professionals and unskilled workers. Several workers including casual labourers, masons, carpenters, joiners, plumbers, electricians and engineers are expected to work on the project from the start of the project to the end. Semi-skilled, unskilled labourers and formal employees are expected to obtain gainful employment during the period of construction. With labour intensive construction technologies, the project will provide employment for youths and provide support to the Government of Tanzania initiatives on creation of jobs though on short term. The creation of employment opportunities is beneficial both from the economic and social point of view. *The impact is considered positive, short term and of moderate significance.*

6.3.18 Benefit to local producers and suppliers of goods and services

The development of the project at various phases will require supplier and produces of the services and products. Some of services include design of the building and provision of associated drawings, consultancy services like this study have started to be realised even before construction starts. Supply of materials for construction from local sources is also a positive aspect of the project, as it will reduce the cost of the project from procuring far from the site while benefitting local producer and suppliers. The materials include gravel, sands, cement, colour paints, nails, iron sheet and alike. *This impact is considered positive, cumulative short term and of moderately significance.*

6.4 OPERATION PHASE

A. Environmental impacts

6.4.1 Public health hazards from general solid wastes

The operations of the multipurpose laboratory building with offices have potential of generating solid wastes though in small amount and mainly laboratory related wastes and domestic type of solid wastes.

Waste might emanates from the office use and presence of people for prolonged hours at the area to include paper wastes, organic wastes from remains of food, packaging wastes, and plastic bottles. Laboratory wastes might include organic waste in terms of plant parts, dead small animals like insects, rats for experimental purpose. If these are not handled and disposed properly may bring eyesore and attract vermin and vectors that causes disease. These wastes when left or dumped in drainage may block the normal water flow and thus creating conducive environment for disease causing organisms such as mosquito while also might accelerate floods during rainy season. However, the amount of generated waste will be small due to small envisaged number of workers to be full time station at site. Likewise the nature of operation of OUT do not involve full time students rather once in a while visitation for practical and examinations. *The impact is predicted negative, long term and of low significance.*

6.4.2 Public health hazards from liquid wastes

During operation phase of the proposed Multipurpose laboratory Building there are many factors for consideration related with management of liquid waste which if not well considered could lead to detrimental effects particularly to public health and pollution of water. Design for associated infrastructures such as sewage system and removal of waste are important for the planned building so as to maintain the sanitation, hygiene and aesthetics. If not properly disposed of, waste may provide sites for reproduction of vermin and becomes a focal point for the spreading of diseases. This is not only in the close vicinity of the building area but also at considerable distances since bacterial, viral and parasitically may migrate to far areas. Inadequacy in the design and management of waste will result into health hazards to public and workers, reduce aesthetic of the area and can severely degrade ground and reduce the land/property value. *The impact is predicted to be negative, long term and of low significance.*

6.4.3 Public health hazards from hazardous wastes

During operation of the laboratories there will be waste generated which can not be mixed with normal wastes especially those with chemical nature both in liquid and solid form. Improper management of the waste might pose risks to the public that could be exposed to the chemicals. Likewise, untreated chemical waste might pollute the surface and subsurface water. Solid waste in form of expired chemicals cannot be guaranteed hence its management need to be considered accordingly without which might pose public health risks. *The impact is predicted to be negative, long term and of moderate significance.*

6.4.4 Fire Hazards

In absolute terms, the possibility of fire outburst at any place or part of the building always exists. Such an occurrence will then inevitably have an environmental bearing on the atmosphere. A fire is a combustion which develops in a totally uncontrolled manner with respect to time and space. It produces tremendous quantities of heat, smoke and polluting and even toxic gases. And the energy generated further favours the spreading of the fire. The impacts on humans are smoke and gases, such as CO_2, CO, H2S. These smoke and gases may present the following hazards: temperature (internal burns by inhalation of hot gases), Opacity (which obstructs the view of evacuation), asphyxiation through lack of oxygen (the oxygen concentrate in ambient air is 21% during a fire this concentration is drastically reduced) and toxicity of the combustion products. The flames reach temperatures of 600°C to 1200°Cand burns immediately result from any human contact with them. The impacts on buildings are the destruction of the buildings and their contents, and costs associated with the damages caused. While in absolute terms, a fire hazard always exists in everyday life, yet measures need to be taken at the design and operational phases of the project to minimize this risk, and concurrently to provide

security to the project and its users. *Therefore the impact is considered negative, long term and of moderate significance.*

6.4.5 Occupational health and safety hazards

The laboratory activities might be involved with complex chemical reactions that might generate fumes in the atmosphere. Some of the fumes might be unfriendly to the human health especially to the personnel's involved with the chemicals. These fumes requires management at source to avoid the impact of air pollution and its resultant effects. Without proper management the fumes might cause serious even fatal to the workers and personnel involved depending on the nature of the fumes. Other occupational health and safety issues include the ergonomic hazards which need to be considered for the workers. *The impact is considered negative, long term and of high significance.*

B. Social Impacts

6.4.6 Employment opportunities

During operation of the proposed project, there will be employment opportunities for both professionals and unskilled workers though not in large number. Currently, the OUT Arusha centre does not have science laboratory building and thus the coming of the laboratory will require more staffs to operate it. This implies new staffs to be employed. This is positive impact in line with the Government of Tanzania initiatives on creation of jobs. The creation of employment opportunities is beneficial both from the economic and social point of view. *The impact is considered positive, long term and of moderate significance.*

6.4.7 Benefit to local producers and suppliers of goods and services

The operation of the laboratory will require various goods and services to include consumables used in the laboratories. Supply of goods and services from local sources is also a positive aspect of the project, as it will reduce the cost of the project from procuring far from the project area while benefitting local producer and suppliers. *This impact is considered positive, cumulative long term and of moderately significance.*

6.4.8 Improved service delivery by the Open University of Tanzania at the area

The construction of multipurpose laboratory building will enhance the service delivery to the science students than before without inhouse laboratories. Further, physical presence of The Open University of Tanzania building in Arusha will attract more students to join with the University and especially science students. *This impact is considered positive, long term and of high significance.*

6.4.9 Visual impact/ increased aesthetic value of the project area

The construction of the modern laboratory building and their associated facilities at the area though is not natural feature will bring about positive visual impact in the area. Thus, its presence will cause visual difference with the current development. Thus, the surrounding area has already been modified to suit to human ecology thus development of this structure in the existing human environment will bring more appealing features and thus enhance the visual features of the area. *The impact is considered positive, long term and of high significance.*

6.4.10 Risk of SEA/SH issues

Students in particular female students are at risk of SEA/SH while using the proposed Zonal laboratory at OUT Arusha Regional Centre. This can include expectations of sexual favours in return for grades, sexual assault, verbal sexual harassment amongst others. SEA/SH may affect students and teachers and perpetrators can also include faculty staff, other students and none faculty staff. The identification of SEA/SH risks during operation will be considered further as part of the GBV Action Plan. *This impact is predicted to be negative, cumulative, long-term, and of high significance.*

6.4.11 Health Hazards due to social interaction among workers and users

With the anticipated increase in number of visitors and employees in project area, the social interaction among them may not be avoided. Some of interactions may be of intimate nature resulting in contracting of sexually transmitted diseases such as HIV/AIDS. Considering the nature with which HIV/AIDS is contracted and spread, this makes it a significant contribution to the pandemic. The youth especially girls are the most vulnerable group to that social interaction due to the nature of their work and their social economic background. *The impact is predicted to be negative, of long-term duration and moderate significance.*

6.4.12 Non-user-friendly buildings for Persons with Disabilities (PWDs)

The Persons with Disabilities Act, No. 9 of 2010 defines a person with disability as any person with physical, intellectual, sensory, or mental impairment and whose functional capacity is limited by encountering attitudinal, environmental and institutional barriers. The Act was enacted to provide for the protection of persons with disabilities. It included provisions for access to health care, social support, accessibility, rehabilitation, education and vocational training, communication, employment, and non-discrimination. Most public buildings and facilities in Tanzania are not accessible to people with disabilities despite that the Government has laws and policies in place that strictly instruct how these buildings and facilities should be (Kavishe, F. and Isibika, S., 2018). Despite the effort of the Act which requires all public institutions to create convenient access to persons with disability, many public institutions, including universities, are yet to comply. Despite the presence of people with disabilities in higher learning institutions, facilities provided for both accommodation and classrooms prove to be ineffective in fulfilling their expectations (Mbiru, M.B., 2022).

This necessitates more considerations of the inclusion of expectations of PWDs in the design of the proposed laboratory building to avoid the elimination of all forms of discrimination and social exclusion. Additionally, physical barriers may restrict people with disabilities movement in building and hinder their performance. Consideration to PWD has been given a high priority during designing whereby rumps and toilets have been designed to carter for PWD. *Based on this consideration the impacts is considered to be negative, long-term, and of moderate significance.*

Table 6.3: Summary of Potential Impacts

Potential Impacts	Significance value
Mobilization/Construction phase	
Environmental Impacts	
Loss of vegetation	*The impact is considered negative, long-term and of low significance.*
Accelerated soil erosion	*The impact is considered negative, short term and of moderate significance.*
Air pollution due to dust emission	*The impact is considered negative, cumulative, short term and of moderate significance*
Air pollution due to exhaust emission	*The impact of air pollution due to exhaust emission*

	is considered negative, cumulative, short term and of low significance.
Noise pollution and vibration	*The impact is considered negative, cumulative, short term and low significance.*
Land degradation at the sources of construction materials	*The Impact is considered Secondary or indirect, negative impacts, cumulative, long-term and of moderate significance.*
Land and water pollution from construction wastes	*The impact is considered negative, short term and of moderate significance.*
Public health hazards due to liquid waste	*The impact is considered negative, short term and of moderate significance.*
Occupational health and safety hazards	*The impact is considered negative, short term and of high significance.*
Contamination of land and water from accidental spills and leakages of hydrocarbon	*The impact is predicted to be negative, short-term duration and of low significance.*
Social impacts	
Traffic accidents along the main and access roads	*The impact is considered negative, short term and of moderate significance.*
Increased incidence of diseases transmission including HIV/AIDs and STDs	*The impact is considered negative, short term and of moderate significance.*
Potential risk and hazards associated with labour	*The impact is predicted to be negative, short term but of low significance.*
Potential risks and hazards associated with child labour	*The impact is predicted to be negative, long term but of moderate significance.*
Potential GBV/SEA/SH related incidences	*The impact is predicted to be negative, short term but of moderate significance.*
Gender inequity in employment	*The impact is predicted to be negative, long term but of moderate significance.*
Employment opportunities	*This impact is considered positive, cumulative short term and of moderately significance.*
Benefit to local producers and suppliers of goods and services	*This impact is considered positive, cumulative short term and of moderately significance.*
Operation phase	
Environmental impacts	
Public health hazards from general solid wastes	*The impact is predicted negative, long term and of low significance.*
Public health hazards from liquid wastes	*The impact is predicted to be negative, long term and of low significance.*
Public health hazards from hazardous wastes	*The impact is predicted to be negative, long term and of moderate significance.*
Fire hazards	*Therefore the impact is considered negative, long term and of moderate significance.*
Occupational health and safety hazards	*The impact is considered negative, long term and of high significance.*
Social impacts	
Employment opportunities	*This impact is considered positive, cumulative long term and of moderately significance.*
Benefit to local producers and suppliers of goods and services	*This impact is considered positive, cumulative long term and of moderately significance.*
Improved service delivery by the Open	*This impact is considered positive, long term and of*

University of Tanzania at the area	*high significance.*
Visual impact/ increased aesthetic value of the project area	*The impact is considered positive, long term and of high significance.*
Risk of SEA/SH issues	*The impact is predicted to be negative, cumulative, long-term, and of high significance.*
Health Hazards due to social interaction among workers and users	*The impact is predicted to be negative, of long-term duration and moderate significance.*
Non-user-friendly buildings for Persons with Disabilities (PWDs)	*The impacts is considered to be negative, long-term, and of moderate significance.*

6.5 CONSIDERATION OF ALTERNATIVES

6.5.1 Introduction

The discussion and analysis of alternatives in Environmental and Social Impact Assessments considers other practicable strategies that will promote the elimination of negative environmental impacts identified. This section is critical in consideration of the ideal development with minimal environmental disturbance.

In analysing the environmental impacts, there are usually two or more development alternatives to consider for each issue. The alternatives may encompass a wide range of consideration and can represent a choice between the construction and operation of a development and the non-development option. With this in mind, the general principle involved in identifying the option(s) of the proposed project in the area was to ensure that the option chosen would result in optimal social, economic and environmental returns. In effect the option chosen should corroborate well not only for the proponent, but also for the environment and stakeholders in the area. The option with the highest cost benefit factor, the most technically feasible and with least residual impact is identified as the preferred option. The following alternatives have been identified and have been discussed with project proponent as means of reducing environmental effects. They are discussed in further detail below:

6.5.2 Alternative Site

The ADB EIA Guidelines, Annex 2 (1992) states that "*project options should be provided within the constraints of the aim and broad economic, technical and environmental factors*". In the context when a site for construction of Three Storey Science Laboratory Building was chosen a number of factors were considered and these include:-

i. **Availability of Land** – The OUT has rented regional center office in Arusha .It had plans to construct its own building for regional office and thus acquired a piece of land in 2012 at Burka area in Arusha District Council however the site was thereafter realized to be not conducive for OUT activities and thus a new piece of land acquired in March 2023 at Olasiti Ward Oloresho Mtaa which is designated for organization offices. The coming of this project found an already in place piece of land fully owned by the Institution. The land was examined to see if would be appropriate to accommodate the Science Laboratory Building and the findings were positive as the site is located in appropriate land use, the site was free from cumbersome i.e. resettlement or land conflicts. Further, the site was more conducive due to the other factors noted subsequent bullets.

ii. **Availability of basic public infrastructures**;- existing of public basic infrastructures in the project area to include water supply, electrical supply and road to easily reach the site were

considered for the project. The Science Laboratory building requires these services just like any other public building. The owned plot located in an area where there are existing networks of utilities. The area without these would mean to get it far from the project site, the aspect of which would mean more environmental and social costs as well as more financial costs.

Since the owned piece of land by the OUT qualified the requirement of the Science Laboratory Building project and poses no major environmental and social impacts and risks the site was considered for the project. The plot land use is compatible with the proposed development and it is away from sensitive environmental areas. Thus, the chosen site recognizes the viability and need for the proposed development and is designed to address environmental and social issues and concerns.

6.5.3 No development Alternative

In the assessment, zero option is considered separately to demonstrate the condition without changes on site and with changes on site as far as environmental, social and economic aspects are concerned. Leaving an area in its existing state will mean all foreseen potential negative impacts will not happen in the area, likewise all potential project positive impacts will not be realized. Considering the area is within urban planned area (Arusha City Council), developed and modified area it is obvious even without this proposed project in long run the area will continue to change due to urban development based on the plan. Thus ignoring the project will not have significant environmental benefits. However, turning this part of land into OUT Science Laboratory Building in an area with existing academic institution and planned other institutions with positive impacts far beyond the core area is something cannot be easily ignored. Considering the nature and level of significance of the potential negative impacts (i.e most of which are usual impacts to most development and are graded moderate to low significance) and the potential means to offset the impacts (which do exist), the project cannot be foregone in the area.

Based on the above the alternative is for project other than zero option. The project will improve education service delivery to students of the OUT for socio-economic development of the country.

6.5.4 Liquid Waste Management Alternatives

The study has considered only four liquid waste management alternatives for the sewage from the proposed project building usage as other alternatives are not applicable in the area. The four alternatives include;- connecting to the existing public sewer network, Waste Stabilization Ponds, Septic Tanks and Soak Pits and Constructed wetland.

Public Sewer Network: There is public sewer system in arusha which serves part of Arusha CBD area. In the project area the network has reached A1 Hotel and Resort area which is about 850 meters when Crow is flying. The AUWSA noted that there is no immediate plan for extending the network to the project area. Thus, this would mean the OUT to finance the construction of the pipeline to connected to the nearby network area. This would be the best option as eliminates the hassles for waste management during operation as the burden is dealt centrally by the AUWSA. However, considering the distance required for connecting to the network this would require substantial amount of financial resources which has not been considered for this project.

Waste Stabilization Ponds (WSP);- This is the use of a series of ponds (primary, secondary/facultative and tertiary/maturation ponds), which allow biological processes to treat the wastewater to meet the discharge limits of effluent quality standards. However, this treatment is suitable to serve large number of people while the building will serve few number of people on daily basis. The

OUT regional centre office has less than 15 people and even after construction permanent staff will be less than 30 people while the OUT students will be visiting once in a while during practical sessions. Thus the amount of waste to be generated will be small in amount to require WSP. Despite, small amount of sewage to be generated the WSP also requires larger area that is not available in the area. Also, the ponds generate foul smell which is not conducive condition for the area.

Constructed wetland: This is the removal of pollutants in wastewater through the combination of physical, biological and chemical processes. It is engineered system designed and constructed to mimic natural processes taking place in the natural wetlands. There are two types of the constructed wetland i.e. surface or sub-surface constructed flow. The land required for subsurface flow is $5m^2$ per person (Paul G. Smith et al, 2005). Thus the required space is less compared to WSP system. The system does not require operation costs once constructed as longer as there is space for the construction. The resultant effluent can be directed to the natural stream or to the constructed soak away pit.

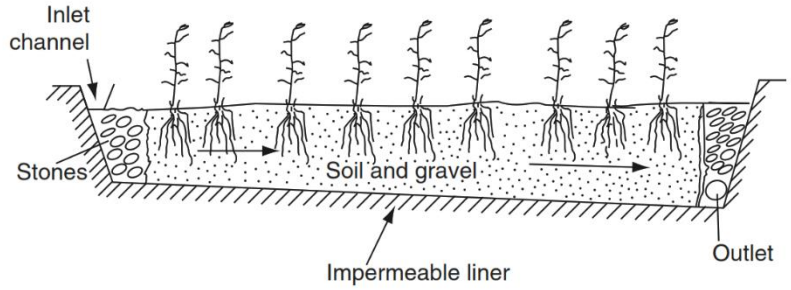

Figure 6.1: Illustration of sub-surface flow constructed wetland
Source: Paul G. Smith et al, 2005.

Septic tank and soak pit systems: - This involves the construction of underground tanks for treatment of sludge and is connected to soak away pits for disposal of resultant effluent. It is less expensive to construct and requires relatively small space than the rest. It is suitable for houses or buildings with few people. However, it requires emptying of the sludge once septic tank is full.

Conclusion: Based on analysis of the four alternatives the most preferred is the septic tank and soak away pit due to low number of people to be involved at site with resultant small amount of generated waste water. Further, this is less expensive to construct than the rest and requires small space than the rest. A well designed septic tanks and soak pit system is also environmentally friendly as does not produce excessive foul smell like WSP.

7 MITIGATION MEASURES

7.1 INTRODUCTION

The impacts which are most likely to affect the environment and human health in the execution of the proposed project have been identified and analyzed in Chapter 6. Based on the analysis and hence classification of the most significant environmental and social impacts, this chapter proposes the mitigation measures for the negative impacts and enhancement measures of those positive ones. The mitigation measures aim at offsetting the impacts or reducing the severity of the impacts to a minimal level that becomes also insignificant. The standards upon which the mitigation measures are targeted, the responsible entity and the associated mitigation costs are presented as part of the Environmental and Social Management Plan in Chapter 8. Below are the mitigation and enhancement measures:-

7.2 MOBILIZATION PHASE/ CONSTRUCTION PHASE

A. Environmental Impacts

7.2.1 Loss of vegetation

The following shall be done;-

- Clearance will be restricted to areas with physical structures and supporting facilities only to avoid spill over effect to other unintended areas.
- After construction the OUT shall plant ornamental trees and other vegetation as part of beautification of the area.

7.2.2 Accelerated soil erosion

To mitigate the impact, the following shall be done; -

- Major earth work shall be done during dry season when there is no run off to act on the nude site. This will also simplify the machinery work other than working in wet environment with machines. Should there be a need to conduct civil works between March and May during construction phase, the contractor's employed shall take appropriate mitigation measures to prevent accelerated soil erosion to include creation of temporary drainage to direct water to flow towards intended area and putting sediment traps to reduce soil removal.
- The contractor shall ensure that backfilling is done adequately, compacted, and the site restored. The backfilling operation will be performed in such a manner so as to prevent washing away of soil.
- Putting gravel materials or murrum soil to areas used by trucks and with loose soil and hence more vulnerable to soil erosion.

7.2.3 Air Pollution due to Dust Emission

The following measures shall be applied; -

- All trucks carrying the fine earth materials will be enclosed during transportation to the construction site to prevent dust generation along the route. Trucks used for that purpose will be fitted with tailgates that close properly and with tarpaulins to cover the materials.
- Measures to suppress dust shall be applied to include watering the area vulnerable for dust including routes/earth roads.

- Washing of Trucks each morning to remove mud on mudguard and tires to reduce dust on routes
- Watering on dry excavated areas to reduce fugitive dust
- Speed limits will be instituted to drivers and especially in routes passing in community centers areas.
- Covering stockpile that have potential to generate fugitive dust at site

7.2.4 Air pollution due to exhaust emission

The following measures shall be applied; -

- Equipment maintenance to be undertaken in accordance with manufacturer's instructions and at the specified maintenance interval to reduce exhaust emission;
- Equipment operators will be trained in and will follow equipment operational procedure.
- Load limit shall be specified to type of vehicle to avoiding overloading that causes excessive exhaust emission.
- Timely maintenance of the trucks through regular inspection on the need for maintenance.

7.2.5 Noise pollution and vibration

The following shall be done;-

- Construction activities will be restricted to daytime hours only.
- Vehicles and machines will be maintained and serviced as required to ensure they do not generate excessive noise. Among others shall have properly functioning exhaust mufflers.
- Installation of portable barriers to shield compressors and other small stationary equipment shall be done
- Enforced vehicle load restrictions to avoid excess noise emissions from engine overloading shall be done.
- Speed limits will be instituted to drivers and especially in routes passing in community areas.
- No huge compactors that generate excessive vibration shall be used at site.
- Training to drivers on safe driving habits that also control noise levels shall be done

7.2.6 Land degradation at source of construction materials

The contractor will source construction materials such as sand, ballast and hard core from authorized quarry and sand mining firms/sites, whose projects have undergone satisfactory environmental assessment and received appropriate approval. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated. If there are no registered quarry site, the materials shall be sourced from the areas designated by local authority for sourcing such materials. The contractor will be encouraged to make use of premix concrete suppliers for those major construction works requiring concrete.

7.2.7 Land and water pollution from construction wastes

To mitigate the impacts of wastes an efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the project site. A site waste management plan shall be prepared by the contractor that will be followed. This will include designation of appropriate waste storage areas, collection and removal schedule, and a system for supervision and monitoring. Introduction of waste disposal bins, warning notices, "DOs & DoNTs" etc posted at strategic points of the project site will be done. No, on site burial or open burning of solid waste shall be

permitted at the project site. The contractor will make use of the existing solid waste disposal and collection system of the City Council i.e. collected by City truck or by City Coundil authorised Agent. Further, the construction site will be fenced and all wastes will be handled within the fenced area before collection.

7.2.8 Public Health Hazards due to Liquid Wastes

To manage sewage at the construction site a temporary pit latrines will be established for the workers to include for both male and female latrines.

7.2.9 Occupational health and safety hazards

To mitigate this impact, OUT and contractor shall comply with relevant Tanzania (OHS Act, 2003) on health and safety requirements including the provision of Personal Protective Equipment's (PPE), reasonable working hours and good working conditions and facilities. Specifically; -

- Accidents will be minimized through proper maintenance of the machines, protecting or guarding the cutting edges, and awareness of the people including workers on the dangers and make them understand how to protect themselves and others.
- The supervisors shall ensure that safety procedure and measures are in place and are enforced (implemented) including appropriate safety gears (PPEs) e.g. eye glasses and dust masks will be ensured in order to reduce risks associated with dust.
- The contractor shall provide adequate training to workers on the OHS of the construction works
- Approved working hours shall be observed in order to avoid careless mishandling due to fatigue.
- Medical checks pre & post-employment as well as mandatory once a year checks shall be done
- Undertake site specific risk assessment and developing mechanism to avoid or reduce the risks. This shall be done per each new work to be undertaken and a safety procedure shall be developed and implemented by dedicated project HSE officer.
- The contractor shall prepare Health and Safety Management Plan for implementation of OHS issues at site.

7.2.10 Contamination of land and water from accidental spills and leakages of hydrocarbon

It shall be ensured that re-fueling and services for vehicles will be done off site. Spill control measures such as storage and handling of hydrocarbons such as oil shall be done to include storage on impervious areas (such as concrete surfaces with bund wall). Heavy equipment will be checked for lubricant leaks before starting the work, and workers will be trained on proper storage of hydrocarbons. Emergency response measures shall be put on site in case of accidental oil spill that will include having absorbent materials, sand kits at site, and alike.

A. Social Impacts

7.2.11 Traffic accidents along the main and access roads

The following shall be done; -

- Only qualified drivers with appropriate driving license shall be engage.
- Induction course shall be done to all drivers prior starting driving
- Drivers shall be sensitized on maintaining speed limits for main roads and on access roads.

- Promoting safe drive with specified hours for long drive to avoid fatigue
- Provision of road and safety signs at site or access roads shall be done.

7.2.12 Public Health Hazards (HIV/AIDs and STDs spread)

The OUT and Contactor will devote time in raising awareness of the dangers of the HIV/AIDS within the project premises. Although basic knowledge of HIV/AIDS is high among Tanzanians, knowledge of self-protection measures and behaviour change will be provided and a preference will be given to those who are vulnerable and to empower women for they compose one of the most vulnerable groups. When the need arises OUT and Contractor will seek for professional assistance from local organizations working in the field of public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace. The contractor shall also prepare HIV/AIDS Management Plan for implementation of OHS issues at site.

7.2.13 Increased local population due to labour influx

To avoid increasing influx of people, semi-skilled and unskilled labour required by the project will be sourced locally to provide communities with employment and the opportunity to earn an income during the construction phase. Local communities will be given prior information through local government offices on available employment opportunities and required qualifications. A special clause that requires local peoples to be employed as labourers during construction will be included in the contract. This will minimise the influx of people within the project area.

7.2.14 Potential risks and hazards associated with child labour

To prevent the exploitation of the child labour, the OUT and Contractor will comply with the provisions in the Employment and Labour Relation Act,2004 and the ILO Convention No. 182. OUT will develop transparent human resources policies and Labour Management Procedures for recruitment process, working conditions, terms of employment wages, worker-employer relations, non-discrimination issues, monitoring, roles and responsibilities. The OUT expects its contractors to adhere to the principles set forth in the Contract which will cover inter alia, standards related to Labour and prohibition of Child Labour. Employment of child labour (children below the age of 18), pregnant women and elder citizens in hard labour and dangerous activities will be prohibited.

7.2.15 GBV/SEA/SH related incidences

The OUT will emphases to all contractor to provide equal employment opportunities between men and women depending on required qualifications at all level. During construction local employment shall be optimized by allocating jobs fairly (consider gender, marginalized groups), involve community leaders/ committees to identify suitable/able people for the jobs, review to avoid bias or favouritism observing national/and international labour standards. The OUT and Contractor will conduct mandatory and periodic training for workers on required lawful conduct in host community and legal consequences for failure to comply with laws on gender-based violence (GBV). The OUT will roll out its grievance redress mechanism (GRM) of the proposed project for communities living in the project's area and areas of Influence and collecting information about GBV and associated social ills on a monthly basis with a view to resolving it with the project contractor. The OUT will identify and create a partnership with a local NGO to report workers' misconduct and complaints/reports on GBV or harassment through the GRM. Further, awareness on GBV issues to the workforce shall be provided in collaboration with the Local NGOs and/or GBV committees in the area.

7.2.16 Gender inequity in employment

The OUT will ensure that women and men are given equal employment opportunities during recruitment and job postings. Regular sensitization and awareness campaigns to the workers will be done to promote gender equity in employment during the construction works and during operation. Gender disaggregated data, separate bathing, changing room, sanitation facilities for men and women will be provided. Zero tolerance on sexual harassment, all forms of gender-based violence and discrimination at all phases of the project will be imposed.

7.2.17 Employment

It is expected that during construction phase of the project, a good number of people will be employed. Offering local people, the opportunity for employment during the construction or of providing services such as supplying construction materials etc, will provide an additional income-generating opportunity to locals of the area. Where skilled labour is concerned, this will almost certainly be the case when there will be limited or no local skilled labour. This minor impact could be turned into a positive impact if the contractor constructing the building is both encouraged to and committed to hiring local labour, particularly when only semi-skilled or unskilled labour is required. This could be made clear during the tendering process for construction of the building. One way of promoting this would be for the Contractor to train local people to acquire the skills needed by these contractors to carry out the work.

7.2.18 Benefit to local producers and suppliers of goods and services

The project will procure most construction materials from local sources. The use of locally available materials and labour for the proposed development will contribute towards growth of the economy by contributing to the income and hence poverty reduction as well as contributing to gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue. Some of the project services have been already contracted to Tanzanian suppliers and contractors.

7.3 OPERATION PHASE

A. Environmental Impacts

7.3.1 Public health hazards from solid wastes

The OUT will establish a system for waste management. The system will include having disposal bin located in strategic areas of the site for collection at source. Further, centralized waste collection point will be established to handle increased quantity of waste and for collection. It will be designed at one of the corners close to the gate for easy collection of the same without major nuisance during collection. Only authorised waste collection agency by the Municipality will be allowed for collection of the waste. The Municipal authorised agents are responsible for collection and disposal to the authorised disposal site.

7.3.2 Public health hazards from liquid wastes

The OUT will design and construct a septic tank and soak away pit system for sewage management on site. The design will consider the full operational capacity of the building.

As noted in section 2.6.3.3, the centralised sewer system is about 850 meters from the site and the project will not be able to connect to the system. Further, the expected amount of effluent from sanitary

areas ranges from 1.28 m^3 to 3.84m^3. Thus, the OUT will design a septic tank and soak away pit system for sewage management on site. Further, proper construction as per design shall be done.

7.3.3 Public health hazards from hazardous wastes

The OUT will design a waste water retention structures for the laboratory effluent. Two on series retention ponds will be designed for dilution of the effluent before final discharge to the open environment. The effluent on the retention ponds will be monitored to ensure it is safe for final disposal.

7.3.4 Fire Hazards

The architecture of the proposed Building shall ensure the building has easy mechanism of evacuation in the eventuality of a fire and other emergencies. The design of the building will provide ample space for exiting the building and the corridors will be of sufficient widths and dimensions to enable easy and speedy evacuation. Provision will be made under the plumbing installation, for fire-fighting system. Further, the following shall be done; -

- The OUT shall install firefighting system to include fire detectors, portable fire extinguishers for emergency, fire hydrant and water reserve tank that can also be used in case of fire.
- Staffs will be trained on how to operate the firefighting equipment.
- Drawings shall be submitted to fire department for scrutiny and guidance on fire safety designs and shall adhere to the requirement(s).

7.3.5 Occupational health and safety hazards

The final designs of the science laboratory building shall adhere to the required standards taking into account the nature of operations. Some of the key aspects to be considered include the ventilation of the chemistry laboratory, location of the gas to be involved in the process, storage room of chemicals requirements. Further, in order to mitigate the potential impacts due to laboratory fumes from complex chemical reactions the chemistry laboratory shall be equipped with fume hood built-in with scrubber which is acid and organic resistant to withstand the acid and organic fumes from the chemistry laboratory operations. Also, before operations of the laboratory building baseline risk assessment should be done in line with OHS Act of 2003 to identify OHS risks and hazards and thereafter to formulate the mitigation measures to be implemented during the operation.

B. Social Impacts

7.3.6 Employment

It is expected that during operation phase of the project, relatively few number of people will be engaged compared to construction phase. However, construction phase will more of temporary engagement contrary to operation that will be permanent though few people will be involved. Offering local people, the opportunity for employment will provide a steady income for their families and hence partly addressing unemployment and poverty issues of the country. This minor impact could be turned into a positive impact if the proponent is both encouraged to and committed to hiring local labour. This could be made clear during the employment process to involve local community through local government offices for information sharing.

7.3.7 Benefit to local producers and suppliers of goods and services

During operation various goods and services will be requires for laboratory and related activities at site. The use of locally available suppliers will contribute towards growth of the economy by contributing to the income and hence poverty reduction as well as contributing to gross domestic product. The consumption of goods and services will attract taxes including VAT which will be payable to the government hence increasing government revenue. This could also be advertised through local offices for information sharing for service providers within the local area.

7.3.8 Risk of SEA/SH

The OUT will draft, approved and implemented a GBV Action Plan and will assess the SEA/SH risks associated with the project based on existing data and input from key stakeholders. This will include identification of risks to workers and communities as well as risks to students within operating institutions. The GBV requirements and expectations will be defined in the bid documents including codes of conducts (to be signed by workers), training, awareness raising for workers and the community, GBV responsive GRMs and approach to GBV case management. Also, GBV measures needed to protect students at the national level and the institutional level including the need for institutions to develop GBV policies to address SEA/SH, training and awareness raising, GBV responsive GRMs, educator/ staff codes of conduct (to be signed), student agreements, referral pathways etc., will be defined. The OUT will identify and create a partnership with a local organisation to report workers' misconduct and complaints/reports on GBV or harassment through the GRM.

7.3.9 Health Hazards due to social interaction among workers and users

The project proponent will support already existing and new initiatives to sensitize/educate the people around the project on the HIV/AIDS pandemic. Also, the proponent will provide HIV/AIDS training/awareness campaign programmes to its employees and will encourage workers who know they are infected and receive care to break through the denial about HIV by talking with their fellow workers, friends and neighbours and reducing the discomfort associated with the subject. When the need arises, the OUT will seek for professional assistance from organizations working in the field of public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace.

7.3.10 Non-user-friendly buildings for Persons with Disabilities (PWDs)

As noted earlier the building will be designed and built with ramps and other special facilities such as toilets to facilitate access and use by PWDs. Detailed consultation with the PWDs community will be undertaken during the design process to ensure key access and user-friendly facilities are designed and constructed.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 INTRODUCTION

The Environmental and Social Management Plan (ESMP) is presented in table 8.1 below. This ESMP for the proposed science laboratory building project is based on the assessment undertaken as part of the ESIA. A number of mitigation measures have been identified which aim to reduce and / or eliminate the predicted impacts of the project. These mitigation measures will be appropriately applied to the project mobilization/construction, operation and decommission phases. This management plan provides a strategic framework for mitigation implementation. The Contractor shall implement components relevant to mobilization of materials and machines and actual construction. The ESMP include an estimate of the costs of the measures so that the project proponent can budget the necessary funds. Appropriate bills of quantities shall clearly give the actual figures. In any case the consultant used informed judgment to come up with these estimated figures.

8.1.1 Purpose of the ESMP

The purpose of the ESMP is to describe the measures that should be implemented by the contractors and project proponent during the implementation of the proposed project to eliminate or reduce to acceptable levels of the key potential environmental and social impacts related to project activities. The specific measures set out in the ESMP must be fully adhered to by all the project parties. In particular, the project must strive to avoid significant impacts on the bio-physical, socioeconomic, or health aspects during implementation. Where impacts cannot be avoided, they must be mitigated against using appropriate measures. The ESMP has been developed: -

i) To bring the project to comply with Government of Tanzania applicable national environmental and social legal requirements social policies and procedures;
ii) To provide guidance on EHS issues as required by the IFC and World Bank Environmental and Social Framework (ESF)
iii) To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.
iv) To provide an operational reference and tool for environmental management during project construction and operation activities.

All contractual and legal obligations relating to the ESMP apply to the main Contractors and any Sub-Contractors appointed by them. It is the responsibility of the Construction Contractors to provide adequate resources to ensure effective implementation and control of the ESMP. The Sub-Contractor is responsible to its respective Contractor for compliance with the measures presented in the ESMP. It is also the responsibility of the Construction Contractor and their Sub-Contractors to ensure that all project staff are trained and procedures are understood and followed. Further reasonability of each part is given under section 3.5.2. The summary of the key issues of the proposed project and their management are shown in Table 8.1 below.

Table 8.1: Environmental and Social Management Plan

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
Mobilization/Construction Phase		***Environmental Impacts***			
	Loss of vegetation	▪ Clearance will be restricted to areas with physical structures and supporting facilities only to avoid spill over effect to other unintended areas. ▪ After construction the OUT shall plant ornamental trees and other vegetation as part of beautification of the area.	Planted trees around the building, retained mature tree	Proponent	500,000
	Accelerated soil erosion	▪ Major earth work shall be done during dry season when there is no run off to act on the nude site. This will also simplify the machinery work other than working in wet environment with machines. Should there be a need to conduct civil works between March and May during construction phase, the contractor's employed shall take appropriate mitigation measures to prevent accelerated soil erosion to include creation of temporary drainage to direct water to flow towards intended area and putting sediment traps to reduce soil removal. ▪ The contractor shall ensure that backfilling is done adequately, compacted, and the site restored. The backfilling operation will be performed in such a manner so as to prevent washing away of soil. ▪ Putting gravel materials or murrum soil to areas used by trucks and with loose soil and hence more vulnerable to soil erosion.	No eroded area / the disturbed areas reinstated	Proponent, Contractor	
	Air pollution due to dust emission	▪ All trucks carrying the fine earth materials will be enclosed during transportation to the construction site to prevent dust generation along the route. Trucks used for that purpose will be fitted with tailgates that close properly and with tarpaulins to cover the materials. ▪ Measures to suppress dust shall be applied to include watering the area vulnerable for dust including routes/earth roads ▪ Washing of Trucks each morning to remove mud on mudguard and tires to reduce dust on routes	Units- mg/m^3 TSP < 0.23, PM_{10} < 0.05 & $PM_{2.5}$ < 0.025	Proponent, Contractor	15,000,000

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
		▪ Watering on dry excavated areas to reduce fugitive dust ▪ Speed limits will be instituted to drivers and especially in routes passing in community centres. ▪ Covering stockpile that have potential to generate fugitive dust at site			
	Air pollution due to exhaust emission	▪ Equipment maintenance to be undertaken in accordance with manufacturer's instructions and at the specified maintenance interval to reduce exhaust emission; ▪ Equipment operators will be trained in and will follow equipment operational procedure. ▪ Load limit shall be specified to type of vehicle to avoiding overloading that causes excessive exhaust emission. ▪ Timely maintenance of the trucks through regular inspection on the need for maintenance.	Units- mg/m^3 SO_2<0.5, NOx < 0.2, CO_2 < 500, CO <30,	Proponent, Contractor	
	Noise pollution and Vibration	▪ Construction activities will be restricted to daytime hours only. ▪ Vehicles and machines will be maintained and serviced as required to ensure they do not generate excessive noise. Among others shall have properly functioning exhaust mufflers. ▪ Installation of portable barriers to shield compressors and other small stationary equipment shall be done ▪ Enforced vehicle load restrictions to avoid excess noise emissions from engine overloading shall be done. ▪ Speed limits will be instituted to drivers and especially in routes passing in community areas. ▪ No huge compactors that generate excessive vibration shall be used at site. ▪ Training to drivers on safe driving habits that also control noise levels shall be done	From 7am to 7pm ≤ 55 dBA	Proponent, Contractor	2,000,000

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Land degradation at source of construction materials	• Earth nature construction materials will be obtained from authorized/permitted sources • The contractor will be encouraged to make use of premix concrete suppliers for those major construction works requiring concrete.	No degradation	Proponent, Contractor	500,000
	Land and water pollution from construction wastes	▪ A site waste management plan shall be prepared and followed. This will include designation of appropriate waste storage areas, collection and removal schedule, and a system for supervision and monitoring. ▪ The contractor shall provide different waste bins for segregation on site and to discourage uncontrolled waste disposal. ▪ No, on site burial or open burning of solid waste shall be permitted at the project site. ▪ The contractor will make use of the existing solid waste disposal and collection system by approved contractors by the City Council. ▪ All the waste will be managed within the fenced area before collection	Zero littering	Proponent, Contractor	500,000
	Public Health Hazards due to Liquid Wastes	▪ A temporary pit latrines will be established for the construction workers at the site to include for both male and female.	Pit latrine in place, no hazards due to wastes	Proponent, Contractor	1,500,000
	Occupational health and safety hazards	Relevant health and safety requirements (OHS Act, 2003) including the provision of Personal Protective Equipment's (PPE), reasonable working hours and good working conditions and facilities shall be complied. Specifically; - ▪ Accidents will be minimized through proper maintenance of the machines, protecting or guarding the cutting edges, and awareness of the people including workers on the dangers and make them understand how to protect themselves and others. ▪ The supervisors shall ensure that safety procedure and measures are in place and are enforced (implemented) including appropriate safety gears (PPEs) e.g. eye glasses and dust masks will be ensured in order to reduce	Low risk to workers/ Zero exposure	Proponent, contractor	2,500,000

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
		risks associated with dust. ▪ The contractor shall provide adequate training to workers on the OHS of the construction works ▪ Approved working hours shall be observed in order to avoid careless mishandling due to fatigue. ▪ Medical checks pre & post-employment as well as mandatory once a year checks shall be done ▪ Undertake site specific risk assessment and developing mechanism to avoid or reduce the risks. This shall be done per each new work to be undertaken and a safety procedure shall be developed and implemented by dedicated project HSE officer. ▪ The contractor shall also prepare Health and Safety Management Plan for implementation of OHS issues at site.			
	Contamination of land and water from accidental spills and leakages of hydrocarbon	▪ Re-fueling and services for vehicles will be done off site. ▪ Spill control measures such as storage and handling of hydrocarbons such as oil shall be done to include storage on impervious areas (such as concrete surfaces with bund wall). ▪ Heavy equipment will be checked for lubricant leaks before starting the work, ▪ workers will be trained on proper storage of hydrocarbons. ▪ Emergency response measures will be put on site in case of accidental oil spill that will include having absorbent materials, sand kits at site, and alike.	Zero spill	Proponent, Contractor	500,000
		Social Impacts			

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Traffic accidents	▪ Only qualified drivers with appropriate driving license shall be engage. ▪ Induction course shall be done to all drivers prior starting driving ▪ Drivers shall be sensitized on maintaining speed limits for main roads and on access roads. ▪ Promoting safe drive with specified hours for long drive to avoid fatigue ▪ Provision of road and safety signs at site or access roads shall be done.	Zero accidents	Proponent, Contractor	500,000
	Public Health Hazards (HIV/AIDs and STDs spread)	Awareness raising on the dangers of the HIV/AIDS within the project premises especially to those who are vulnerable and to empower women for they compose one of the most vulnerable groups. When the need arises OUT and Contractor will seek for professional assistance from organizations working in the field of public health and control of HIV/AIDS for instituting a health education and disease control programme at the workplace. The contractor shall also prepare HIV/AIDS Management Plan for implementation of HIV/AIDS issues at site.	No new HIV/AIDs incident	Proponent, Contractor	3,500,000
	Increased local population due to labour influx	Semi-skilled and unskilled labour required by the project will be sourced locally to provide communities with employment and the opportunity to earn an income during the construction phase. Local communities will be given prior information through llocal government offices on available employment opportunities and required qualifications. A special clause that requires local peoples to be employed as labourers during construction will be included in the contract.	No labour influx	Proponent, Contractor	
	risks and hazards associated with child labour	The OUT and Contractor will comply with the provisions in the Employment and Labour Relation Act,2004 and the ILO Convention No. 182. OUT will develop transparent human resources policies and procedures for recruitment process, working conditions, terms of employment wages, worker-employer relations, non-discrimination policy, monitoring, roles and responsibilities. The OUT expects its contractors to adhere to the principles set forth in the Contract which will cover inter alia, standards related to Labour and prohibition of Child Labour.	No child labour incident	Proponent, Contractor	

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	GBV/SEA/SH related incidences	The OUT will draft, approved and implemented a GBV Action Plan and will assess the SEA/SH risks associated with the project based on existing data and input from key stakeholders. This will include identification of risks to workers and communities during construction as well as risks to students within operating institutions. The GBV requirements and expectations will be defined in the bid documents including codes of conducts (to be signed by workers), training, awareness raising for workers and the community, GBV responsive GRMs and approach to GBV case management.	No GBV incident	Proponent, Contractor	
	Gender inequity in employment	Women and men will bee given equal employment opportunities during recruitment and job postings. Regular sensitization and awareness campaigns to the workers will be done to promote gender equity in employment during the construction works and during operation. Gender disaggregated data, separate bathing, changing room, sanitation facilities for men and women will be provided.	Equal opportunity	Proponent, Contractor	
	Employment	The employment impact could be turned into a positive impact if the contractor constructing the building is both encouraged to and committed to hiring local labour, particularly when only semi-skilled or unskilled labour is required. This could be made clear during the tendering process for construction of the building. One way of promoting this would be for the Contractor to train local people to acquire the skills needed by these contractors to carry out the work.	As many as possible	Proponent, contractor	N/A
	Benefit to local producers and suppliers of goods and services	The proponent/contractor shall strive to procure the required service and products from local supplied and producers.	As much as possible	Proponent, contractor	N/A
Operation Phase		***Environmental Impacts***			
	Public health hazards from solid wastes	▪ Designated area for wastes collection shall be established. ▪ Provision of wastes receptacles and labeling of these receptacles according to the type of wastes will be done. ▪ Only authorised waste collection agency by the Municipality will be engaged for collection of the waste.	Zero littering/	Proponent	1,200,000

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Public health hazards from liquid wastes	• The OUT will design and construct a septic tank and soak away pit system for sewage management on site. The design will consider the full operational capacity of the building.	No waste water leaks	Proponent	
	Public health hazards from hazardous wastes	The OUT will design a waste water retention structures for the laboratory effluent. Two on series retention ponds will be designed for dilution of the effluent before final discharge to the open environment. The effluent on the retention ponds will be monitored to ensure it is safe for final disposal.	Neutral water (pH 6 - 8)	Proponent	
	Fire Hazards	There will be enough exit doors for evacuation in case of fire incidence. The corridors will be of sufficient widths and dimensions to enable easy and speedy evacuation. Provision will be made under the plumbing installation, for fire-fighting system. Further; - • The OUT shall install with firefighting system among others portable fire extinguishers for emergency especially in the office side. • Staffs will be trained on how to operate the firefighting equipment. • Drawings shall be submitted to fire department for scrutiny and guidance on fire safety designs and shall adhere to the requirement(s).	Zero fire incident	Proponent	1,500,000
	Occupational health and safety hazards	The final designs of the science laboratory building shall adhere to the required standards taking into account the nature of operations. Some of the key aspects to be considered include the ventilation of the chemistry laboratory, location of the gas to be involved in the process, storage room of chemicals requirements. Further, in order to mitigate the potential impacts due to laboratory fumes from complex chemical reactions the chemistry laboratory shall be equipped with fume hood built-in with scrubber which is acid and organic resistant to withstand the acid and organic fumes from the chemistry laboratory operations. Also, before operations of the laboratory building baseline risk assessment should be done in line with OHS Act of 2003 to identify OHS risks and hazards and thereafter to formulate the mitigation measures to be implemented during the operation.	Zero incident	Proponent	Part of investment costs
		Social Impacts			

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Employment	The employment impact could be turned into a positive impact if the proponent is both encouraged to and committed to hiring local labour. This could be made clear during the employment process to involve local community through local government offices for information sharing.	As many as possible	Proponent, contractor	N/A
	Benefit to local producers and suppliers of goods and services	The proponent shall strive to procure the required service and products from local supplied and producers. This could also be advertised through local offices for information sharing for service providers within the local area.	As much as possible	Proponent, contractor	N/A
	Risk of SEA/SH	The OUT will draft, approved and implemented a GBV Action Plan and will assess the SEA/SH risks associated with the project based on existing data and input from key stakeholders. This will include identification of risks to workers and communities as well as risks to students within operating institutions. The GBV requirements and expectations will be defined in the bid documents including codes of conducts (to be signed by workers), training, awareness raising for workers and the community, GBV responsive GRMs and approach to GBV case management. Also, GBV measures needed to protect students at the national level and the institutional level including the need for institutions to develop GBV policies to address SEA/SH, training and awareness raising, GBV responsive GRMs, educator/ staff codes of conduct (to be signed), student agreements, referral pathways etc., will be defined. The OUT will identify and create a partnership with a local organisation to report workers' misconduct and complaints/reports on GBV or harassment through the GRM.	No GBV/ SEA/SH victims/incident	Proponent	5,000,000
	Health Hazards due to social interaction among workers and users	The project proponent will support already existing and new initiatives to sensitize/educate the people around the project on the HIV/AIDS pandemic. Also, the proponent will provide HIV/AIDS training/awareness campaign programmes to its employees and will encourage workers who know they are infected and receive care to break through the denial about HIV by talking with their fellow workers, friends and neighbours and reducing the discomfort associated with the subject. When the need arises, the OUT will seek for professional assistance from organizations working in the field of public health	Tanzania AIDS/ HIV Policy, No HIV/AIDS victims, No new cases.	Proponent	5,000,000

Phase	Potential Direct Impacts	Management/Mitigation and Enhancement Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
		and control of HIV/AIDS for instituting a health education and disease control programme at the workplace.			
	Non-user-friendly building for Persons with Disabilities (PWDs)	The building will be designed and built with ramps and other special facilities such as toilets to facilitate access and use by PWDs. Detailed consultation with the PWDs community will be undertaken during the design process to ensure key access and user-friendly facilities are designed and constructed.	Easy access to all users	Proponent	4,000,000

9. ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1 INTRODUCTION

The correct and successful implementation of impact mitigation measures in order to reduce adverse impacts on environmental and social conditions needs to be ensured by a proper monitoring programme. This chapter presents the Environmental and social monitoring plan (EMP) that will be carried out throughout the project implementation to mitigate the impacts and enhance the benefits of the project. The EMP outlines the specific actions that shall be undertaken to ensure that the project complies with all applicable laws and regulations related to environmental impacts and impact mitigation. The EMP deals with all mitigation required for the physical, biological and socio-economic impacts and focuses on the impacts as provided in table 8.1 above.

9.2 OBJECTIVES OF EMP

The EMP applies to, and will be implemented throughout, all phases of the project: mobilization/construction, operation, and decommissioning. The objective of the EMP is to set out clearly the key components of environmental and socio-economic management for the proposed project and thereby ensure that the following concepts are realized throughout the mobilization/construction, operation, and decommissioning.

i) negative impacts on the physical, biological and socio-economic environments are mitigated;
ii) benefits that will arise from the development of the proposed project are enhanced;
iii) support smooth implementation of project with minimum losses to environmental and social infrastructure;
iv) compliance and guided by National, International laws, standards and guidelines e.g., noise level standards, occupational and safety standards etc and best practice is achieved; and
v) good will and good relations with communities, and governments at local and national levels are maintained.

9.3 MONITORING RESPONSIBILITY

Implementation of the EMP is the solely the responsibility of the project proponent. The proponent shall supervise and monitor components of the monitoring plan and keep record of monitoring outcome. The proponent has ability to provide the necessary supervisory oversight to ensure the mitigation measures are working and where they are not remedial measures are established. The proponent is committed to protect and enhance the environment.

Detailed parameters to be monitored have been considered along with responsible party(s). The proponent will endeavor to ensure that resources are available to implement the EMP throughout all phases of project development and decommissioning. The EMP will be subject to the principle of continuous improvement. The details of environmental and social issues/impacts, proposed parameter to be monitored and timing agencies responsible for execution of proposed actions during mobilisation/construction, operation and decommissioning stages are presented in tables 9.1 below. The EMP includes an estimate of the costs of the monitoring activities so that the project proponent can budget the necessary funds.

Table 9.1: Environmental and Social Monitoring Plan

Phase	Potential Direct Impacts	Parameter to be Monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level /Standard	Responsibility	Estimated Costs [Tsh]
Mobilization / Construction Phase	***Environmental Impacts***							
	Loss of vegetation	Trees and other végétation	Twice a year & after construction	Project area	Visual	No disturbed vegetation out of project area	Proponent,, Contractor	200,000
	Accelerated soil erosion	Eroded area	Monthly	Project area	m^2	No eroded area	Proponent, Contractor	500,000
	Air pollution due to dust emission	Particulate matter (TSP, PM_{10}, $PM_{2.5}$)	Monthly	Project area,	Mg/m^3	TSP < 0.23, PM_{10} < 0.05 & $PM_{2.5}$ < 0.025	Proponent,, Contractor	300,000
	Air pollution due to exhaust emission	Noxious gas	Once per Month	Project area,	Mg/m^3	SO_2<0.5, NOx < 0.2, CO_2 < 500, CO <30,)	Proponent,, Contractor	300,000
	Noise pollution and Vibration	Noise level	Once per Month	Project area	dB	Day < 55, Night < 45	Proponent,, Contractor	200,000
	Land degradation at source of construction materials	Records	Quarterly	project site	-	No degradation	Proponent,, Contractor	300,000
	Land and water pollution from construction wastes	haphazard disposal of waste / wastes bins	Once per month	Project surrounding area	Visual,	No haphazard disposal of solid waste	Proponent,, Contractor	200,000
	Public Health Hazards due to Liquid Wastes	Pit latrine/ leak	Monthly	Project site,	visual	Pit latrine in place, no leak	Proponent, Contractor	200,000
	Occupational health and safety hazards	Availability of PPE, Measures to reduce risk/risk exposure	Once per month	Construction site	NA	Low risk to workers/ Zero exposure	Proponent,, Contractor	400,000
	Contamination of land and	Hydrocarbons	Once per Month	Project area	Visual	No spill	Proponent,	200,000

Phase	Potential Direct Impacts	Parameter to be Monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level /Standard	Responsibility	Estimated Costs [Tsh]
	water from accidental spills and leakages of hydrocarbon					incident	Contractors	
	Social Impacts							
	Traffic accidents	Accident records, Safety/warning signs on roads/awareness training to drivers	Once per Month	Project area, access route	Number of accidents, visual, training records	Zero accidents	Proponent,, Contractor	200,000
	Public Health Hazards (HIV/AIDs and STDs spread)	HIV/AIDs Incident	Once per Month	Project area	Records	No new HIV/AIDs incident	Proponent, Contractors	200,000
	Increased local population due to labour influx	Influx of workers	Once per Month	Project area	Local leaders	No labour influx	Proponent, Contractors	200,000
	Risks and hazards associated with child labour	Child labour incident	Once per Month	Project area	Local leaders	No child labour incident	Proponent, Contractors	200,000
	GBV/SEA/SH related incidences	GBV Incident	Once per Month	Project area	Records, local leaders	No GBV incident	Proponent, Contractors	200,000
	Gender inequity in employment		Once per Month	Project area	Local leaders	Equal opportunity	Proponent, Contractors	200,000
Operation Phase	***Environmental impacts***							
	Public health hazards from solid wastes	Solid wastes	Once every six month	Project vicinity/channels & drainage	Visual	Zero littering	Proponent,	200,000
	Public health hazards from	leak	Once every six month	Project site,	visual	no leak	Proponent	200,000

Phase	Potential Direct Impacts	Parameter to be Monitored	Monitoring Frequency	Monitoring Area	Measure ment Unit	Target Level /Standard	Responsibili ty	Estimate d Costs [Tsh]
	liquid wastes							
	Public health hazards from hazardous wastes	pH level	Once every six month	Project site,	Records	6.0 – 8.0	Proponent	200,000
	Fire hazards	Number of accidents	Once every six month	Project area	Number of Incidence	Zero incidence	Proponent	200,000
	Social impacts							
	Occupational health and safety hazards	Number of incidents	Once every six month	Project area	Number of Incidence	Zero incident	Proponent	200,000
	Employment	local employees	Every 6months	Project area	Number of local employees	As many as possible	Proponent	200,000
	Benefit to local producers and suppliers of goods and services	Local contracts for supply of goods and services	Every 6months	Project area	Number of Local contracts	As many as possible	Proponent	200,000
	Risk of SEA/SH	Incidents	Every 6months	Project area	Number of incidents	No incidents	Proponent	200,000
	Health Hazards due to social interaction among workers and users	Incidents	Every 6months	Project area	Number of incidents	No new HIV/AIDS victims	Proponent	200,000
	Non-user-friendly building for Persons with Disabilities (PWDs)	Ramps and other special facilities such as toilets	One During Design & commissioning state	Project area	Facilities & type	Easy access to all users	Proponent	200,000

10 COST BENEFIT ANALYSIS

10.1 INTRODUCTION

The cost-benefit analysis of this project focuses on economic costs and benefits and social benefits other than income and externality which are not included as part of the calculation. The Higher Education for Economic Transformation (HEET) Project is geared towards meeting the following strategic objectives (i) to increase enrolment in priority disciplines, (ii) to improve the relevance and quality of programs at universities to meet the conditions and standards of the current and future labour market, (iii) to strengthen system-level coordination, management, and regulations to ensure quantity, quality and relevance of higher education in Tanzania, and (iv) to increase the rate and extent of graduate employability through improving the relevance of curricula and create new and demand driven programs.

These results suggest that the project is expected to yield significant economic returns and thus is a very sound investment. These are conservative estimates of the project benefits, given that they do not account for other potential benefits, including the social benefits of education and training. The proposed project will increase access and improve the quality of technical programs at OUT. The benefits are expected to emerge from realising economies of scale in training design and delivery in Tanzania.

The main costs associated with the Three Storey Science Laboratory Building at Oloresho area include direct project costs, education and training costs for individuals and foregone income (indirect cost) for individuals during training. The additional maintenance cost for construction and additional academic and administration staff are anticipated. Moreover, because HEET supports OUT in staff development, salary increase due to additional qualification/training experience for some staff could be expected.

10.2 COST STRUCTURE

The proposed building will provide adequate space and equipped facilities for the labs that will be used as zonal science laboratories for science students in the project's priority areas. The tangible and intangible annual benefits of the project would include the following: monies gained from students paying fees; potential to increase employment locally; potential to increase local economy by injecting funds into the surrounding community and the ability to contribute over the long term to a better internal economy in Tanzania. The tangible and intangible costs of project include:

- the cost of general operations, namely paying employees, food, and maintenance. All running costs
- the initial startup cost of establishing a process area and the operational costs associated with running it
- the environmental costs would include a definite loss of vegetation as establishment of proposed project would entail the clearance of onsite vegetation to allow project activities to take place effectively
- the destruction of the natural landscape which cannot be completely restored to its original pristine shape once altered
- the potential cost to surrounding communities in terms of heightened noise levels during construction, increased contamination of both surrounding air and water, and increased dust as a result of the project activities.

Before the project is approved by the Government of Tanzania and the World Bank it has to pass the net present value test. The costs and benefits were used to calculate the net present value of the project. According to the Ministry of Education, Science and Technology, the net present value of this project is positive with a promising payback period. The conclusion indicates that the project is economically viable from economic perspectives.

10.3 FINANCIAL EVALUATION

The World Bank Appraisal Document for HEET project reveals that the project is technically, socially and economically feasible, viable and is desirable for country's economy. The construction of laboratory, teaching and research facilities will include Physics Lab, Chemistry Lab, Botany and Zoology Lab, Food Science Lab, Tourism and hospitality Lab, ICT multimedia state of the art Lab, Multipurpose modern Conference facilities as well as offices. It will result into many social benefits like employment generation, inflow of technology, strengthening of education base within the country, inflow of technical and managerial expertise, creation of many other ancillary businesses etc. In light of anticipated financial, social and development benefits the project qualifies for positive recommendation for immediate implementation. Since the World Bank has confidently arranged the required funds and of establishing the project within the committed time frame the conclusion is to recommend to all concerned authorities to accord utmost support to this project so as to enable the country to realize the benefits as perceived in this report.

10.4 SOCIAL BENEFITS

Labs provide students with various opportunities to learn and experiment, which plays a crucial role in the ongoing intellectual development of students at any academic level. Science labs give students the time, space, and resources to explore and experiment. The benefits from the proposed Three Storey Science Laboratory Building project at Oloresho area will be beyond the direct benefit of an individual's increase of wage, employability, and productivity. The strategic intervention of government in the priority economic sector with potential growth opportunities will lead to national development. Therefore, it is essential that policies and institutional mechanisms are set to remedy externalities. The proposed project under HEET will support the OUT and support building capacity at the national level.

10.5 COMMUNITIES BENEFITS

The benefit to the communities may be looked into in different perspectives. The successful construction Two Storey Science Laboratory Building with a wide range of different users will make money for local contractors and services provider who will be involved in the project e.g., Construction companies, Architectures, Soil surveyors, ESIA Consultants, etc. who in turn will pay taxes which the Government will use to provide social services to the community. The project activities will also generate employment during the construction and operation of the projects and facilities. As indicated in chapter 2, the activities that the project accommodates, will provide direct employment to Tanzanians from all businesses and services. In addition to the Science Laboratory operational expenditure on local goods and services, including staff wages, food and beverages, concession fees, utilities and maintenance, the project demonstrates the indirect contributions through discretionary spending outside the centre and induced spending by staff and students. It also suggests demonstration effects around training, standards, and stimulation of private sector development and recognizes the additional benefits generated during construction. Generally, since the project has a positive net present value, it will contribute to Tanzania's economic growth and development.

10.6 POSSIBLE COSTS TO GOVERNMENT

As already mentioned, the Government will directly and indirectly benefit from taxes generated during the Science Laboratory construction and operations. Apart from tax generation, the project will also enhance the economic growth and education sector development spurred by the operations and activities associated with the project. The government's image in the promotion of the education sector will also be enhanced nationally and internationally, which will increase attractions from other local and foreign funders and ensure continued market growth.

10.7 ENVIRONMENTAL AND SOCIAL COST-BENEFIT ANALYSIS

Environmental and social cost-benefit analysis is assessed in the negative versus positive analysis. Furthermore, the analysis considers whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable. As mentioned in Chapters 6 and 7, the benefits of the project, in terms of financial and social benefit, are substantial, the environmental and social impacts are mitigatable and the financial resources needed to mitigate the impacts are relatively small compared with the actual capital investment. This project shall have a significant impact on the economy of Tanzania.

11 DECOMMISSIONING PLAN

11.1 INTRODUCTION

This is a preliminary decommissioning plan. This plan establishes feasible decommissioning schemes that can be accomplished without undue risk to the health and safety of the public and decommissioning personnel, without adverse effects on the environment, and within established guides and limits of the appropriate regulatory agencies. This preliminary plan will serve to ensure that the decommissioning and ultimate dispositions of the Laboratory Building are considered during the initial design and construction of the building. The preliminary plan will remain a "living document," and revisions will be made throughout the operating life of the building. It must be reviewed periodically and revised to reflect any changes in the Lab Building construction or operation that might affect decommissioning. Prior to the initiation of actual decommissioning activities for the Lab Building, a detailed final disposition plan will be prepared.

The final plan should be based on the preliminary plan and revisions, and will define specific work activities including safety evaluations of planned decommissioning methods, new technology, and the Lab Building status that will result from the decommissioning program. In addition, this plan must contain sufficient information to obtain any approvals needed from the appropriate regulatory agencies to proceed with decommissioning activities.

11.2 AIM OF THE PRELIMINARY PLAN

The preliminary plan serves to establish decommissioning as an important consideration from the inception of the project, during design and throughout the operation of the Lab building project. The plan has the following purposes:

a) The primary purpose of the preliminary plan is to ensure that the Laboratory building project designers are cognizant of decommissioning during the initial design of the project. Thus, where design choices that would enhance decommissioning are available for types of materials and system components, and location of components, these choices shall be made.

b) Another purpose of the preliminary plan is to identity the ultimate decommissioning options and final project status. These options would be evaluated and narrowed to the decommissioning method of choice as the end of Laboratory building project life is approached.

c) The final purpose of the preliminary plan is to demonstrate to regulatory agencies that important aspects of decommissioning are considered as early as possible during the initial design of the project. The plan serves as the starting point to demonstrate that areas such as decommissioning methods, costs, schedules, and operating impact on decommissioning will be reviewed and refined throughout the operating life of the Lab building project.

11.3 CONTENT OF THE PRELIMINARY

The preliminary plan provides a general description of decommissioning methods considered feasible for the Laboratory building project. The description is intended to demonstrate that the methods considered are practical and that they protect the health and safety of the public and decommissioning personnel. Design personnel should study the proposed decommissioning methods and take steps to

ensure that the design incorporates features that will facilitate decommissioning. Considerations include:

a) An estimate of manpower, materials, and costs anticipated to support decommissioning.
b) A description of the anticipated final disposition and status of the Lab building equipment and site.
c) A discussion demonstrating that adequate financing will be programmed for decommissioning.
d) Identification of records that should be maintained during construction and operation which might facilitate decommissioning, including a set of "as built" drawings.

11.4 PROJECT DECOMMISSIONING METHODOLOGY AND SCHEDULE

The OUT shall fund and implement all aspects of Project decommissioning, including but not limited to, all engineering, environmental assessment, permitting, construction, and mitigation activities associated with the removal of the structures, in accordance with this plan and mitigation of Project removal impacts on site. The project proponent shall monitor environmental impacts during and after project removal to respond to defined events during the monitoring phase.

1. Decommissioning will involve, but not limited to the specified list, because some issues or problems may surface during subsequent monitoring and audits:

    a) The buildings will continuously be rehabilitated and renovated. While doing that there will be solid wastes which will be disposed of according to the ESMP.

    b) Moreover, during decommissioning the buildings will be demolished accordingly to suit the new activity while doing that the rubble will be disposed off according to the directions of the Arusha City Council's directives.

2. Since the lab building activity is an ongoing concern the Employees will not be terminated from their employments rather will be relocated to the other area of works.

3. On decommissioning the proponent will search for experts' opinions in order to convert the entire area into another or other uses. Could be expanding the laboratory building to serve more students than the current design capacity of the project, or could be used for other communal use.

4. The restoration or convention plan for the entire premises will be made by proponent (with expertise from environmentalists and economists) and then forwarded to NEMC for approval.

5. Also, proponent Management shall obtain all permits required to undertake decommissioning of the Project. This basically will include Pension Fund, City Council etc.

Should there be no feasible option for conversion to other use of the building then the project structures will be required to be totally removed. Project removal will begin six months after closure and continue for twelve months. Within the six months from closure, proponent will carry inventory for all components that need to be removed and / or disposed of. This inventory will include building structures, equipment etc. to be demolished/dismantled. Also, mode of disposal will have to be finalized. This information will assist in the preparation of the final decommissioning plan, for approval by NEMC. After the approval of the decommissioning plan the metal parts will be removed first within the first three months (this is important to ensure that they are not vandalized). The second three months of the decommissioning will

be used to remove concrete structures and foundations. Debris will be used as road fills for rural roads. All disturbed areas will be landscaped and re-vegetated using indigenous trees.

Project decommissioning has five phases: (1) pre-removal monitoring; (2) permitting; (3) interim protective measures; (4) Project removal and associated protective actions; and (5) post-removal activities, including monitoring of environment and socio-economic activities.

The first three phases will occur prior to removal of the Project (i.e., within the first three months). The fourth phase — project removal and associated protective actions — will take place six months after closing business. The fifth phase will begin after total removal and due to nature of the project (medium scale, with relatively moderate impacts) removal and continue for at least three months.

The description that follows outlines the activities that will occur in each phase:

(1) Pre-removal monitoring: Pre-removal monitoring includes environmental and socio-economic status of the project site and the surrounding. This monitoring is essential to identify if there is any environmental or social liability which need to be settled before the permit for closure is given. This period will also be used to inventories all assets and facilities that need to be disposed of and to prepare a final decommissioning plan for approval by NEMC.

(2) Permitting: Proponent shall obtain all permits required to undertake removal of the Project. This basically will include NEMC, Arusha City Council etc.

(3) Interim Protective Actions: This will take care of any interim protective measure that needs to be implemented to protect human health and environment, if any.

(4) Project Removal: As noted above, the removal of the project will be completed within three months.

(5) Post-Removal Activities: Post-Project removal monitoring will continue for three months

The Proponent shall remove the Laboratory equipment, rubbles from demolition and ancillary structures safely and in a manner that minimizes environmental impacts e.g., dust pollution, disposal of any hazardous material, providing protective gear to decommissioning personnel etc; satisfies its obligations under the EMA Cap 191; restores the site to a condition suitable for other use; and pays all dues (government, suppliers etc.).

12 SUMMARY AND CONCLUSION

The ESIA study has scrutinized the environmental and social implications of the proposed Construction of Three Storey Science Laboratory Building at Plot No. 4/2/1, Oloresho Mtaa, Olasiti Ward In Arusha City, Arusha Region, Tanzania. The study was conducted to comply with the Environmental Management Act (2004) and was done in accordance with the EIA and Audit (amendment) Regulations, 2018 as well as World Bank Environment and Social Framework (ESF) and the project's Environmental and Social Management Framework (ESMF) respectively. Stakeholder consultations were conducted during the study to encompass central and local government authorities, communities in the project neighborhoods and interested parties. Project Stakeholder Engagement Plan was a guiding document during the stakeholders engagement. Standard methodology for impact identification was used including checklist, matrix and professional judgement.

Based on the findings, it is evident that development of the proposed three storey laboratory building will greatly contribute towards provision of quality education by the OUT to students for country socio-economic development. The Environmental and Social Impact Assessment study for the proposed project indicates that, the potential negative impacts can be easily mitigated without any major effect to the environment. However, some important resources/receptors may be affected negatively affected such as flora, fauna, the soil and water resources and air as well as local community. The impacts associated with these mostly vary from low to moderate significance and can be mitigated as shown in the Environmental and Social Management plan.

The project will be implemented within the area designated for institution/organization offices and fully owned by the Open University of Tanzania and thus no land compensation or resettlement for the project will be involved. The area is isolated from human settlements and thus with minimal impacts to social aspects. The area was subjected to agricultural activities specifically farming and grazing and thus natural vegetation of the area has long been cleared for the activities. Thus, the project will not exert significant impact as far as local ecosystem is concerned. Many people of the area are likely to benefit from the project compared to those who will be affected negatively. The benefit in terms of provision of competent personals and professionals in the labour market to address socioeconomic challenges for economic growth of the country.

The study concludes that a number of environmental impacts have been identified and assessed; none of these are considered to be that severe after mitigation as to prevent the further planning, design and construction of the proposed science laboratory building in the area. Thus, the project development in the area can be considered suitable subject to the implementation of the mitigation measures as indicated in the Environmental and Social Management Plan.

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APPENDICES

APPENDIX 1: TERMS OF REFERENCE

TERMS OF REFERENCE FOR UNDERTAKING ESIA STUDY FOR THE PROPOSED CONSTRUCTION OF THREE STOREY SCIENCE LABORATORY BUILDING AT PLOT NO. 4/2/1, OLORESHO MTAA, OLASITI WARD IN ARUSHA CITY, ARUSHA REGION, TANZANIA.

1. INTRODUCTION

1.1 Project Background

The Open University of Tanzania (OUT) is a Public Higher Learning Institution established by an Act of Parliament No. 17 of 1992. The Act became operational on 1st March, 1993 by publication of Notice No. 55 in the official gazette. The Act No.17 of 1992 was replaced by the Open University of Tanzania Charter, effectively from January 1st, 2007, which is in line with the University Act No.7 of 2005. The OUT offers its certificate, diploma, degree and postgraduate courses through the Open and Distance Learning (ODL) system which includes various means of communication such as face-to-face, broadcasting, telecasting, correspondence, seminars, e-learning as well as a blended mode which is a combination of two or more means of communication. The OUT's academic programmes are quality-assured and centrally regulated by the Tanzania Commission for Universities (TCU). It operates through 28 regional centers, and 6 coordination centers in the country as well as 62 examination centers scattered inside and outside the country.

The Open University of Tanzania as Public learning institution has received financial support from the World Bank (WB) through the Tanzania Higher Education for Economic Transformation (HEET) project (P166415) in which part of it will be used for construction of multipurpose science laboratories in seven regions of Tanzania namely Pwani, Dodoma, Mwanza, Arusha, Kigoma, Njombe and Mtwara.

The laboratories will be used as zonal science laboratories for science students, researchers, secondary schools and community in the project's priority areas. The laboratory buildings will also include ICT facility, pantry for hospitality and tourism hands-on practical's and also stores, and office for the laboratories staff. Each building will be built with partitions for six (6) laboratories in the following disciplines:-

vii) Botany and related disciplines
viii) Chemistry, environmental and related disciplines
ix) Physics, energy and related disciplines
x) Food product development and pantry for Tourism and Hospitality
xi) ICT, e-Learning, e-Teaching and data management
xii) Zoology, biotechnology and related disciplines

In Arusha Region, the laboratory building will be of three storeys that will be constructed at Plot No. 4/2/1**,** Oloresho *Mtaa*, Olasiti Ward in Arusha City. The OUT is having title deed of the three adjoining plots with a total area of 12,129 square meters.

The construction of these laboratories must abide to the Environmental Management Act of 2004 of Tanzania which requires the project developers to carry out Environmental and Social Impact Assessment prior to project implementation. The First Schedule of the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018, categorize major urban projects including multistorey buildings as type B1 project (borderline project), which may or may

not require ESIA study and upon screening the Council will guide the course of the study. Likewise the World Bank's Environmental and Social Standards requires the borrower to identify, assess and manage potential environmental and social impacts associated with the project. Thus, OUT engaged TRES Consult (T) Limited (a certified firm of environmental experts) to carry out an environmental and social impact assessment (ESIA) for the proposed multipurpose science laboratories in the project areas.

TRES Consult undertook scoping exercise that culminated into scoping report and ToR. During the study several key environmental issues were identified after site reconnaissance, holding consultations with stakeholders of the project and reviewing literatures related to the project. Based on study finding terms of reference were developed. The aim of developing the Terms of Reference (TOR) is to provide formal guidance to the project proponent and contracted Consultant for carrying out the ESIA of the proposed project on the range of issues that must be addressed in the study process. Furthermore, they form the basis for subsequent review process. In these ToR, strategies for addressing the issues identified have been incorporated to make the EIA focused.

1.2 Objectives of EIA

The objectives of the EIA as provided in Part IV of the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 are:

- To ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal;
- To protect the productivity and capacity of natural systems and ecological processes which maintain their functions
- To promote development that is sustainable and optimizes resources use and management opportunities;
- To establish and assess impacts that are likely to affect the environment before a decision is made to authorize the project;
- To propose mitigation and socio-management procedures aimed at managing the proposed mitigation of the identified potential impacts and that will form part of the overall EMP for the project operations.
- To enable information exchange, notification and consultations between stakeholders;

This requirement clearly presents a broad challenge on what type of activity that is environmentally friendly need to be dealt with the proposed project.

1.3 Environmental Assessment Requirements

The Environmental Management Act, cap 191 requires that EIA be undertaken for all new projects that may cause adverse environmental and social impacts. Under the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 the proposed project is categorized as an EIA obligatory project for which a full EIA is required.

1.4 Study Area

The proposed project site is specifically located at Plot Number 4/2/1 Mateves area of Oloresho *Mtaa*, Olasiti Ward in Arusha City, Arusha Region, Tanzania. The site is outskirt of Arusha Central Business District (CBD) area towards West Southern side and it is about 2 Kilometers south of Arusha Airport. It

is about 280 meters off the East Africa by-pass road and it is 3.5 kilometers from Kisongo junction/round-about towards Kwamrombo area/southern side. The specific coordinates of the site are 03^0 23' 13" South and 36^0 37' 30" East. The core study area includes the Oloresho area while immediate and large area are Olasiti Ward and the entire Arusha area respectively.

1.5 Environmental Impact Assessment Scope of Work

Task 1: Description of the Proposed Project

The Consultant shall give details of:

- Location of all project-related development and operation sites
- General layout of facilities - diagrams of facilities, design basis, size, sources of utilities;
- pre-construction activities and construction activities;
- Organizational relationships, mandates and interactions among the different parties to be involved in the project

Task 2: Description of the Environment

The Consultant shall:

i. Provide general description of the project environment and sources of information for anyone requiring a more extensive description (especially the ESIA reviewers).
ii. Identify those features that are particularly important in the project area –and other areas related to the project i.e. maps at appropriate scales to illustrate the surrounding areas likely to be environmentally and socially affected.
iii. Identify areas that require special attention in the project implementation.

Environmental Impact Assessment shall specifically focus on these ecological components in the environment to ensure that the proposed development does not harm the well-being or these characteristics.

Task 3: Legislative and Regulatory Considerations

The Consultant shall:
Describe pertinent local, national and international regulations and standards governing environmental quality, health and safety, land use control etc. which the project developer required to observe during the implementation of the project activities.

Task 4: Determination of Potential Impacts of the new Proposed Project Component

Under this activity the consultant shall:

i. identify issues and concerns in order to find suitable remedies;
ii. identify linkages among project components and the issues;
iii. identify where project activities or elements interact with social and biophysical environment (direct impacts):
iv. identify indirect impacts of the project on the environment;
v. identify cumulative impacts that may be anticipated;
vi. identify residual impacts if any;
vii. predict probability, magnitude, distribution and timing of expected impacts:
viii. for certain project components it might be necessary to carry out assessment at two or more sites (alternatives) in order to come out with the best option; and

ix. Forecast what will happen to the affected environmental components if the project is implemented as is or if the alternatives (e.g. sites and routes) are chosen.

Task 5: Estimation of the significance of the impacts

The consultant shall:

i. determine which environmental components are mostly affected by the project or its alternatives;
ii. list issues raised by the public and classify them according the level and frequency of concern whenever possible;
iii. list regulatory standards, guidelines etc. that need to be met; and
iv. Rank predicted impacts in order of priority for avoidance, mitigation, compensation and monitoring.

Task 6: Development of Management Plan to Mitigate Negative Impacts and develop a monitoring plan

The consultant shall:

i. determine appropriate measures to avoid or mitigate undesirable impacts;
ii. assess and describe the anticipated effectiveness of proposed measures;
iii. ascertain regulatory requirements and expected performance standards;
iv. determine and assess methods to monitor impacts for prediction accuracy remedial measures for effectiveness;
v. determine and assess methods to monitor for early warning of unexpected effects;
vi. re-assess project plans, design and project management structure;
vii. describe follow-up scheme and post-project action plan for achieving EIA objectives; and
viii. Assess the level of financial commitment by the project proponent for the management and monitoring plan, and follow up activities.

The consultant shall be guided by the cost-effectiveness principles in proposing amelioration measures. Estimation of costs of those measures shall be made. The assessment will provide a detailed plan to monitor the implementation of the mitigation measures and impacts of the project during construction and operation.

Task 7: Institutional set-up for

The Consultant shall review the institutional set-up - community, ward, District/ Regional and national levels - for implementation of the Management and Monitoring Plans recommended in the environmental assessment. The assessment shall identify who should be responsible for what and when.

Task 8: Drawing Recommendations

The consultant shall:

i. highlight key concerns and considerations associated with the acceptance and implementation of recommended actions;
ii. determine resources requirements for implementing recommendations;
iii. determine capacity and resourcefulness of the client to meeting such commitment;
iv. explain rationale for proposed development and benefits and costs vis-à-vis the no-project option;
v. Ascertain degree of public acceptance of or reaction to recommendations.

Task 9: Environmental Impact Statement (EIS)

The assessment shall result into an EIS focusing on findings of the assessment, conclusions and recommended actions, supported by summaries of data collected etc. This shall be a concise document limited to significant environmental issues. The report format will be as per Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018.

Task 10: Review

The review report from NEMC may require further input (data collection, consultation inputs etc.). The consultant shall undertake to provide extra information and inputs until the project review is satisfactorily concluded.

Task 11: Public involvement

The assessment shall establish the level of consultation of the affected stakeholders before designing the project, level of involvement in the running and maintenance of the project facilities as this is an important aspect for both environmental and project sustainability. The assessment will provide a framework:

- For co-ordinating the environmental impact assessment with other government agencies, and
- For obtaining the views of affected groups, and in keeping records of meeting and other activities, communications, and comments and their disposition.

A people's participation report will be prepared as part of the ESIA i.e. apart from the socio- economic and cultural impact report (which basically are dealing with consultants' perception and interpretation of issues). Consultations with various stakeholders have been conducted during the scoping and further consultation will be conducted during the EIA study.

1.6 Time Scale

It is expected that the study would be completed within a period of two months.

1.7 Personnel Requirement

The consultants shall deploy consultants/experts with the demonstrable practical experience in conducing ESIA studies. Specific experience/competence in environmental assessment and management, sociology and GBV aspects management, and civil /environmental engineering, will be engaged.

1.8 Reporting and Report Presentation

The draft of the EIA document submitted to Council should be concise, following the report writing guidelines in the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 for simplifying the review process.

1.9 Record of Meetings

The consultants shall provide record of the names of organizations, government and departments and individuals whose views will be obtained. The record will also provide description of views and information that will be obtained.

1.10 Outputs

The consultant shall submit to the Client, 3 original bound hard copies and electronic format of the Scoping Report and the Environmental Impact Statement (EIS). The Consultant shall also make 15 copies for the review process as stipulated in the EMA 2004.

1.11 Reference

The consultant shall provide a list of all information sources used, including unpublished documents and sources.

1.12 PROPOSED TEAM OF CONSULTANTS

Abel Noah Sikaona

Mr. Abel Sikaona is a Tanzanian Environmental Scientist, Registered and Certified as Environmental and Social Impact Assessment expert and Environmental and Social Audit expert with the National Environmental Management Council {Council} of Tanzania. He has 15 years of experience in the environmental and social consultancies. Before becoming a consultant, he worked with the Council for four years as Senior Environmental Management Officer, and served as a Programme Officer for one year with AGENDA for Environment and Sustainable Development, NGO. Mr. Sikaona has training and experience in Environmental and Social Assessments [i.e. ESIA, Environmental and Social Monitoring and Environmental and Social Auditing]; Environmental Management System (EMS); Cleaner production; Biodiversity Conservation; and Ecosystem management. He is also having a good knowledge and experience on Water Resources Assessments and Management. Mr. Sikaona has been engaged in a number of environmental and social consultancies and researches within and outside the country some of which being donor funded projects. Notably he has worked on a number of World Bank, IFC and MCC-funded projects. As such, he is familiar with World Bank and IFC, MCC safeguards as they apply to projects in Tanzania as well as with the requirements of applicable Tanzanian law and regulations. Mr. Sikaona holds Masters in Integrated Water Resources Management, and BSc. Environmental Sciences and Management. Additionally, he has undertaken a number of courses relevant to the field of his specialization within and outside the country. He is registered with Rural Energy Agency (REA) as individual consultant for Energy related projects. He is a members to Environmental Experts Advisory committee under the Council (NEMC).

Bashiru Abdul Hassani

Mr. Bashiru Abdul Hassani is an Environmental Impact Assessment and Environmental Audit Expert, dully registered and certified with the National Environment Management Council of Tanzania (NEMC). Mr. Hassani is a management consultant specializing in issues of sustainable development, including natural resources and environmental management/conservation, people's participation, environmental impact assessment (EIA), environmental audit (EA), strategic environmental assessment (SEA), social assessment, pesticide use impact assessment, and civil society development. He also has sufficient background both in terms of education and experience in resettlement action plan development, communication and awareness creation activities, participatory project design, planning, monitoring and evaluation. Mr. Hassani has over 20 years' experience working with reputable NGOs (AGENDA) and private consulting firms, and recently has been involved in a number of assignments related to government, private firms and NGOs.

Sam R. Shemsanga

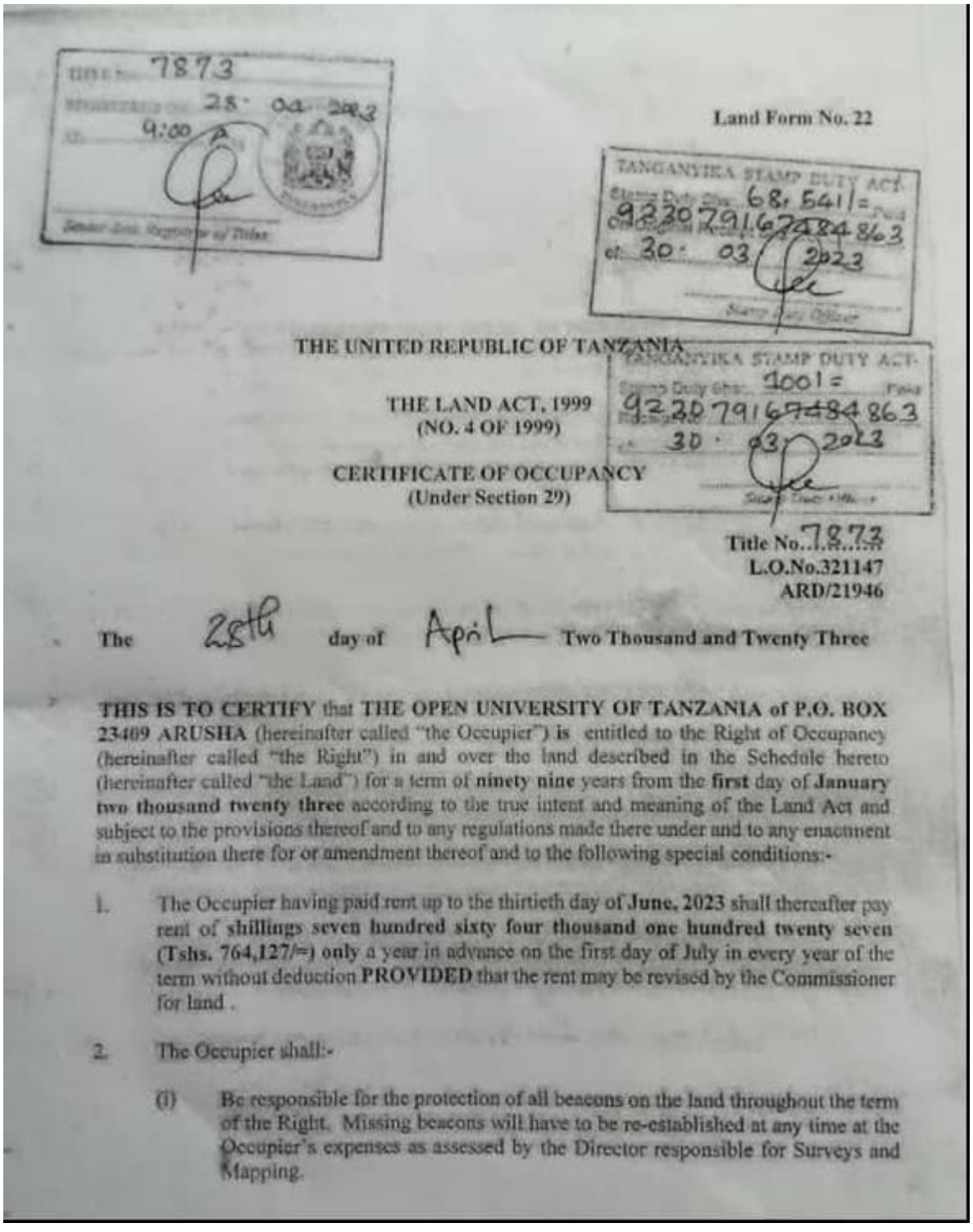
Mr. Sam Shemsanga is a registered consulting engineer by Engineers Registration Board (CE302) and certified EIA Expert by National Environmental Management Council (NEMC) holding MSc. In Water Resources Management and BSc. Environmental Engineering. He has more than 16 years of working experience. Has wide experience in preliminary survey, concept designs & reports in water supply and

wastewater, storm water drainage and solid waste management sectors. His professional experience covers project planning and designing, project management consultancy for collection, conveyance / transportation, treatment & distribution for rural and urban drinking water supply, treatment and disposal system for waste water and solid waste management, socio-economic and environmental studies, urban and rural sanitation.

Sesilia Jeremia

Ms. Sesilia Jeremia is a Sociologist hold a Master's Degree in Master of Community Economic Development and Bachelors of Art Majoring in Sociology. She is a social Economist/Community Development and Gender Specialist with more than 10 years' professional experience in different projects. She has worked with different Local and International Consulting firms in Tanzania performing the roles of Socio-economic themes. She has been involved in a number of activities ranging from value chain development, management of donor funded projects, monitoring and evaluating donor projects, systems development support to unlock farmers' constraints in accessing productive assets and services, advocacy and policy support to enhance value chain growth. She has participated in Environmental Impact Assessment, Social Impact Assessment, Environmental Auditing teams on different Sector projects in Tanzania. Ms. Jeremia do have an experience working with World Bank funded projects as gender expert and also have an experience in facilitating training workshops and seminars as well as working with communities in the remote areas.

APPENDIX 2: CERTIFICATE OF OCCUPACY



Land Form No. 22

THE UNITED REPUBLIC OF TANZANIA

THE LAND ACT, 1999
(NO. 4 OF 1999)

CERTIFICATE OF OCCUPANCY
(Under Section 29)

Title No. 7873
L.O.No.321147
ARD/21946

The 28th day of April Two Thousand and Twenty Three

THIS IS TO CERTIFY that **THE OPEN UNIVERSITY OF TANZANIA of P.O. BOX 23409 ARUSHA** (hereinafter called "the Occupier") **is** entitled to the Right of Occupancy (hereinafter called "the Right") in and over the land described in the Schedule hereto (hereinafter called "the Land") for a term of **ninety nine** years from the **first** day of **January two thousand twenty three** according to the true intent and meaning of the Land Act and subject to the provisions thereof and to any regulations made there under and to any enactment in substitution there for or amendment thereof and to the following special conditions:-

1. The Occupier having paid rent up to the thirtieth day of **June, 2023** shall thereafter pay rent of **shillings seven hundred sixty four thousand one hundred twenty seven (Tshs. 764,127/=) only** a year in advance on the first day of July in every year of the term without deduction **PROVIDED** that the rent may be revised by the Commissioner for land .

2. The Occupier shall:-

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

(ii) Do everything necessary to preserve the environment and protect the soil and prevent soil erosion on the land and do all things which may be required by the authorities responsible for environment and to achieve such objective.

(iii) Erect on land Buildings in permanent materials designed for use in accordance with the conditions of the right and which conform to the building line (if any) decided by the **Arusha City Council** (hereinafter called "**the Authority**")

(iv) Submit to the Authority building plans within Six months from the date of commencement of the **Right**

(v) Begin building construction within six months after the approval of the building plans by the Authority.

(vi) Complete the building construction within Thirty Six months from the date of commencement of the **Right.**

3. **USER:** The land shall be used for **Office use only. Use Group 'G' use Class (b)** as defined in the Town and Country Planning (Use Classes) Regulations, **2018.**

4. The Occupiers shall not assign the Right within three years of the date hereof without the prior approval of the Commissioner.

5. The Occupiers shall deliver to the Commissioner notification of disposition in prescribed form before or at the time the disposition is carried out together with the payment of all premier, taxes and dues prescribed in connection with that disposition.

6. The President may revoke the right for good cause and in public interest.

SCHEDULE

ALL that Land known as **Plot No. 4/2/1** situated at **Mateves** area in **Arusha City** containing **twelve thousand one hundred twenty nine (12,129) square metres** shown for identification only edged **red** on the plan attached to this Certificate and defined on the **registered survey plan numbered 173152** deposited at the Office of the Director for Surveys and Mapping at Dodoma.

Given under my hand and my official seal the day and year first above written.

ASSISTANT COMMISSIONER FOR LANDS

We, the within name **THE OPEN UNIVERSITY OF TANZANIA hereby** accept the terms and conditions contained in the foregoing Certificate of Occupancy.

SEALED with the **COMMON SEAL** of the said **THE OPEN UNIVERSITY OF TANZANIA and DELIVERED** in our presence of us this 22nd day of March 2023.

Name PROF ELIFAS TOZO BISANDA
Signature
Postal Address P.O. BOX 23409 DAR ES SALAAM
Qualification: VICE CHANCELLOR

Name DR. NASSUFE MSOFE
Signature
Postal Address P.O. BOX 19 ARUSHA
Qualification: DIRECTOR REGIONAL CENTER

APPENDIX 3: DETAILED STAKEHOLDERS VIEWS AND CONCERS

The team of TRES consultants undertook stakeholder's consultation to ensure key project stakeholders are fully involved with the project. The TRES Team was accompanied by Open University senior officials namely Dr. Pamela Semiono, Dr. Nelly Moshi from Head quarter and Samwel Savuno (the regional Director). The stakeholders consulted include: - Arusha City Council- City Director's office, Occupation Safety and Health Authority (OSHA), Government Chemist Laboratory Authority (GCLA), Arusha Urban Water supply and Sanitation Authority (AUWSA), Orasiti Ward office, Oloresho Mtaa office, and neighbors of the project site to include Arusha Girls High school, Peace Houses High School, Tumbili Safari lodge, as well as staffs of Open University of Tanzania in Arusha. Below are the views and concerns from the consulted stakeholders; -

Arusha City Council, City Director's Office

The team of TRES consultants visited Arusha City Council and held discussion with Mr. Community Development officer and City Environment Management officer. The following were the views and concerns from the officers on the project;-

i. Project proponent should have proper solid waste management system including waste sorting on site and those considered to be general wastes to be hauled to authorized dumpsite by the authorized contractors.
ii. Care should be taken on handling of chemicals for use in the laboratory as well as its resultant chemicals wastes. Hazardous wastes especially waste chemicals from laboratory should be well managed at site and handled by authorized hazardous waste dealers for their disposal;
iii. It is important for land ownership issues to be well cleared for smooth approval process in the course of the ESIA study. Likewise, land use of the area should be compatible with the proposed development.
iv. There should be effective stakeholders engagement at local level to include meeting and there should be minutes from the meeting as evidence for the engagement.
v. The officer were not certain if the area is served with public sewer system or not and thus advised to engage with the AUWSA for more information on the sewerage coverage in the area.

Olasiti Ward and Oloresho Mtaa

The team of consultant convened a meeting at the Oleresho *Mtaa* with the community members of the Mtaa where the project is administratively located. The meeting was also attended by the Ward Leaders to include the Ward Councillor and Acting Ward Exective Officer who also is the Mtaa Executive Officer of the Oloresho Mtaa. The following were views and concerns from the meeting;-

i. The members acknowledged the government efforts toward development of the proposed construction of laboratory buildings in the area and thus were in support of the project in the area.

ii. Also members were positive on project with expectations of opportunities that will come along with the project to include employment opportunities. It was advised for the proponent to give priority to the locals on the job opportunities instead of sourcing far from the area.
iii. Further, members noted that there will be influx of people during examination period that will create a demand for lodging and renting and thus this will be opportunity for provision of the needed service(s).
iv. Others noted that it will be an opportunity for our science pupils and students for getting the laboratory services from surrounding schools.
v. Members also noted that the Oloresho Mtaa and general Olasiti area will be known and recognized by having open university.
vi. Also it was noted that Oloresho Mtaa does not have health facility and hence requested for Open University to consider build a dispensary or health center for the community of the area. This was taken for subsequent forwarding to the higher Authorities for considerations.
vii. There should be cooperation between the project and the local leaders to ensure the project is well implemented. Also it was advised for the contractor to be engaged for construction to inform the respective Ward and Mtaa office prior to commencement of the project construction.
viii. The leaders guaranteed a support for the for the project to ensure it is well executed in the area.

Occupation Safety and Health Authority (OSHA)- Northern Zone office

The team of TRES consultants consulted Occupation Safety and Health Authority (OSHA) specifically on the occupation health and safety aspects at the work place of which the Authority is dealing with. The team held discussion with OHS inspector. The officer had the following views on the proposed project; -

i. OSHA have online system for registration of the project/workplace (i.e. WIMS – workplace information management system) on which the contractor or proponent is required to register the workplace online.
ii. During project construction phase, the contractor and or/proponent is required to adhere to all OSHA requirement as indicated in the Occupational Health and Safety Act, 2003 (Act No. 5/2003);
iii. Inspector from OSHA shall visit the workplace for the purpose of inspection to include general environment, hygiene and electrical system inspections;
iv. The project contractor and or workplace need to have appointed designated safety representative and First Aider among the workers and ensure they attend OHS training at OSHA;
v. The project Proponent and or contractor should provide the First Aid kit with full equipped at workplace during construction and operation phase;
vi. Safety Committee should be formed by contractor and to be headed by SHE representative that will describe and discuss all safety issues related to project and make follow-up during project implementation;
vii. There should be a safety file for filling all safety minutes for meeting that has been held, letters and action taken to minimize or mitigate the hazardous and accident risks;

viii. The contractor is required to undertake a risks assessment of the project activities before commencement ;
ix. The contractor should prepare Occupation and Health Safety (OHS) policy in both English and Swahili languages and should be displayed at workplace;
x. The contractor should provide appropriate Personal Protective Equipment (PPE) to all workers and enforce the use of PPE during project implementation;
xi. The contractor and or proponent should conduct medical examination for workers during pre-employment and during employment period once per year and post-employment;
xii. Provide clean and safe drinking water to staff for free and ensure there is conducive sanitary facility such as changing room for workers; and
xiii. The contractor is required to report any accidents that occurred at the workplace during project construction.

Government Chemist Laboratory Authority (GCLA)-Northern Zone office

The team of consultants visited the Government Chemist Laboratory Authority-Northern Zonal office in Arusha region. The team held discussion with the Zonal Manager who had the following views on the proposed project;-

i. The manager advised for the laboratory building to have a separate system of sewage and those of chemical effluents from the laboratory.
ii. The manager also advised for treatment of chemical effluent before disposal to the open environment of which a common treatment method is pH neutralization.
iii. It was also advised for the chemical laboratory to be equipped with fume hood built-in with scrubber which is acid and organic resistant to withstand the acid and organic fumes from the lab operations. The fume hood will avoid air pollution from chemical fumes.
iv. The officer recommended the designs should consist of the Chemicals storage room, gas storage should be outside the lab, extraction area and adherence to the lab ventilation required standards. Additionally, wind direction should be taken into consideration;
v. The laboratories have to be equipped with appropriate warning signs symbols and labels.
vi. The chief Chemist is the registrar of all laboratories in the country and thus the Proponent should register the laboratory with the GCLA. Likewise as a chemicals user is required to be be registered by the GCLA.

Arusha Urban Water Supply And Sanitation Authority (AUWSA) Office

The AUWSA Office was consulted by the team of consultants. The discussion was held with on of the Engineers of AUWSA. The following were response and views of the engineer on the project; -

i. There is AUWSA water supply network in the project area and hence the project will be able to be connected to the network.
ii. There is no public sewer network in the area earmarked for the proposed project. The Nearby area where the sewer network has reached is A1 – Hotel which is about 800 meters on the eastern side. Further, the officer noted that there is no plan in place for extending the network to the project area.

Arusha Girls High School

The team of consultants consulted Arusha Girls High School as one of the neighbor of the site. Discussion was held with the Headmistress. The Headmistress had no objection on the development of the project in the area. Likewise had no any issue to comment on the project.

Peace House High School

The team of consultants also consulted Peace House High school which is nearby development on south western side about 600 meters. The discussion was held with the acting Head Master. The following were views on the proposed project;

i. The project will bring the open university services closer to us and thus will be an opportunity for members of staffs (i.e. teachers) to join for further studies.
ii. It is a right place for development of the project as the area has important public infrastructures to include road, electricity and water supply. The only challenge is poor network for mobile phones.
iii. The project during construction should control excessive noise emission (noise pollution) that might bring disturbance to the neighboring schools of the project area.
iv. The project area is not flooded and there are storm water drainage along th roads of the area and thus measures to direct the storm water to these drainage channels should be done.

Tumbili Safari Lodge-Arusha

The team of consultants visited Tumbili safari Lodge which is nearby development on the south eastern side (about 500 meters) of the project site. The team held a discussion with Lodge Manager, who noted that the site is relatively far and thus do not expect any challenge from construction activities rather expects contractors crew to be among of the guests at the lodge. Further, she expects local community to have opportunity to work on the project and hence positive aspects to the locals.

Staff of Open University of Tanzania-Arusha Centre

The team consulted the staffs of Open University of Tanzania-Arusha Centre office as the main users of the proposed building project. The following are views from the staffs;-

i. Among of the staffs advised for consideration of the herbarium room as part of biology laboratory to store plant samples for research and learning purposes during project operation.
ii. It was recommended for the installation of a well contained automatic standby generator which will be used during power outrage;
iii. There should be well designed waste management facilities especially for the effluents from laboratories with chemical contents to safeguards the surrounding environment.
iv. The staffs also advised for the consideration of supporting facilities like concrete fence and parking space.

APPENDIX 4: AIR QULITY, NOISE AND VIBRATION BASELINE DATA

Appendix 4.1: Average ambient particulate matter in mg/m³

Station	Location	Coordinates	TSP	PM_{10}	$PM_{2.5}$
1	Northern Border	3°23'12.72"S 36°37'32.95"E	0.006	0.004	0.002
2	Western Border	3°23'13.61"S 36°37'36.04"E	0.011	0.007	0.003
3	Eastern Border	3°23'14.53"S 36°37'31.03"E	0.010	0.006	0.003
4	Southern Border	3°23'16.32"S 36°37'31.93"E	0.008	0.005	0.003
Local Standard – TBS, 2019, Air Quality Specification			**0.5**	**0.15**	**0.075**
WHO/IFC (2007) and WB AQG 2006			**0.23**	**0.05**	**0.025**

Appendix 4.2: Average ambient pollutant gases

Station	Location and coordinates	CO	NO_2	NO_X	SO_2	VOC	H_2S
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³
1	Northern Border 3°23'12.72"S 36°37'32.95"E	2.03	0.029	0.037	0.01	5.2	0.012
2	Western Border 3°23'13.61"S 36°37'36.04"E	2.50	0.025	0.031	0.02	5.0	0.019
3	Eastern Border 3°23'14.53"S 36°37'31.03"E	2.25	0.030	0.039	0.01	5.4	0.004
4	Southern Border 3°23'16.32"S 36°37'31.93"E	2.09	0.019	0.027	0.01	5.2	0.010
Local Standard – TBS, 2019, Air Quality Specification		**10**	**0.12**	**0.12**	**0.5**	**-**	**-**
WHO/IFC (2007) and WB AQG 2006		**30**	**0.2**	**0.2**	**0.5**	**-**	**0.1**

Appendix 4.3: Average noise levels

Station	Location	Coordinates	Daytime Noise in (dBA)
1	Northern Border	3°23'12.72"S 36°37'32.95"E	45.13
2	Western Border	3°23'13.61"S 36°37'36.04"E	52.73
3	Eastern Border	3°23'14.53"S 36°37'31.03"E	52.90
4	Southern Border	3°23'16.32"S 36°37'31.93"E	56.27
TBS-NES Limits			**<60**
WB/IFC Guideline			**<70**

Appendix 4.4: Average vibration (in mm/s PPV)

Station	Location	Coordinates	(mm/s)
1	Northern Border	3°23'12.72"S 36°37'32.95"E	0.005
2	Western Border	3°23'13.61"S 36°37'36.04"E	0.004
3	Eastern Border	3°23'14.53"S 36°37'31.03"E	0.003
4	Southern Border	3°23'16.32"S 36°37'31.93"E	0.005
OSH (Working Envt) Regulations, 2016			**5**

Sampling date: October, 2023 Source: Field measurements