Environmental and Social Impact Assessment (ESIA) for the Proposed Construction of Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania

PROPONENT

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EXECUTIVE SUMMARY

Introduction

The Open University of Tanzania (OUT) is a fully fledged, autonomous and accredited public University, established by an Act of Parliament Number 17 of 1992. The Act became operational on 1st March 1993 by the publication of Government Notice No. 55 in the Official Gazette. The first Chancellor was officially installed in a full ceremony on 19th January 1994 and the first batch of students was admitted in January 1994. In January 2007, following enactment of the Universities Act No. 7 of 2005, OUT started using the OUT Charter and Rules (2007) for its operations. The Open University of Tanzania offers its certificate, diploma, degree and postgraduate courses through the open and distance learning 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).

OUT Headquarters are temporarily located off-Kawawa Road in Kinondoni Municipality, Dar es Salaam. The permanent headquarters are under constructions at Bungo in Kibaha District, off-Soga Road, about 4.0 Km from the main Morogoro highway in Coast Region. OUT operates through a network of about 30 Regional Centres; 10 Coordinating Centres, of which one is in Zanzibar and one in Pemba; two are in Kenya (Egerton and Njoro), one is in Rwanda (Kibungo), one in Namibia and one in Uganda. Other OUT Internal Coordination Centres are the African Council for Distance Education – Technical Collaboration Committee (ACDE TCC), the Centre for Economics and Community Economic Development (CECED) and the SADC Centre of Specialization in Teacher Education (SADC ODL CoS TE). OUT has also 69 Study Centres spread throughout the United Republic of Tanzania. The Open University of Tanzania offers its certificates, ordinary diplomas, degrees, postgraduate diplomas and PhDs through its five Faculties and two Institutes - Faculty of Arts and Social Sciences, Faculty of Business Management, Faculty of Education, Faculty of Law, Faculty of Science, Technology and Environmental Studies, Institute of Educational and Management Technologies and Institute of Continuing Education.

The OUT as public learning institution has received financial support from the World Bank (WB) through the Tanzania Higher Education for Economic Transformation (HEET) project in which part of it will be used for construction of multipurpose science laboratories in seven regions of Tanzania. The HEET is a five-year project, which is financed by the World Bank through the Ministry of Education, Science and Technology (MoEST). HEET project aims at promoting higher education as a catalytic force for the new industrial based economy of Tanzania. Thus, the project is designed to revitalize and expand the capacity of universities to contribute to key areas for innovation, economic development, and labour market relevance, by investing in requisite infrastructure for modern and effective teaching and research.

The OUT is intending to use part of HEET project fund to construct a Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania. The plot area which is the proposed project site, measures Forty-One decimal point three eight four (41.384) hectares and the proposed three Storey (Ground + 2) laboratory building will use only 2,000 m^2. The building also will have 51 total parking bays for the users and visitors. Other associated facilities to support the project are retaining wall, concrete paving blocks, security guard post, changing room, water storage tank with a pumping system, toilets, solid waste collection area, waste water drainage system, fire system and utilities network. The building shall be built to the highest acceptable standards using the best available environmentally friendly materials and offering a comfortable and high-quality laboratory and teaching space. The proposed project will have an investment cost of TZS. 1,826,348,062.50 to cover all project components.

The OUT would like to ensure that the development and operation of the proposed Three Storey Science Laboratory Building project do not jeopardize the integrity of the environment in the area. Thus, the OUT undertook the Environmental and Social Impact Assessment (ESIA) study for the proposed project. This is also in line with the Environmental Management Act, cap 191 and the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 which requires that ESIA should be undertaken before commencement of any project/activity which may have environmental impacts on human and the environment. Also, the World Bank Environmental and Social Frameworks (ESF) and Standards (ESSs) require project developers to carry out an Environmental and Social Impact Assessment (ESIA) prior to project implementation. In view of the above, OUT therefore commissioned TRES Consult (T) Limited of Dar es Salaam (Registered Environmental Consultancy Firm) to carry out the Environmental and Social Impact Assessment (ESIA), for the proposed project.

In fulfilment of the above, the consultants as a first step of the ESIA process prepared EIA application documents. The documents included the project Registration Form, Scoping Report and Terms of Reference (TOR) which were submitted to the National Environment Management Council (NEMC). The scoping report and ToRs were approved by the NEMC through the letter dated 15th December 2023 with Reference Number HG. 145/208/38/02. The ToR was also approved by World bank and used to provide guidance under which this Environmental Impact Assessments were done. Therefore, 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.

Project description

The laboratory will be used as zonal science laboratory for science students, researchers, secondary schools and community in the project's area. The project components will cover; - Zoology Laboratory, Food science laboratory, Chemistry Laboratory and Preparation rooms and technical offices for each laboratory on the ground floor. The first floor will comprise the ICT Multimedia state of the art laboratory and Modern conference facilities. Second floor will comprise DRC and staff offices, Min library and Multipurpose/Examination Halls. The building also will have 51 total parking bays for the users and visitors. Other associated facilities to support the project are retaining wall, concrete paving blocks, security guard post, changing room, water storage tank with a pumping system, toilets, solid waste collection area, waste water drainage system, fire system and utilities network. The building shall be built to the highest acceptable standards using the best available environmentally friendly materials and offering a comfortable and high-quality laboratory and teaching space.

The building shall be built to the highest acceptable standards using the best available environmentally friendly materials and offering a comfortable and high-quality laboratory and teaching space. The project site is already connected to TANESCO power supply and thus upgrading of the same shall be considered for the project. There is existing public water supply pipeline at the project site that shall be considered for connection. Currently, there is no centralised sewer system within the project site as such the septic tank and soak away system will be used. The solid waste will be collected in waste bins from the laboratory and thereafter to the centralized transfer station (waste collection area) from where Authorized agent will be collecting the wastes to the to the designated Town Council's dumping site.

Project location

The proposed project will be located at the Open University of Tanzania Pwani Regional Centre, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania. The specific coordinates of the site are 06°46´58.36´´S and longitude 38°55´25.18´´E having elevation of 534 ft AMSL. Administratively the

project is located within the boundaries of the Pwani Region, Kibaha Town Council, Mkuza Ward, Bungo Mtaa. The Kibaha Town Council is among the 7 Councils of the Coast Region. It is located 40km away from Dar es Salaam City. It is bordered by Kinondoni District to the East, Bagamoyo to the North, Kisarawe South and the Small Town of Mlandizi North. The Council has an estimated area of 750 square Kilometers and lies between latitude 6.8° South and longitude 38.2° and 38.5° East. The Council has 14 Wards, which are Tumbi, Mailimoja, Kibaha, Visiga, Mkuza, Kongowe, Misugusugu, Viziwaziwa, Picha ya Ndege, Pangani, Mbwawa and 62 Mitaa.

The project site area is reached by the Dar es Salaam - Chalinze highway. Key landmarks on the highway after the Kibaha Picha ya Ndege is the GBP Service Station to the right before reaching the Tanita Bus stop. The site is about 3.2 kilometre from the main road and easily accessed by the Soga Pwani earth roads which is in good condition. Also, the project site is directly linked with Bagamoyo Town by seasonal road, while connection to other District Headquarters such as Kisarawe, Mkuranaa, Kilindoni (Mafia) and Utete (Rufiji) area accessible through Dar es Salaam City. All of these roads are passable throughout the year, though during the rainy season, some spots can be rough in the Chalinze - road, despite the regular maintenances conducted along it. This ESIA considers that the environmental and socio-economic influence of the project is anticipated to extend beyond the scope of the project area. The area of influence is a wider area than the project area. For example, dust pollution or employment opportunities could have a wider impact on the Pwani Region.

Policy, legal and institutional framework

There are several policies, laws and regulations that require the project proponent to undertake an ESIA. The proposed project should comply with these policies, laws and regulations. The most relevant national policies and strategies include: the National Environmental Policy, 2021; the Land Policy (1995); the Water Policy (2002); the National Construction Policy (2003); the National Employment Policy (2008); the National Human Settlements Development Policy (2000); the Energy Policy of Tanzania (2015); the National Investment Promotion Policy (1996); the National Health Policy (2017); the National Policy on HIV/AIDS (2001); the National Women and Gender Development Policy (2000); the Tanzania Education and Training Policy, (2014); the Urban Planning and Space Standards Policy (2012). To guide national development more effectively and systematically, Tanzania has prepared many strategies aiming at operationalizing the various policies in key sectors. Some of the strategies that have a bearing on the proposed project are: the Tanzania Development Vision 2025; the Third National Five-Year Development Plan (FYDP III; 2021/22 – 2025/26) and the National Plan of Action to End Violence Against Women and Children (NPA-VAWC) 2017/18-2021/22.

The main legislation with a bearing to this project include the Environmental Management Act, Cap 191; the Open University of Tanzania Act, [Cap. 268 R.E 2019]; the Land Act, [Cap. 113 R.E 2019]; the Occupation Health and Safety Act, 2003 (Act No. 5/2003); the Local Government (Urban Authorities) Acts, [Cap. 288 R.E 2019]; the Water Resource Management Act, 2009 (Act No. 12/2009); the Workers Compensation Act, 2015; the Land Use Planning Act No.6 of 2007; the Urban Planning Act No. 8 of 2007; the Contractors Registration (Amendments) Act No. 15 of 2008; the Engineers Registration Act No. 15 of 1997 and its Amendments of 2007; the Public Health Act, 2008; the HIV and AIDS (Prevention and Control) Act, 2008; the Fire and Rescue Service Act No. 14 of 2007; the Water Supply and Sanitation Act of 2009; the Persons with Disability Act, 2010; the Child Act of 2009; the Antiquities Principal Act, 1964 and (Amendment 1979) and the Architects and Quantity Surveyors Act No. 16 of 1997 R.E. 2019.

Furthermore, this ESIA study has also complied with the following tools: World Bank's new Environmental and Social Framework (ESF); the World Bank Environmental and Social Safeguarding Policy for Investment; World Bank relevant Environmental and Social Standards. This ESIA study has applied 6

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; Land Acquisition, Restrictions on Land Use and Involuntary Resettlement (ESS5); and ESS10 - Stakeholder Engagement and Information Disclosure.

Baseline conditions

The proposed project will be situated within the larger part of the OUT Pwani Regional Centre. Typically, the general project area has a slightly even topography. The quick topographical survey indicated that the land is conducive for the proposed science laboratory building with an average of a 1.1% fall from the East-West corner to the North-Southern corner. There are no rivers in the vicinity of the project area. Drainage follows the slope and runs from North to southern side towards the Ngerengere River which is located about 2 kilometres on the Southern side. The Ngerengere Rivers joins the Mpigi river which drains to the Indian Ocean. Reference from the drilled borehole on site, the water table in the area is about 60m below the earth surface. Due to that it is not expected the ground water level to rise to near ground surface during heavy rain. The soils are typical of the coastal area i.e., sandy with moderate drainage. Topsoil in the project area is characterized by well graded (non-cohesive) silty sand (SW) with good drainage properties up to a depth of 4m. The top thin layer is white sand and little amounts of organic matter (litter/ humus).

The lower strata are brown loamy soils well drained that support growth of vegetation. Though flat, the site is not subject to seasonal water logging because of slope which has been directed to the lower areas. There are no signs of soil erosion. Vegetation cover within the project area is woodland savannah, which is typical of coastal area of Tanzania. The vegetation in the core project site is very little and not natural as the site is already been cleared for other OUT activities. The area previously was used as vehicle parking area especially during the graduation ceremony. The area is covered with short grasses and bushes of small trees to an extent that it becomes very difficult for a person to get a good shed during sunny days. Most of the vegetation in this site for a long time has been affected by anthropogenic activities such as bush fire, slashing and graduation ceremonies.

Stakeholder Engagement

Stakeholder consultations were carried out, including interviews and meetings with officials from national and local government departments, as well as local communities in the Project area. Local organisations representing the council, ward and Mtaa representative in the project area, as well as institutions representing environmentally sensitive areas in the vicinity of the Project, were also engaged in the study. To cover a wider spectrum of stakeholders, public notices were posted in strategic area, soliciting comments on Project issues, concerns and public views. Consultation with stakeholders indicated that they generally view the proposed project as a positive venture that will open up new fields of employment and enhance increase income for several individuals and households. This will stimulate socioeconomic activities and economic development in the area. Concerns and questions raided by stakeholders have been documented and addressed in the ESIA report.

Environmental Impact Assessment

The TOR for the ESIA was approved by NEMC on 15th December 2023. As part of the review, NEMC requested inclusion of several topics in the EIA. These are noted, along with the location in the report where the topic is addressed, in Table E 1.1. The ESIA assessed the potential environmental and social impacts of the proposed Construction of Three Storey Science Laboratory Building. The study was conducted to comply with the Environmental Management Act, cap 191 and in accordance with the

requirement of the Environmental Impact Assessment and Audit Regulations, 2005 as amended in 2018. Further World Bank Environment and Social Framework (ESF) and the project's Environmental and Social Management Framework (ESMF) were observed in the study. A standard methodology for impact identification was used to define the scope for the analysis, including a checklist/matrix approach, stakeholder input and professional judgement.

The analysis found that the proposed Project will directly increase income to local communities from employment opportunities, increase of admission of Students to OUT and increase of revenue to the Open University of Tanzania. Potential negative impacts identified by the ESIA include temporary disturbance to the local environment, other users of the Kibaha Centre in the immediate vicinity of the project. Project construction has a relatively short duration (approximately 1 month for the construction and installation works) and a limited impact footprint. The Project is expected to have moderate to low significant impacts during the operation phase. None of these impacts identified during operations considered severe after mitigation. With mitigation measures, all negative impacts identified in the ESIA are expected to have a residual significance rating of minor or lower (Table E1).

Table E1: Summary of impacts

NEGATIVE ENVIRONMENTAL IMPACT DURING PREPARATION / MOBILIZATION PHASE	
Loss of vegetation	The contractor and OUT shall ensure that clearance of the site for construction purposes shall be kept to a minimum and areas that will not be impacted by the project shall not be disturbed. The Contractor shall clearly mark out the extent of clearing within the approved work-site and instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas.
Depletion / degradation at points of source of construction materials	Exploitation of construction materials will be from the authorized source only. These authorized dealers should have the Mining license from the Ministry of Energy and Minerals. Restoration of the borrow pits/quarries after use constituting levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (natural resources department) and local environmental NGOs.
Noise pollution	All plant and equipment will be properly maintained, silenced where appropriate and operated to prevent excessive noise and switched off when not in use. Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the site will be conducted as far as practicable during day time hours; and noise complaints will be immediately investigated.
Impaired air quality	Reduction of air emissions from exhausts shall be achieved by contracting new equipment or well serviced and maintained equipment. No vehicles or equipment's to be used that generate excessive black smoke. Where practical, contract will inspect machines and vehicles on delivery.
Increased alien plant invasion	Areas invaded by alien species shall be cleared in the appropriate manner and rehabilitated with indigenous species. Cleared areas shall be stabilized and rehabilitated as soon as possible in order to minimize the risk of an increase in alien vegetation.
Increased erosion risk as a result of soil disturbance and loss of vegetation cover	Terracing and levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. Re-cover exposed soils with grass and other appropriate species as soon as possible and temporarily will bind exposed soil and redirect flows from heavy runoff areas that threaten to erode or result in substantial surface runoff to adjacent water courses.

NEGATIVE ENVIRONMENTAL IMPACT DURING CONSTRUCTION PHASE

Dust pollution	Dust generating activities shall not be carried out during times of strong winds. The Contractor shall suspend earthworks operations wherever visible dust is affecting properties adjoining the project site. Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the OUT Supervisor. Vehicles delivering soil materials will be covered to reduce spills and windblown dust and vehicle speeds will be limited to minimize the generation of dust on site and haul routes.
Nuisance and disturbance on/offsite receptors from noise pollution	Installation of portable barriers to shield compressors and other small stationary equipment where necessary, use of quiet equipment and the proponent will ensure all vehicles have properly functioning mufflers. Also, will limit pick up trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
Deterioration/impairment of local air quality	All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles.
Pollution of soil and water resources (surface and ground water) from hydrocarbons	The OUT and contractor shall ensure that re-fueling and services for vehicles is done off site at the fuel depot. 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.
Loss of visual amenity due to haphazard disposal of construction waste	During the construction, the contractors shall maintain the project development area in neat and tidy condition through general housekeeping, to reduce any negative visual impacts. The visual impacts will also be mitigated by removing any equipment and machinery that is not in use, as soon as possible.
Environmental pollution from poor management of construction materials	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 and will include instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process; and introduction of waste disposal bins, warning notices, “DOs & DoNTs” etc posted at strategic points, through the project area.
Road traffic safety risks	Traffic accidents will be avoided by ensuring good driver awareness and maintaining speed limits for main roads and on material access roads. Also, by providing both road and safety signs to public as well as drivers at the core activity project site(s). All large or over-size transport vehicles will be accompanied by escort cars equipped with flashing yellow warning lights while in transit on public roads.
Occupational accidents at the work place	OUT and contractor shall comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation’s Performance Standards and regulations on health and safety requirements including the provision of Personal Protective Equipment’s (PPE), reasonable working hours and good working conditions and facilities.

NEGATIVE SOCIAL IMPACT DURING CONSTRUCTION PHASE

Increased spread of HIV/AIDs and STDs	The project proponent 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.
Potential 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.
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 village government offices on available employment opportunities and required qualifications.
Potential 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 observe national/and international labour standards.
Gender inequity in employment	The OUT will ensure that women are given adequate 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.

NEGATIVE ENVIRONMENTAL IMPACT DURING OPERATION PHASE

Health and safety hazards from chemical handling in the laboratories	Only small amounts of chemicals necessary for daily use would be stored in the laboratory. Bulk stocks would be kept in specially designated rooms away from the laboratory. The proponent will replacement of the hazardous substance with a less hazardous substitute and will implement engineering and administrative control measures to avoid or minimize the release of hazardous substances into the work environment keeping the level of exposure below internationally established or recognized limits.
Contaminations of land from poor solid wastes management	The proponent will be responsible for the efficient management of solid waste generated by the project during its operation. In this regard, solid waste will be collected and sorted out in different containers so that non-biodegradable wastes such as plastics and others will be handled separately.
Deteriorated/impaired water quality (surface and ground) from	The project proponent shall take reasonable precautions to prevent the pollution of the ground and/or water resources located adjacent to the site due to the project activities. Sanitary arrangements shall be to the satisfaction of the requirement of the EM (SQS), 2007 and EM (WQS) 2007. Septic tank and soak away shall be

wastewater disposal	designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites.
Compromise quality of soil, ground water and surface water from laboratory effluents	The proponent will consider proper retention tank volume, geometry and compartmentalization to impart adequate hydraulic residence time for sedimentation. The elongated tank with length-to-width ratios of 3:1 or more is will be used to reduce short circuiting of the effluent. Two compartments will be used to achieve, better suspended solids removal rates.
Public health hazards from reject materials/expired chemicals	Proper disposal of reject materials/expired chemicals can be expensive. So, the project proponent will minimize the need for proper disposal, by minimizing chemical purchases. The University will purchase chemicals for the lab according to the need of that particular time. This inventory will be used to inform laboratory manager and staff members when samples become so old/expired that disposal is necessary. Thus, these expired chemicals will be stockpiled in the dedicated store room for further guidance from regulatory authority.
Health and safety risks due to fire hazards	All staff will have training in fire control through regular firefighting drills. Fire extinguishers would be available in accessible area near to fire risk area and ensure that all fire-fighting equipment is regularly maintained and serviced. Fire emergency telephone numbers would be displayed in communal areas.
Occupational health and safety hazards due to inadequacies in provisions for working conditions	OUT shall provide and enforce use of appropriate PPE. Appropriate safety measures will be developed based on a risk assessment and may include adequate ventilation in the laboratory, office or in workers' long exposed working area, and guidance on safe working in confined spaces; establish safe working procedures/guidelines which will be followed by all employees working in the project premises.
NEGATIVE SOCIAL IMPACT DURING OPERATION PHASE	
Health Hazards due to social interaction among workers and users	The 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.
Non-user-friendly buildings 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.
Risk of SEA/SH within the project area	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.
POSITIVE SOCIAL IMPACT DURING CONSTRUCTION AND OPERATION PHASE	

Contributing to local economic growth

Where possible the construction contractor will be advised through contractual means to maximize the application and use of locally produced construction material supplies. This will increase the quantity of materials to be procured from the various local suppliers and hence it will enhance the income generation capacity of local suppliers. The use of locally available materials and labour for the proposed project development will contribute to the economy's growth by contributing to the 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, while the cost of these raw materials will be payable directly to the producers.

Increased income by utilization of local resources

It is expected that, materials such as cement, aluminium, roofing sheets, timber, paving blocks tiles, sanitary, plumbing and electrical appliances, steel, and other miscellaneous materials required for construction can be sourced locally e.g., Kibaha Town Council or other parts of Tanzania, depending on the type of materials required. Therefore, such a demand would create a market for local people and should be enhanced.

Support to local social services and livelihood

The project has a potential of enhancing development of the area through increased business activities and direct employment. As a corporate citizen, OUT will work all along with the Government to achieve the millennium development goals mainly in the area of poverty reduction. This will be done through a non-partisan scheme set by the University, tailored towards extending support to disadvantaged sections of various communities in the area to enable them access education, health care and clean safe water.

Induce development

To enhance this positive impact to the community living in the vicinity and area of influence; OUT shall ensure efficient operation of the Science Laboratory Building at the North Buswelu Mtaa, and good security within the project area and area of influence

Corporate Responsibility

As part of social corporate responsibility, it is expected for the OUT to establish a separate budget to implement its social commitment in the area. Its priority should focus on the pressing needs in the community such as supporting the community on the ongoing social projects including supporting building dispensaries, classrooms, and water related projects to mention some.

Employment/Income generation

Offering local people, the opportunity for employment during the construction or providing services such as supplying construction materials etc., will provide an additional income-generating opportunity to a significant number of persons who may be affected in these targeted areas. This will almost certainly be the case where skilled labour is concerned when there will be no local skilled labour. This minor impact could be turned into a positive impact if the contractor of project is both encouraged to and committed to hiring local labour (especially marginalized groups such as youth), particularly when only semi-skilled or unskilled labour is required. During the tendering process for project construction, special clause that requires residents to be employed as labourers shall be included in the contractor's contract

Decommissioning phase

Environmental pollution from haphazard disposal of demolished waste	The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work. All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety

	harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors.
Noise pollution	The OUT will coordinate activities that produce the most noise levels. Use of equipment designed with noise control elements will be adopted where necessary and demolition exercise will be limited at day time only. All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise.
Air pollution due to dust	The contractor will douse the surface with water to suppress excessive dust and whenever possible, water sprinklers shall be used. Also, the contractor will provide protective gear (i.e., breathing masks) to workers working in dusty environment.
Soil and water pollution	Demolished materials shall be kept within planned boundaries and with a clear separation. If it is essential to stockpile materials close to runoff, control measures shall be implemented, such as excavation of a shallow water/ sediment collection ditch around the boundaries of stockpiles to contain run-off water for a sufficient length of time to allow for settlement of solids.
Occupational health and safety	All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors. The proponent shall establish safe working procedures/guidelines which will be followed by all employees and any subcontractor working in the facility premises
Loss of employment	The proponent shall prepare the workers to be employed anywhere else in the laboratory through provision of extensive training. Also, the project will prepare workers for forced retirement by providing skills for self-employment, wise investment. Further shall ensure that all employees are members of the Pension Fund and the employees shall ensure that the developer's contributions are made.

Alternatives Considered

The general principle involved in identifying the option(s) of the proposed project is to ensure that the option chosen would result in optimal social, economic and environmental returns. In practice, if more than one site is available for selection for construction of the three Storey Science Laboratory Building, screening exercise could be used and the site qualifying above the others must undergo a detailed characterization for its suitability in terms of location, accessibility, security, availability of social services (water, electricity etc.) and hydrogeological characteristics. Consideration would also be given to proximity to residential development, prevailing wind direction, surface water flow and water table. The Science Laboratory Building sitting also needs to conform to land use plans and to minimize the aesthetic impacts. The OUT approach to locate the Three Storey Science Laboratory Building at Kibaha centre is to follow a balanced approach which seeks to reduce and minimize the impacts of laboratory on the natural environment.

It has been evaluated that construction of Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre is economically preferable above buying new land elsewhere. Also, this site is the property of the OUT as such it does not involve complicated issues of displacing people, compensation and re-settlement. The selected site is within the area designated education facilities development area as such issues of community disruptions and disturbances because of project activities are not so pronounced. In this respective, the proposed site meets all the required

standards. From a technical perspective locating the Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre will allow the OUT to run its operations efficiently and with better beneficiaries/stakeholder's satisfaction.

With due consideration of many factors that include structural engineering, socio-economic and environmental, the recommended alternative is the "Proposed Alternative" because it recognizes the viability and need for the proposed development, is designed to address environmental issues and concerns, meets all local regulatory requirements, and supports communication and close relations during all stages of the development between the OUT and the surrounding communities.

Mitigation Measures and Environmental and Social Management Plan

The Project will implement a suite of best-management practices and compliance measures, referred to herein as "in-built" mitigation measures, designed to avoid or reduce potential impacts on sensitive receptors. These measures have been captured in the initial impact ratings assigned above. "Additional" mitigation measures have been proposed for some impacts those that would affect receptors with higher sensitivity, and where a targeted mitigation measure can readily be applied to reduce the likelihood or magnitude of impact. The proposed mitigation measures are presented in the impact assessment and summarised in an Environmental and Social Management Plan (ESMP). The ESMP included in Chapter 8 of the ESIA has been designed to support the successful implementation of the Project while respecting and conserving the social and environmental aspects of the country.

Environmental Monitoring Plan

An Environmental Monitoring Plan has been developed to monitor the efficiency of the environmental mitigation measures and socio-economic initiatives specified in the ESMP. It supports the ESMP by maintaining a record of environmental performance and enabling adjustments to be made to mitigate environmental and socio-economic impacts during the project's lifetime. The Monitoring Plan consists of the set of mitigation, monitoring parameter, and institutional measures to be taken during construction and operation of the planned facility to eliminate, offset, or reduces adverse environmental and social impacts. The plan also includes the actions needed to implement these measures.

Cost-Benefit Analysis

The cost-benefit analysis of this project focuses on economic costs benefits and social benefits other than income and externality 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 project's total economic and social impact is likely to exceed the economic benefits substantially. 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 include direct project costs (IDA credit and grant), 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.

Further, the overall scale and duration of activities associated with the proposed project are relatively small. Most of the associated negative impacts have been reduced to a significance rating of minor or low with the incorporation of in-built and additional mitigation measures. Furthermore, the financial resources needed to mitigate these impacts are relatively small compared with the capital investment for the project. There are no significant negative residual impacts anticipated due to the project. Therefore, it is expected that the social benefits will outweigh the social and environmental costs associated with the proposed project.

Decommissioning

The proposed Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre may exist for a long time since appropriate rehabilitation and upgrading are done when needed. The proposed project has an anticipated life span of about 100 years. However, the Science Laboratory Building may be stopped if the Tanzania Government/OUT decides so for one reason or another, or technology change may necessitate discontinuation of the existing Science Laboratory Building. If this happens, a preliminary decommissioning plan has been developed. 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. The first three phases will occur before removal of the project (i.e., within the first six months). The fourth phase — project removal and associated protective actions — will occur twelve months after closing business. The fifth phase will begin after total removal and continue for at least one year.

Conclusion

This ESIA report concludes that many environmental and social impacts have been identified and assessed. However, none of these are considered severe after mitigation to prevent the further planning, design, and development of the proposed Science Laboratory Building at the OUT Pwani Regional Centre. Thus, considering the nature, duration and location of the project, the ESIA report concludes that all of the potential impacts associated with the proposed project are of a nature and extent that can be reduced, limited or eliminated by applying appropriate mitigation measures. Therefore, with proper implementation of the proposed ESMP, the project will not result in significant adverse effects on the people and environment of project site and its vicinity/surroundings.

NAMES OF CONSULTANTS FORMED ESIA TEAM

S/N	NAME OF CONSULTANT	POSITION/AREA OF EXPERTISE	SIGNATURE
	Certified Experts		
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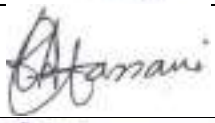
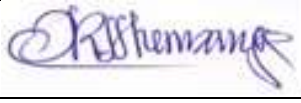
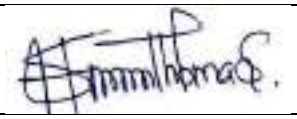
2.	Mr. Bashiru Abdul Hassani (Reg No. NEMC/EIA/0034)	Lead Consultant, Environmental Planning and Social Economist	
3	Eng. Sam Shemsanga	Environmental Engineer	

4	Mr. Sengerema Thomas	Natural Resources Management	
	Other Experts		
5	Sesilia Jeremia	Gender/GBV Specialist	
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ACKNOWLEDGEMENT

This Environmental and Social Impact Assessment (ESIA) report was produced for the proposed Construction of Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania 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 other various reports and documents which are cited in the report.

The Open University of Tanzania would like to acknowledge; - the National Environment Management Council (NEMC) for reviewing the scoping report and the Terms of Reference. This has enabled the Consultants to address pertinent project issues and those raised by different stakeholders. Also, the Open University of Tanzania wishes to extend special thanks to TRES Consult (T) Limited for carrying out this assignment and contributions of other experts. All stakeholders as listed in appendix 3 are also acknowledged for their invaluable comments, information and data.

ABBREVIATIONS AND ACRONYMS

CBD	Central Business District
CBOs	Community Based Organisations
CO	Carbon monoxide
CO_2	Carbon dioxide
dBA	decibels-acoustic
DDI	Domestic Direct Investment
DED	District Executive Director
DOE	Division of Environment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMP	Environmental Management Plan
ERB	Engineering Registration Board
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EWURA	Energy and Water Utilities Regulatory Authority
FDI	Foreign Direct Investments
GHGs	Greenhouse Gasses
HIV/AIDS	Human Immune Deficiency Virus/ Acquired Immune Deficiency Syndrome
ILO	International Labour Organization
ISO	Organization de Standards International
IUCN	International Union for Conservation of Nature
MV	Medium Voltage
MW	Mega Watts
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGOs	Non-Governmental Organisations
NHSDP	National Human Settlements Development Policy
OSHA	Occupation Safety and Health Authority
PM_{10}	Particulate matters
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PV	photovoltaic
R.E	Revised Edition
SO_2	Sulphur dioxide
STDs	Sexual Transmission Diseases
TAC	Technical Advisory Committee
TANESCO	Tanzania Electric Supply Company
TIC	Tanzania Investment Centre
TMA	Tanzania Meteorological Authority
TNS	Tanzania National Standards
ToR	Terms of reference
TRA	Tanzania Revenue Authority
TTCL	Tanzania Telecommunication Company Limited
TZS	Tanzania Standards
UDSM	University of Dar es Salaam
URT	United Republic of Tanzania
VAT	Value Added Taxes

VPO	Vice President Office
WEO	Ward Executive Officer
WHO	World Health Organisation
WHO-GPA	World Health Organization Global Programme on AIDS

CHAPTER 1
INTRODUCTION

1.1 PROJECT BACKGROUND

The Open University of Tanzania (OUT) is a fully fledged, autonomous and accredited public University, established by an Act of Parliament Number 17 of 1992. The Act became operational on 1st March 1993 by the publication of Government Notice No. 55 in the Official Gazette. The first Chancellor was officially installed in a full ceremony on 19th January 1994 and the first batch of students was admitted in January 1994. In January 2007, following enactment of the Universities Act No. 7 of 2005, OUT started using the OUT Charter and Rules (2007) for its operations. The Open University of Tanzania offers its certificate, diploma, degree and postgraduate courses through the open and distance learning 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).

OUT Headquarters are temporarily located off-Kawawa Road in Kinondoni Municipality, Dar es Salaam. The permanent headquarters are under constructions at Bungo in Kibaha District, off-Soga Road, about 4.0 Km from the main Morogoro highway in Coast Region. OUT operates through a network of about 30 Regional Centres; 10 Coordinating Centres, of which one is in Zanzibar and one in Pemba; two are in Kenya (Egerton and Njoro), one is in Rwanda (Kibungo), one in Namibia and one in Uganda. Other OUT Internal Coordination Centres are the African Council for Distance Education – Technical Collaboration Committee (ACDE TCC), the Centre for Economics and Community Economic Development (CECED) and the SADC Centre of Specialization in Teacher Education (SADC ODL CoS TE). OUT has also 69 Study Centres spread throughout the United Republic of Tanzania. The Open University of Tanzania offers its certificates, ordinary diplomas, degrees, postgraduate diplomas and PhDs through its five Faculties and two Institutes - Faculty of Arts and Social Sciences, Faculty of Business Management, Faculty of Education, Faculty of Law, Faculty of Science, Technology and Environmental Studies, Institute of Educational and Management Technologies and Institute of Continuing Education.

The OUT as public learning institution has received financial support from the World Bank (WB) through the Tanzania Higher Education for Economic Transformation (HEET) project in which part of it will be used for construction of multipurpose science laboratories in seven regions of Tanzania. The HEET is a five-year project, which is financed by the World Bank through the Ministry of Education, Science and Technology (MoEST). HEET project aims at promoting higher education as a catalytic force for the new industrial based economy of Tanzania. Thus, the project is designed to revitalize and expand the capacity of universities to contribute to key areas for innovation, economic development, and labour market relevance, by investing in requisite infrastructure for modern and effective teaching and research.

The OUT is intending to use part of HEET project fund to construct a Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania. The plot area which is the proposed project site, measures Forty-One decimal point three eight four (41.384) hectares and the proposed three Storey (Ground + 2) laboratory building will use only 2,000 m^2. The building also will have 51 total parking bays for the users and visitors. Other associated facilities to support the project are retaining wall, concrete paving blocks, security guard post, changing room, water storage tank with a pumping system, toilets, solid waste collection area, waste water drainage system, fire system and utilities network. The building shall be built to the highest acceptable standards using the best available environmentally friendly

materials and offering a comfortable and high-quality laboratory and teaching space. The proposed project will have an investment cost of TZS. 1,826,348,062.50 to cover all project components.

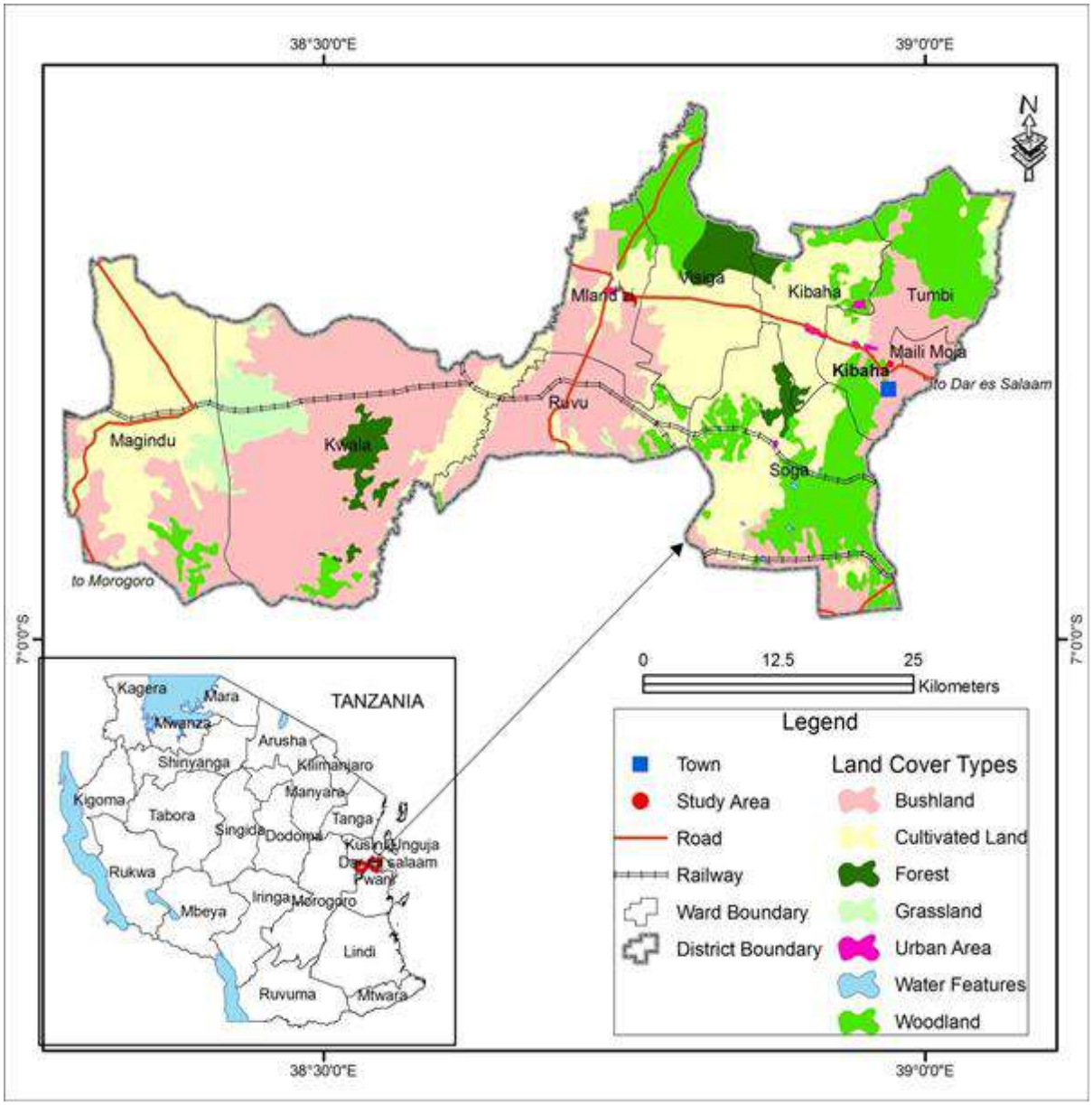

Figure 1.1. Map of Kibaha Town Council showing the location of project are
Source: TRES Consult (T) Limited, 2023

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 the HEET Project Appraisal Document (PAD) of 2021, the main objective of the project is to strengthen the learning environment and labour market alignment of priority programs at beneficiary higher education institutions and improve the management of the higher education system. The 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 – 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 NEED FOR ESIA STUDY

The OUT would like to ensure that the development and operation of the proposed Three Storey Science Laboratory Building project do not jeopardize the integrity of the environment in the area. Thus, the OUT undertook the Environmental and Social Impact Assessment (ESIA) study for the proposed project. This is also in line with the Environmental Management Act, cap 191 and the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 which requires that ESIA should be undertaken before commencement of any project/activity which may have environmental impacts on human and the environment. Also, the World Bank Environmental and Social Frameworks (ESF) and Standards (ESSs) require project developers to carry out an Environmental and Social Impact Assessment (ESIA) prior to project implementation. In view of the above, OUT therefore commissioned TRES Consult (T) Limited of Dar es Salaam (Registered Environmental Consultancy Firm) to carry out the Environmental and Social Impact Assessment (ESIA), for the proposed project.

In fulfilment of the above, the OUT as a first step of the ESIA process prepared EIA application documents. The documents included the project Registration Form, Scoping Report and Terms of Reference (TOR) which were submitted to the National Environment Management Council (NEMC). The scoping report and ToRs were approved by the NEMC through the letter dated 15th December 2023 with Reference Number HG. 145/208/38/02. The ToR was also approved by World bank and used to provide guidance under which this Environmental Impact Assessments were done. Therefore, the Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study.

1.5 SCOPING REPORT

The Scoping Report for this project provided a description of the proposed Construction of Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council and any feasible and reasonable alternatives, a description of the property and the environment that may be affected and the manner in which the biological, social, economic and cultural aspects of the environment may be impacted by the proposed project activity; description of environmental issues and potential impacts, including cumulative impacts that have been identified, and details of the public participation process undertaken. In addition, the Scoping Report contained a roadmap for the Environmental Impact Assessment, specifying the methodology to be used to assess the potential impacts, and the specialists or specialist reports that are required. The scoping report is also aimed at providing enough information to the NEMC for screening decision. Based on the nature of the project and their inherent activities as well as the site.

As a product of the scoping report, ToR was formulated to facilitate an efficient assessment process and assisted a team of experts to focus on the concerns that were identified and outlined in the scoping report. The scoping exercise on the view of public consultation in ESIA was that the proposed project should not suppress the differing views of the institutions and communities' interests. This is based on the fact that institutions have their obligations to address their perspectives of social and environmental concerns of the proposed project. The specific objectives of scoping exercise were as follows: -

- To determine key environmental and social issues that is likely to be important during the ESIA study.
- To provide an opportunity for the proponent, the relevant authorities and affected parties in a project area by sharing information and express their views and concerns' regarding the project proposal which will enhance rational decision to the project.
- To focus the ESIA on reasonable alternatives and relevant issues to ensure that the resulting assessment is useful to decision-maker and address the concerns of interested and affected parties.

- To facilitate an efficient assessment process that saves time and resources and reduces costly delays of the project but also to design the project into socially accepted, economically viable and environmentally sound.

1.6 APPROACH AND METHODOLOGY OF THE SCOPING STUDY

The ESIA study conforms to the requirement of 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 OUT management particularly Dr. Timothy Lyanga (HEET Project Coordinator), Dr. Law Yohana and Dr. Pamela Semiono (HEET Project Environmental and Social Safeguards), local government officials and communities in the vicinity of the project area.

The study was done both as a desktop study and field work. It involved the review of literature/documents including HEET Environmental and Social Management Framework (ESMF) report, HEET Stakeholder Engagement Plan, Kibaha Town Council socio-economic profile, development plans and field studies at the project site to gather information and data on various aspects of the project. This information allowed the identification of potentially sensitive and valued environmental resources and receptors at an early stage in the design process. This information has been used to identify, likely effects from the development proposals and measures that could be adopted to avoid and minimize potential effects. The environmental assessment required consultations with many stakeholders, including responsible Ministries, Local Government Authorities, etc. The study adopted the following approach:

1.6.1 A team of experts

A team of experienced scientists and environmental professionals were 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 was collected using a combination of site reconnaissance, analysis of maps and plans, review of reports and background documents, checklists, field studies and public consultations.

1.6.2 Communication with Stakeholders

Identification of stakeholders

The identification was based on the role and relevance of an organization, group or individual to the proposed project. Some of the stakeholders such as the VPO, NEMC, Ministry of Education, Science and Technology, Ministry of Water (Wami Ruvu Basin Water Offices), Government Chemist Laboratory Authority (GCLA); Occupational Safety and Health Authority (OSHA), the Open University of Tanzania (OUT), Pwani Regional Secretariat Office, Fire Rescue office; Kibaha Executive Director Office, Ward Development Committees – (Ward Councillor, WEO, Ward Environment Committee); Mtaa Council (Chairman/ MEO, Environment Committee) were pre-determined based on the nature of the project, while others and affected groups at the proposed project site and area of influence unfolded as consultations went along. List of stakeholders is found in appendix 3 of this document.

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

Identification of stakeholders' concerns
The stakeholders pointed out several issues and concerns. An individual or a group of people who raised an issue was cross-checked by discussing it with other groups. Key issues raised by each stakeholder group were summarized and further analysed in this report. For details of stakeholders consulted, the record of main issues raised, names and signatures of people consulted, records of meetings, communications and comments from key stakeholders, see Chapter 5 and Appendix 3.

1.6.3 Physical Environment

Information was gathered on the existing physical environment, particularly geology, topography, soils, drainage, water quality, air quality and noise.

Geology, Topography, Soils
Information and data on the climate, geology, topography, soils were generated from published geological information as well as assessment of the site through field visits, previous site reports and intrusive site reports done and current public domain reports held within various governmental and non-governmental organizations. Aerial photos, satellite imagery and other published maps were also examined. Field work was carried out to augment and verify existing information relating to geology and soils and obtain first-hand knowledge of topography.

Seismic or tectonics activities
In determining the possible seismic hazard associated with a potentially active fault, the history of recent activity was used as a guide. Although it is known that earthquakes are generally caused by fault movements, the fault systems in the area surrounding the project site were not precisely documented, and therefore it was not possible to identify specific earthquake-generating fault with certainty. Consequently, this ESIA endeavoured to delineate seism tectonic source areas, i.e., seismic occurrences in Pwani region and its surrounding regions. The criteria for assessment of the provinces around the site were based on observed seismicity, trends of the faulting and stress patterns within the area (Daudi 2007, Msabi 2016).

Hydrology and drainage
Surface and ground water characteristics were assessed using field investigation, maps and data from previous reports. Field investigation was carried out to determine and verify all the existing inflows into the general area, including both natural and man-made features, assessment of drainage issues, sediments transfer and its impact to the project, interviews with local community members and discussions with stakeholders.

1.6.4 Biological Environment

This study aimed at surveying the site to reveal the existing environmental conditions including determination of habitat types as well as revealing the flora and fauna found in the project area. This study involved literature reviews, Google earth satellite image (GE) analysis, and field observation. The flora and fauna site information are as follows;

Flora

A simple 'walk through' survey of the terrestrial flora within and around proposed project area was conducted within the established transects. Identification was carried out on dominant vegetation species in sample plots/ transects. Whilst carrying out the transect work every plant species encountered both inside and near to the vegetation plots was identified and included in the species inventory. Plants were identified direct in the field by experts and for those difficult to identify specimens was collected and carried to the consultant office for further verification and/or identification using various taxonomical literatures. The principal habitats present within the site were identified, classified, and described basing on the Field Guide to Common Trees and Shrubs of East Africa (Dharani, 2002).

In addition, attempts were made to include aspects of invading species, and an indication of biodiversity and species hinting important historical information among others. The vegetation species were identified and described for their taxonomical, rarity and whether they are endangered species or not. The identified list of plants found in the area and plant species of ecological conservation concern is included in the report. Possible impact of the project activities on the flora was identified and their mitigation measures and monitoring plans suggested.

Fauna

The proposed project area was surveyed using methodology outlined in the African Forest Biodiversity (Leon *et al.,* 2002). Interviews with the locals to get information on commonly sighted animals in the area and if there exists any migration corridor was also employed. Apart from few small wild animals, no large mammals observed or identified while walking along transect in representative habitats and through observation of animal signs such as droppings, burrows, footprint, or vocalization.

Small mammals, amphibians and reptiles were studied through sighting, droppings whereas, birds and insects were identified through sighting, droppings, burrows, and visualization while walking along the transects established within the project area. Most importantly, information about the presence of any significant species (i.e., locally observed animals) was obtained from local people in the area. List of fauna organisms found in the area, organisms of ecological conservation concern and mapping of any critical habitats were documented. Moreover, possible impact of the project activities on the organisms were identified and their mitigation measures and monitoring plans suggested. All fauna information is included in this report as baseline data.

1.6.5 Specialized Baseline Assessments

1.6.5.1 Air quality

The air quality is one of the aspects audited in which three types of spot measurements were done to monitor the existing air quality on ambient dust in terms of particulate matter (i.e., TSP, PM10 and PM2.5) status of the project site and the nearby receptors. Dust monitor that complies with the EMC Directives was used to measure dust particles of different dimensions (microns of 10, 5.0, 2.5, <1.0, 0.3 and >10). On taking measurements, the device was placed at breath height of about 1.5 meter from the ground to monitor dust concentrations at each identified station. This position is assumed to be a relatively the breathing zone of the people at their respective locality or working environment. As there is no source of

pollution in the area, dust levels were recorded in terms of PM_{10} and $PM_{2.5}$ during the morning and afternoon. The recordings measured at each point were used to calculate the daily average value.

1.6.5.2 Noise levels

Sound level meter device was used to record noise at the selected points as prescribed in ISO 19961:2003 and ISO 3095:2001. The device was set to A-weighting scale during measurement to enable the meter to respond in the same manner as the human ear. The "A" scale is applicable for workplace compliance testing, environmental measurement, and workplace design. A number of readings were recorded periodically at each point during the morning and afternoon hours and used to calculate the diurnal average level. The noise measurements were then categorized in terms of daytime and night-time, in order to generate results suitable for comparison to local standards as well as international guidelines.

1.6.5.3 Vibrations

Data logger vibrometer was utilized to quantify the ground vibration in accordance to European standard EN 14253:2003. On taking measurements, the accelerometer transducer was mounted on the ground to record peak vibration. To produce accurate results, the transducer was secured in direct contact with the ground. The levels of vibrations were recorded in terms of Peak Particle Velocity (PPV) in millimeters per second.

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

1.6.7 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 local government Council (Kibaha Town Council) and relevant committees.

1.7 IMPACT IDENTIFICATION AND EVALUATION

The methodology used considered all potential impacts using a standard matrix approach which takes into account impacts on the physical environment (e.g., air quality, soil and ground water quality), impacts on the ecology (e.g., flora and fauna) and, impacts on human socio-economic setting, as shown in table 1.1.

Table 1.1: Matrix of impact identification

Project Activity	Physical environment		Ecological environment			Socio-economic setting		
	e.g., Air quality	Fresh water quality	Flora	Fauna	Other ecosystem components	Social	Economic	Cultural
Site Selection Phase								
Activity 1								
Activity 2								
etc.								
Design Phase								
Activity etc								
Mobilization Phase etc…								

Environmental, health, safety risk (and other risks) is a measure of the potential threats taking into account the likelihood that events will cause or lead to damage or degradation and the potential severity of that damage or degradation. The Consultant used the general criteria, listed below, to evaluate significance of the identified impacts.

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

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

L+ = Low positive
M+ = Medium/moderate positive
H+ = High positive
L- = Low negative
M- = Medium/moderate negative
H- = High negative
0 = No apparent impact

The grades for compliance and ecosystem have also been combined, as shown in Figure 1.2 below to arrive at an overall grade for the aspect's environmental significance, which favours the higher of the two grades.

Figure 1.2: The combination of significance grades

The resulting terms for the overall assessment for each environmental aspect were defined thus:

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

The assessment also considers the contribution to local and national environmental and socio-economic issues as well as global environmental issues.

1.8 MITIGATION MEASURES AND MANAGEMENT CONTROLS

Identifying and proposing mitigation measures that aim at eliminating or minimising the potential negative impacts and promote positive ones using expert judgment.

i. ESMP and EMP - Preparing the Management and Monitoring Plans for ease of reference and follow-ups during project implementation.
ii. Preparation of the EIS - Presenting the information which involved writing the Environmental Impact Statement (EIS).

1.9 REPORT STRUCTURE

Information obtained from the review of existing environmental assessments, environmental monitoring data and from baseline surveys has been compiled in this report. Additionally, information on the Project and its associated environmental and social impacts including mitigation measures and corresponding monitoring plan is also presented in the report structured in accordance to the format given in Section 18 (1 and 2) of the Environmental Impact Assessment and Audit Regulations, 2005 as amended in 2018. It is presented in as follows:

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- Project background and description
- Policy, administrative and legal framework
- Baseline/ Existing conditions
- Stakeholders Analysis
- Assessment of Impacts and Identification of Alternatives
- Environmental Mitigation Measures
- Environmental and Social Management Plan
- Environmental and Social Monitoring Plan

- Resource Evaluation / Cost Benefit Analysis
- Decommissioning and Closure
- Summary and Conclusions
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CHAPTER 2
PROJECT DESCRIPTION

2.1 SITE LOCATION

The proposed project will be situated at the Open University of Tanzania Pwani Regional Centre, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania. The specific coordinates of the site are 06°46´58.36´´S and longitude 38°55´25.18´´E having elevation of 534 ft AMSL. The environmental and socio-economic influence of the project is anticipated to extend beyond the scope of the project area. The area of influence is a wider area than the project area. For example, dust pollution or employment opportunities could have a wider impact on the Pwani Region.

2.2 ACCESSIBILITY

The project site area is reached by the Dar es Salaam - Chalinze highway. Key landmarks on the highway after the Kibaha Picha ya Ndege is the GBP Service Station to the right before reaching the Tanita Bus stop. The site is about 3.2 kilometre from the main road and easily accessed by the Soga Pwani earth roads which is in good condition. Also, the project site is directly linked with Bagamoyo Town by seasonal road, while connection to other District Headquarters such as Kisarawe, Mkuranaa, Kilindoni (Mafia) and Utete (Rufiji) area accessible through Dar es Salaam City. All of these roads are passable throughout the year, though during the rainy season, some spots can be rough in the Chalinze - road, despite the regular maintenances conducted along it.

2.3 LAND OWNERSHIP

The piece of land for the proposed project is registered as Plot No. 24 situated at Bungo, Kibaha Town Council. The project plots contain forty-one decimal point three eight four (41.384) hectares and is covered under registered Survey Plan number 31927 with land office number 183403. The project land belongs to Open University of Tanzania of P. O. Box 23409 Dar es Salaam, Tanzania. The OUT is the legal and beneficial owner of that property and the premises with certificate of occupancy title number 53562. The title specifies that the land and building to be erected thereon shall be used for educational building purposes only. In this respect OUT intends to use the above-mentioned land for the proposed development as per Land use indicated in the certificate of occupancy. Use Group 'K' use class (a) and (b)'' as defined in the Urban Planning Act No. 8 of 2007, (Use Classes) Regulations of 2018. The location is convenient to the envisaged Three Storey Science Laboratory Building activities.

2.4 SITE DESCRIPTION

The proposed project will be situated within the larger part of the OUT Pwani Regional Centre. Typically, the general project area has a slightly even topography. The quick topographical survey indicated that the land is conducive for the proposed science laboratory building with an average of a 1.1% fall from the East-West corner to the North-Southern corner. There are no rivers in the vicinity of the project area. Drainage follows the slope and runs from North to southern side towards the Ngerengere River which is located about 2 kilometres on the Southern side. The Ngerengere Rivers joins the Mpigi river which drains to the Indian Ocean. Reference from the drilled borehole on site, the water table in the area is about 60m below the earth surface. Due to that it is not expected the ground water level to rise to near ground surface during heavy rain. The soils are typical of the coastal area i.e., sandy with moderate drainage. Topsoil in the project area is characterized by well graded (non-cohesive) silty sand (SW) with good drainage properties up to a depth of 4m. The top thin layer is white sand and little amounts of organic matter (litter/

humus). The lower strata are brown loamy soils well drained that support growth of vegetation. Though flat, the site is not subject to seasonal water logging because of slope which has been directed to the lower areas. There are no signs of soil erosion. Vegetation cover within the project area is woodland savannah, which is typical of coastal area of Tanzania. The vegetation in the core project site is very little and not natural as the site is already been cleared for other OUT activities. The area previously was used as vehicle parking area especially during the graduation ceremony. The area is covered with short grasses and bushes of small trees to an extent that it becomes very difficult for a person to get a good shed during sunny days. Most of the vegetation in this site for a long time has been affected by anthropogenic activities such as bush fire, slashing and graduation ceremonies.

Figure 2.1: Vegetation of the project site

2.5 ADJACENT FEATURES

The area is zoned for education use and the adjacent land use is primarily Open University training facilities. However, in terms of current boundaries of the core area, the site is closely surrounded by undeveloped land on both sides. There are access roads on two directions i.e., North and East and green field on Southern and western sides. The major developments/activities in the general area are football ground located about 80 meters and godown about 100 meters. The OUT-Administration block is located about 200 meters.

2.6 PROJECT COMPONENTS AND DESCRIPTION

2.6.1 Project components

The laboratory will be used as zonal science laboratory for science students, researchers, secondary schools and community in the project's area. The project components will cover; - Zoology Laboratory, Food science laboratory, Chemistry Laboratory and Preparation rooms and technical offices for each laboratory on the ground floor. The first floor will comprise the ICT Multimedia state of the art laboratory and Modern conference facilities. Second floor will comprise DRC and staff offices, Min library and Multipurpose/Examination Halls. The building also will have 51 total parking bays for the users and visitors. Other associated facilities to support the project are retaining wall, concrete paving blocks, security guard post, changing room, water storage tank with a pumping system, toilets, solid waste collection area, waste water drainage system, fire system and utilities network. The building shall be built to the highest acceptable standards using the best available environmentally friendly materials and offering a comfortable and high-quality laboratory and teaching space.

The building shall be built to the highest acceptable standards using the best available environmentally friendly materials and offering a comfortable and high-quality laboratory and teaching space. The project site is already connected to TANESCO power supply and thus upgrading of the same shall be considered for the project. There is existing public water supply pipeline at the project site that shall be considered for connection. Currently, there is no centralised sewer system within the project site as such the septic tank and soak away system will be used. The solid waste will be collected in waste bins from the laboratory and thereafter to the centralized transfer station (waste collection area) from where Authorized agent will be collecting the wastes to the to the designated Municipal Council's dumping site.

2.6.2 Project designs/concept

The OUT, through its consultants, has already developed the project designs/concept. The design and shape of the building has taken into consideration the maximum and minimum widths of typical laboratory and office spaces. Shared common rooms will be provided on each floor to facilitate efficient use of shared or infrequently used equipment. The design of the building would also allow for inline, continuous expansion of Laboratory, Laboratory Office Space. Provisions for parking, sidewalk access, roadway access as well as green area allocation were carefully considered in the design. The parking area for the proposed project is proposed to be in front of the building, on the eastern side facing the main road, with direct access from the site to the main road. The main entrance of the building is proposed to be on the eastern side of the building.

The delivery and service access of the proposed building is recommended to be on the same eastern side of the building. Design of these facilities have based in part on the types of work that will occur in each Laboratory and the inherent risks associated with that work. The design of the laboratories has followed the principles of biosafety and biosecurity. Biosafety is ensured by introducing various design criteria of laboratory control and containment, through laboratory design and access restrictions, use of containment equipment, and safe methods of managing infectious materials in a laboratory setting. On the other hand, in order to ensure biosecurity, the project envisaged development of strict procedures for 'securing" or limiting access to the facilities, research materials and information during operational phases.

2.6.3 Design requirement of the proposed Laboratory and operation Specifications

The proposed laboratory building to be built will be designed and operated in accordance with guidance for laboratories established by reputable international organizations. The laboratory will be tested for verification that the design and operational parameters have been met prior to operation. Annual verification of laboratory is recommended.

Figure 2.2: Front view of the building

Figure 2.3: Rear view of the building

Figure 2.4: Bird's view of the proposed project site

2.6.4 Proposed materials

The proposed project is expected to use several materials and resources to successfully achieve its intended objectives. Each phase of the proposed project will require different types and quantities of materials and resources. At this stage, the quantities and sources are unknown. The proposed laboratory building will be constructed using concrete footing and stem walls with simple reinforced concrete framed structure consisting of the cast in place columns, beams and floors, giving extensive use of natural daylight and ventilation. The panels between concrete frames are of non-load bearing masonry block wall/glass infill. The external façade is finished with double glazed curtain walling and due to the nature of the project, modern techniques are adopted to overcome all building aspects.

The lab floors will be impermeable to liquids, monolithic /seamless, or have welded seams. Floors will be easily cleaned, with chemical-resistant flooring (vinyl, or epoxy with fiberglass reinforcement) with a slip-resistant, smooth, hard finish. The walls of the lab will be durable, washable and resistant to detergents/disinfectants (masonry, gypsum board, fiberglass-reinforced plastic, etc.). Walls will also be painted with durable glossy acrylic or epoxy paint. For epoxy paint, if silicone sealants are used for penetrations, the silicone must be applied after the epoxy has been installed. Wall/ceiling penetrations will be kept to a minimum and sealed with non-rigid, non-shrinking silicone or latex sealant. For fire rated walls, sealant will be applied before stopping. The ceiling of the laboratory will be washable and resistant to detergents/disinfectants. Ceiling has to be painted with durable epoxy paint. The ceiling must be of monolithic construction (i.e., gypsum board, not removable tiles). The ceiling must be high enough over to allow a canopy/thimble connection or the opening of canopy/thimble door(s). Ceiling height would be at least 10 feet to allow 14 inches of clearance. All penetrations in floors, walls and ceiling surfaces would be sealed, or capable of being sealed to facilitate disinfection, to aid in maintaining appropriate ventilation system air pressures and to keep pests out.

Laboratory doors to be installed for this project would be self-closing and lockable. Doors need to be open inward slide open. Door between room and corridor will have door sweep for pest control. Door openings shall be sized to allow the passage of large equipment. Wall-door frame connection will be made airtight at time of frame installation. Doors and frames will be of solid finish construction, with the

required fire ratings and include panic-hardware, hardware appropriate for high-use and kick plates. Doors will be coated metal which is chemical resistant. Methods for restricting access to only those individuals with demonstrated need, proper clearance, and training will be in place. Notices will be posted outside the first door to notify potential entrants of the hazards contained within and measures they must take to protect themselves. Windows (safety glass) will be installed so that the interior of the room, except change rooms and restrooms, is visible. Windows must not allow viewing from public areas. Interior sills will be sloped away from windows for ease of cleaning or to minimize dust collection.

2.6.5 Eyewash/safety shower

An emergency eye wash will be in each laboratory room. A combination emergency eyewash/safety shower unit must be in near proximity to places if personnel are exposed to splash hazards (determined during programming). Emergency eyewash and emergency eyewash/safety shower units will be sited and installed.

2.6.6 Plumbing

All pipes into the laboratories will be secured to prevent movement. Fixtures will be resistant to corrosion of bleach and other disinfectants. Back-flow prevention devices will be installed on all faucets. All pipes will be identified by using labels and tags. Water supply control will be located outside the containment area.

2.6.7 Sinks

Hand washing sinks in the lab will be available in each room near exits. Sinks will be hands-free. Infrared sensors are preferable but may not be suitable for all laboratories. In cases where infrared sensors cannot be used, knee-operated sinks are preferable to foot-operated. Each sink will have chemical-resistant traps (for disinfectants), a coved backsplash, a hot-cold water and pre-mixing faucet. Hand washing sink will be accompanied by a paper-towel dispenser and a hands-free soap dispenser mounted within easy reach.

2.6.8 Laboratory furniture and casework

Furniture and casework in the lab will be sturdy and capable of supporting anticipated loading and uses. In addition, they will be spaced so that areas around and under benches, cabinets and equipment are accessible for cleaning. Bench tops will be impervious to water and resistant to acids, alkalis, organic solvents and moderate heat. For future flexibility, modular mobile casework will be used. Ergonomic considerations will be made while designing laboratory furniture and casework (e.g., adjustable work-surface heights, selection of biological safety cabinets, adequate knee clearances for seated work, adequate toe clearances for standing work, wall cabinet heights, etc.). Fixed casework, if used, will be sealed /caulked to the walls on installation to facilitate cleaning and prevent harbourage for vermin. If fixed casework is used, it would be installed before the coved flooring so that the coving can extend up toe-kicks. For storage, closed cabinets will be used rather than open shelving. Chairs and other furniture would be covered with a non-fabric material that can be easily decontaminated. To facilitate cleaning, cabinets/shelves would be made to have angled tops or be built up to the ceiling.

Activities within the laboratory could involve concurrent use of chemical solvents such as phenol and ethanol as well as corrosives or other reactive chemicals. The laboratory bench or work surface must be resistant to the chemical actions of these substances as well as disinfectants used to inactivate the organisms under study. Wooden or other porous or combustible bench tops are not appropriate because

even finished wooden surfaces can absorb liquids or ignite in the event of a fire. Fiberglass is inappropriate since it can degrade in the presence of some chemicals; it also produces toxic smoke if burned. Laboratory furniture will not be absorbent so that it may be decontaminated effectively. Space must be left between furniture to allow for cleaning and maintenance of devices as required (i.e., biosafety cabinets).

2.7 PROJECT ACTIVITIES

The development phase will involve various phases; design, mobilisation, construction, operation, and decommission, though not shortly. As part of the engineering design work, a detailed programme for the development will be determined.

2.7.1 Mobilization phase

The mobilization phase will mainly involve deploying the required tools and machinery for the work and recruitment of the construction crew. Also, the phase will involve the deployment of construction materials and their transportation from the point sources to the site. Construction materials will include steel poles and concretizing materials (cement, bricks, etc.), stones, sand for associated buildings. About 100 construction workers will be required for the project; however, these workers might be required at a 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 management.

2.7.2 Source of materials and construction

Materials for construction (stones, and aggregates) and suitable bedrock for ballast (gravel and sand*)* or suitable sand (free of humus and salt) will be obtained from authorized stone quarries in Kibaha Town Council and Pwani Region. Standard construction techniques will be adopted for building, car parks, roads and pavements, lighting and utility services. The actual construction phase will involve excavating the foundations and trenches, erection of structures and drainage, and minor landscaping. Trenches will be for laying water pipes and electric cables to re-establish the utility network within the project site. Excavators and other construction trucks will be used to clear the area, transporting raw materials from source and disposal of overburden. A contracted construction company will carry out construction and laboratory installation activities at the site. Construction materials such as sand, stone, aggregates, pavement, cement, sanitary ware and steel will be procured locally. The contractor will be responsible for transporting all construction materials and equipment from the point source to the site.

2.7.2.1 Access and transport

Likely, the majority of material and equipment necessary for the construction works will be delivered to at the project site by road. A contractor will develop a construction transport management plan to minimize the number of vehicle movements (e.g., ensuring that inward and outward movements are being utilized for transporting materials/waste, agree to routings for construction traffic, and hours of activity. Standard best practice agreed in advance with the relevant road authority will be adopted to manage potential effects on the entrance to the project site for non-construction traffic. It is unlikely that construction traffic will access the area in front of the current existing OUT buildings.

2.7.2.2 Construction facilities

The proposal is to construct temporary buildings on-site as a construction office and a sample materials store. Also, washrooms and toilets will be provided on-site for usage by visitors and workers during the construction phase. Safe water from the current source at the project site will be used for hygienic purposes.

2.7.2.3 Material storage and handling

The store for non-hazardous materials will be accommodated within the site office. Materials to be stored in this store shall include samples for review by consultants. Hazardous materials shall include paints, solvents, oil, grease, and vehicle fuel etc. The store for these materials shall be a waterproof concrete floor to contain spills. All hazardous chemicals shall be stored and handled based on the manufacturer's instructions. The bulk materials stored on-site include sand, ballast, stones, cement, quarry chips and timber. The contractor intends to have materials delivered in small quantities to avoid any form of deposit that will impede site activities, induce safety hazards, and create a nuisance to the neighbourhood. A special store will be allocated for storing cement.

Since it is readily available in the Municipality, a reasonable quantity will be delivered to the site as appropriate. Timber will be used mainly for roofing, formwork, ceiling, joinery and other carpentry needs, will be used for all formworks. All joinery works will be fixed at the workshop outside the site before being delivered ready for application. Consideration will be given to the working area and material storage requirements to ensure no conflict with the workers' movement.

2.7.2.4 Construction Activities

The construction activities will be done within the fenced site and this will help control access to the site for security and safety purposes. The fence will also reduce the amount of dust and other solid wastes that can get into and out of the site, especially if the climate becomes windy. Site clearance and excavations will be carried out using earth-moving equipment. The project site is generally flat and greenfield. It is not envisaged that significant site preparation will be required to commence work. The excavated material will be removed from the site and dumped at the approved dumpsite. The rest of the excavated material will be used for landscaping.

Backfilling of the excavated area will be carried out using marram and quarry chips compacted in layers to achieve firm bases for the buildings, driveways, and parking. Mixing of concrete using diesel driven concrete mixers will be carried out at the site. The process will generate noise, smoke and dust, especially from the cement. The main contractor will provide workers with appropriate personal protective equipment and sensitize them on their usage and management of air pollution from construction machinery. Local contractors and planners will work based on the recommended designs given by OUT.

2.7.2.5 Construction contractor qualification

Finding and hiring the right construction agency for the construction of lab is the key step for the success of the project. The construction Contractor with satisfactory qualification and expertise helps in making the laboratory functional and achieve standards of biosafety practices for safer working environments. The following essential qualification criteria will be considered when hiring a construction agency for the proposed lab: (i) the minimum average annual turnover during the last three financial years (as per their audited balance sheets) must be adequate to make sure that agency would be able to complete the project. (ii) successful and timely completion of at least one similar project (construction, testing, commissioning and validation of laboratory) including civil, electrical, HVAC works, door interlocks, access control system, primary barrier containment equipment, decontamination system, etc.

Additionally, the ability of construction agency for designing and planning, correct evaluation of architectural layout plans, men and material movement plans, zoning plans, specialized systems and services schemes, services and utilities schemes, laboratory commissioning and validation protocols, laboratory security protocols and integration of laboratory and equipment will be assessed.

2.8 OPERATION OF THE PROJECT

2.8.1 Commissioning of the laboratory

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. Conducting meetings and seminars in the conference room. Commissioning of the laboratory would be performed done by the Project implementation Team (PIT) of the Open University of Tanzania. The PIT will furnish checklists for the laboratory features to be evaluated, depending on the design. Initially, the laboratory needs to pass a series of inspections and tests to meet standards that have been pre-developed, authorized, and specified in the design and construction documents before hazardous agents are used.

These are in addition to the desired outcomes by the commissioning team identified prior to initiation of construction activities. A properly designed and constructed containment facility, including its structural and mechanical safety systems, must meet predetermined performance criteria and be operational upon completion of construction. The integrity of the critical components of the project will be verified by the testing and certification requirements. Certification of the lab, including structural components and safety systems, will be included as part of the overall commissioning processes normally undertaken to verify that the design and construction meet applicable standards, and that the project can operate in accordance with the design intent. Commissioning testing will also be performed without degradation to the project or mechanical system that is being tested. All equipment and materials would be tested/evaluated prior to installation; duplicate testing is recommended.

2.8.2 Power supply

The power supply at the OUT Pwani Regional Centre is from TANESCO through an overhead 33kV transmission line running along the Soga Pwani Road. The proposed project will apply for connection to the existing TANESCO line. A new transformer shall be installed for the proposed project. This will step down the incoming power to the project MV reticulation. All medium voltage switchgears shall be designed for a fault level of 50 kA and the circuit breakers will each have earthing switches. Circuit breakers will be located outside the building and will be labelled. In the laboratory an emergency power will be provided for Heating, Ventilation, and Air Conditioning system (HVAC, alarms, emergency lighting, and storage freezers incubators. The project plans to install standby continuously rated generators to fortify power interruptions that may arise during operations. The lighting systems will be low voltage with general light and spotlight fittings built in the ceiling. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

2.8.3 Water supply

The project operation will require water for laboratory process, workers use, cleaning and sanitation as well as for emergency specifically for fire-fighting in case the facility catches fire. The project site is already connected to the Dar es Salaam Water Supply and Sewerage Authority (DAWASA). Water supply will be connected from the existing 200mm diameter cast iron pipe. The OUT will design the distribution system

of water within the project area. The OUT will install a water storage tanks. Water storage tanks will be covered and frequently inspected to ensure that there has been no contamination and are regularly cleaned. The expected usage of water for the project at full operation scenario is in the range of 1,000 to 2,000 litres per day. Also, raised water supply tank of 5,000 litres and firefighting tank of 10,000 litres will be installed.

2.8.4 Solid and liquid and solid waste management

2.8.4.1 Hazardous and non-hazardous solid waste

The proposed project will generate different types of solid waste including electronic wastes like printer cartridges/ribbons, un-functional electronic equipment (computer, printer, bulb, Air Condition), papers, packaging materials, plastics, organic (vegetables and food wastes) from users, visitors, etc. The OUT management will provide a double-lined waste and recycling receptacles at each strategic point. Proper segregation of waste at source generation (at each laboratory section/department) will be done for efficiency and effective in managing waste. Segregation will involve putting different classes of wastes into separate and appropriate temporary storage color-coded containers/bags. Color coding is one of the efficient ways of achieving segregation of waste and for sorting out items such as paper, plastic, glass and metal for recycling. The waste generated from proposed laboratory building will be segregated and color-coded as outlined below in Table 2.1 as recommended by WHO.

Table 2.1: Laboratory waste collection and segregation methods

Waste categories	Colour of container and markings	Type of container	Collection frequency
Infectious waste	Yellow with biohazard symbol (highly infectious waste would be additionally marked HIGHLY INFECTIOUS).	Leak-proof strong plastic bag placed in a container (bags for highly infectious waste would be capable of being autoclaved).	When three-quarters filled or at least once a day.
Sharps waste	Yellow, marked SHARPS with biohazard symbol.	Puncture-proof container.	When filled to the line or three-quarters filled.
Pathological waste	Yellow with biohazard symbol.	Leak-proof strong plastic bag placed in a container.	When three-quarters filled or at least once a day.
Chemical waste	Brown, labelled with appropriate hazard symbol	Plastic bag or rigid container.	On demand.
Non- hazardous Waste	Black	Plastic bag inside a container or container which is disinfected after use.	When three-quarters filled or at least once a day.

The OUT will designate waste collection from all project components for subsequent delivery to the approved Kibaha Town dumpsite (Council has set aside an area of 12 acres for one sanitary landfill at Misugusugu ward, however, this area is not yet planed for sanitary landfill. For the time being a temporary dumping place at Kidimu Mtaa is being used). The OUT will use a centralized waste management system whereby it will hire one waste management company to collect all wastes within the project area and will be responsible for transporting them to the approved Kibaha Town dumpsite. Table 2.2 indicates which types of waste may be disposed of and indicated the manner in which they will deposed.

Table 2.2: Waste type and disposal options

SN	Waste type	Special Specifications			Disposal options
		Burial	Burning	Approved dump	
1	Inert Construction	Waste / rubble	N/A	Allowed	Re-used to backfill the local quarries and borrow-pits
2	Paper	Allowed	Allowed	Allowed	Incineration at OUT incinerator
3	Cloth	Allowed	Allowed	Allowed	Incineration at OUT incinerator
4	Wood	Allowed	Allowed	Allowed	Incineration at OUT incinerator
5	Scrapers and other metal wastes	Not feasible	Not feasible	Allowed	Sold/provided to NEMC scrap metal dealers for recycling or reused to the extent practicable
6	Plastics	Prohibited	Prohibited	Not feasible	Send waste to recycling plant
7	Organic (vegetables & food wastes)	Allowed	Not feasible	Allowed	Shall be collected and dumped at the Dumpsite
8	Used motor Oil	Prohibited	Prohibited	Not feasible	Collected in drums and stored on dedicated site with a roof and an impenetrable floor. Later the oil will be collected by the authorised NEMC certified oil collector.
9	Used oil filters	Prohibited	Prohibited	Not feasible	Accumulated in the drums at site waiting for certified agents to collect.
10	Electronic wastes and un-functional electronic equipment	Prohibited	Prohibited	Prohibited	Will be collected at the site and when there after will be handed over to the certified government E-waste collectors for final disposal/re-use
11	Batteries	Prohibited	Prohibited	Prohibited	Collected and sent to Dar es Salaam for recycling companies e.g., YUASA
12	Empty chemical containers	Prohibited	Prohibited	Prohibited	collected and stored on the controlled store. Disposal will be handled by hazardous waste handler registered by NEMC

The designated Safety and Waste Management (SWM) staff will be responsible for managing the records of laboratory waste inventory, characterization of waste, assisting with the waste determination and proper separation at source, receiving hazardous wastes from laboratories that will be identified with proper labelling to store at Hazardous Waste Storage Room. All researchers and students who will generate chemical/biological waste will follow the guidelines in the Laboratory Waste Management Plan. They will be responsible for ensure the appropriate handling of waste containers, proper labelling and safe delivery to SWM-staff at a scheduled date.

2.8.4.2 Wastewater

Currently OUT is managing liquid waste with the use of onsite waste treatment system. The treatment system is composed of septic tank//manhole that collectively receives waste from the existing building. Once the waste is submerged in the holding tank, the waste is then flows into consecutives of double

chambered septic tank and sock away pits. The septic tank allows the waste to rest in the first chamber and so that the sludge precipitates. Once the sludge is retained, the effluent further enters into sock away pits.

This sock away pits are packed with different porous sized gravels, cobbles and sands of different mesh size. Wastewater from auxiliary systems (sanitary water) to be generated by the proposed project also will be treated on new constructed septic tank and soak away pits. The septic tanks will be emptied regularly by Municipal Council Septic tank emptier tankers for final disposal. The amount of wastewater generated from washing and auxiliary at the site is estimated at 1 – 1.5m^3 (1000-1500litres) per day when the students are on site using the laboratory.

2.8.4.3 Effluents from the laboratory

Every laboratory trial generates some type of waste materials, depending on the experiments performed in laboratory. Some effluents contain filtering (paper filter, filtration aids), oils and grease, and some contain toxic materials, hazardous chemicals and organic solvents. The effluents generated in these laboratories (Physics, Chemistry and Biology) are characterized by extremely low pH, high COD, heavy metals and sulphate. With the initial uses of about 100 liters per day on the laboratory the anticipated effluents will be in the region of 40 to 50 litres per day. Use of a public sewer line is one of the options considered for treating and disposing effluents generated from the proposed project.

However, this alternative is not possible currently because there is no municipal main or trunk sewer within the project area to which an OUT-sewer system could be connected. The proposed project will develop its own septic tank at the project site to dispose its own effluents. Septic tanks will be constructed according to international standard and will be monitored to avoid ground water pollution. Wastewater collected from the laboratories will flows to a network of collection pipes and from there will be transferred to the constructed wastewater treatment/containment tank (Septic tank) of approximately 5,000 liters. The tank will have two compartments. First compartment will be settling compartment which will again collect finer solids. The settling compartment will be used as chemical treatment compartment. The Technical Specifications of the chambers are as follows height: 68.125" (170cm); width: 49.25" (123cm) and length: 125" (312cm).

2.8.4.4 Storm water drainage system

The project will establish a network of paved storm water drainage at site and thereafter connect to the rainwater harvest tank to be constructed on site.

2.8.5 Health and Safety

Full safety and equipment standards will be applied to the proposed project. To ensure that everybody works in a safe manner in a safe environment, the workers/students will be provided with protective gears. Also, personnel's will be trained in the safe use of equipment and in safe working techniques. Laboratory-safe refrigerators or metal flammable cabinets will be used to store flammable/combustible materials. The laboratory will be periodically monitored to assess its safety. The OUT will install near the exit door of each laboratory room, fire extinguishers such as CO_2, foams and fire horses. The OUT will install first aid facility and annual first aid training will be provided to all first aiders. First aid kits always will be available at working site / in the vicinity. There will be enough kits in order to provide optimal help in case of an emergency. Further, an alarm will be provided for fire hazard and intrusion detection systems. Alarms will be audible above ambient noise and visible throughout the project area. Alarms will be on UPS power.

2.8.6 Security

Security measures in place at the project site will include long concrete wall/fence, security lights, and 24-hour security guards. Controlled access points to the laboratory and offices will be established and manned. The lab access controls will be provided to record entry and exit times and dates. Palm scan, keypad entry with codes unique to each worker, cardkey or equivalent will be used. Attention shall be paid in the design and layout to safe and easy maintenance, as well as emergency escape and fire protection. It is envisaged that actual security will be contracted out. As part of the security contract, a suitable office for the security supervisor and basic equipment will be included in the civil scope. All vehicles that enter the premises through the access points are recorded (reason for visit, time and contact details). Records are filed and used for quality control.

2.8.7 Staffs

The proposed project will have both professional and auxiliary staffs that are required for the continuous and proper operation of the laboratory. It is estimated that the project will create additional permanent employment of about 5 to 6 people during operation and will create about 50 to 100 employment opportunities during construction. The OUT will recruit its staff based on their qualification and experience without consideration of their gender, race, ethnicity, age, religion, pregnancy, marital status, HIV status or sexual orientation as long as they demonstrate that they are capable of doing the job. This commitment will extend to other employment decisions such as promotion, training, compensation, discipline and discharge; and to terms, benefits, privileges and conditions of employment. The OUT actively seek to recruit qualified staff from the local community in order to pass on income and skills development benefits to them.

2.8.8 Project management and supervision

During construction, OUT through the Project implementation Unit (PIU)) and the consultants, will supervise and monitor 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 Deputy Vice Chancellor. The management meetings provide support, guidance and oversight of the progress of the PIU. Furthermore, an established diverse Advisory Committee advises the OUT on technical and academic issues.

Further during operation, the OUT Pwani Centre Director will be responsible for ensuring that the physical components of the laboratory designed for academic purposes for teaching students through practical's is working properly and properly maintained. In case not well maintained, the laboratory operation may be halted.

2.8.9 Communication and handling complains

The Project implementation Unit will oversee all project activities and is responsible for the day-to-day operation of the HEET project. During construction the Project implementation Unit will overseas all environmental issues and assist in safeguarding the major focal point. Internal communication is done in the meetings where a report on progress of the work plans is communicated. The OUT has appropriate communication procedures and processes established within the University organisation structures. The Regional Advisory Committees (RACs) in the region, PMU and the designated Monitoring and Evaluation

team will conduct the internal monitoring of the science laboratories implementation to identify as early as possible the activities achieved and the cause(s) of problems encountered so that arrangements in establishment process can be adjusted. Related information will be collected monthly from the field to assess the progress of science laboratories implementation and will be consolidated every quarter by:

i) Overseeing that the Laboratory establishment is implemented as designed and approved.
ii) Verify that funds for implementing the Science Laboratories project are provided in a timely manner and in amounts sufficient for their purposes, and that such funds are used in accordance with the provisions of the intended purposes.
iii) Record all grievances and their resolution and ensure that problems are dealt with in a timely manner.
iv) The team will incorporate the status of science laboratories implementation schedule of activities in the overall Project progress report to the funding organ.

Further there is a well-defined Grievance Redress Mechanism (GRM) guideline that guides students, staff, stakeholders, and the surrounding community to raise their concerns. The objective of GRM is to ensure that complaints and grievances of the OUT staff, students the surrounding communities and project's activities are recorded and acted upon in a timely, effective and transparent manner. All grievances associated with the OUT's operations apart from project construction activities are called general grievances. Therefore, the grievance officers shall collect general complaints and concerns and administer them by OUT Grievance Redress Integrity Committee (ORIC) at the University level. If the Grievant is not satisfied with the decision of OGRIC, he/she may channel the Grievance to legal redress.

A GRM document to control procedure according to the OUT guidelines document on grievances handling mechanism (process and procedures) is in place that provides guidance to register and file all environmental and social documents related to the management of the proposed project (including complaints). All environmental and social registers, files and reports related to the project are controlled by the Environmental and Social Safeguards specialist.

2.9 DECOMMISSIONING PHASE

The proposed Science Laboratory Building may last for a very long time since rehabilitation is done as the need arise. Major rehabilitation and/or upgrading could involve dismantling and erection of new buildings. Also, the government may decide to develop an entirely new laboratory at a new site or expand the current OUT buildings to be a full-fledged Independent University. This may result in the laboratory eventually closing down.

2.10 ESTIMATION OF TOTAL INVESTMENT IN THE PROJECT

The project's total capital outlay for completion is currently estimated at TZS. 1,826,348,062.50 to cover all project components.

2.11 LIFE SPAN OF THE PROPOSED PROJECT

The proposed project has an anticipated life span of about 100 years.

CHAPTER 3
POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 INTRODUCTION

Policy, legal and administrative frameworks are the basis of Environmental and Social Impact Assessments (ESIA). A policy framework is required to provide broad guidelines on areas of focus in undertaking environmental management activities in the sector adn develop mitigation plans. A legal and regulatory framework is essential for providing mandate, allocating specific responsibility and accountability to key factors and stakeholders, and also prescribes and enforces specific operating environmental procedures and standards to be udbnertaken during implementation. Finally an institutional framework is required to develop policies, guidelines and plans; to ensure compliance with laws and regulations; and to monitor, review and adapt policies, plans and regulations in the light of experience and a as a platform for monitoring compliance.

In preparing plans, for ESIA, the specific institutions take account of location, cumulative and strategic development issues, and define development objectives, economic and environmental standards and safeguard targets, and decision criteria. Without such a context the findings of any ESIA will have little meaning; the decision criteria will be inconsistent, and mechanisms for ensuring compliance with any recommendations will be lacking. In particular, there will be no mechanism for addressing cumulative and incremental environmental issues. The project for which this ESIA was prepared needs to comply with the World Bank Environmental and Social Framework (ESF) requirements and Tanzania's national environmental policy and legislation. The legislation applicable to this project addresses two important aspects of environmental quality and proper management of natural resources.

For the appropriate implementation of the proposed project, the OUT and associated contractors are recommended to observe the policies, legislation and administrative issues pertaining to the environmental management as indicated below. This chapter addresses policies, laws, regulations, strategies and institutional arrangement that are relevant to the proposed Construction of Three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region.

3.2 RELEVANT POLICIES

3.2.1 The National Environmental Policy, 2021

The National Environmental Policy (2021) sets broad goals committing Tanzania to sustainable development of its natural resources. The 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.

These provisions mean that the OUT will have to undertake measures to ensure that the environmental integrity, commensurate with other activities taking place around the project site is maintained.

3.2.2 The Land Policy (1995)

The National Land Policy emphasizes the importance of undertaking EIA for the management of land-based development. The policy also advocates the protection of land resources from degradation for sustainable development. The policy addresses several environmental issues such as, among other, observing land use planning. The project site is located in a designated area and thus does not contradict the provisions of the policy. Land use planning, takes into consideration the land capability, ensures proper management of land resources, promote resource sharing and multiple land use techniques. The OUT is a legal owner of the land and there is no any land dispute. The relevant issues pertaining to land policy were observed and are hereby further complied with by undertaking of the study.

3.2.3 The Water Policy (2002)

The main objective of this revised policy is to develop a comprehensive framework for sustainable development and management of the Nation's water resources, in which an adequate legal and institutional framework for its implementation will be put in place. This framework promotes the optimal, sustainable and equitable development and use of water resources for the benefit of all Tanzanians, based on a clear set of guiding principles. The policy provides for beneficiaries' participation in water supply schemes. It addresses cross-sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management. The policy provides a shift of Government roles from service providers to coordination, policy and guidelines formulation, and regulation. Public consultations conducted for the cause of the assessment for this project brought stakeholder participation in line with the policy objectives.

Furthermore, by undertaking this study, the potential pollution to water resources has been looked upon for the purpose of mitigating. The potential pollution to water resources has been looked upon to mitigate the potential pollution to water resources has been looked upon to mitigate the same.

3.2.4 The National Construction Policy (2003)

Construction project, such as the proposed project, is among key areas embraced by the construction policy. Among the primary objectives of the policy, which support sustainable construction sector include: to promote the application of cost-effective and innovative technologies and practices to support socio-economic development activities such as water supply, sanitation, shelter delivery and income-generating activities and to ensure application of practices, technologies and products which are not harmful to both the environment and human health.

Through this assessment, OUT is expected to abide to the relevant provisions of the policy to ensure compliance of the development.

3.2.5 The National Employment Policy (2008)

The major aim of this policy is to promote employment mainly of Tanzania Nationals. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and section 10.1 is mainly focusing on industry and trade sectors (ii) 10.6, which deals with the 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.

During implementation of the project, the OUT 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.

3.2.6 The National Human Settlements Development Policy (2000)

The overall objective of the National Human Settlements Development Policy (NHSDP) is to promote the development of sustainable human settlement and to facilitate the provision of adequate and affordable shelter to all people, including the poor. The policy outlines a number of some objectives, including environmental protection within human settlements and protection of natural ecosystems against pollution, degradation and destruction.The NHSDP recognizes planning and management of human settlement areas as one of the broad human settlement issues.

Within this regard, the NHSDP identifies environmental protection as one of the strategic issues in human settlement planning and development. The OUT is expected to abide with NHSDP to ensure compliance of the development with NHSDP.

3.2.7 The Energy Policy of Tanzania (2015)

The policy focuses on utilising various energy resources, including water, forests, gas, coal, petroleum, sun and wind, in a sustainable and environmentally friendly manner. The policy states that energy is a prerequisite for the proper function of nearly all sub-sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of development endeavours. A significant policy objective on energy end uses the progressive reduction of dependence on imported energy through demand management to reduce the negative effects of continued dependence on imported petroleum products. The policy insists that activities in energy auditing in the developmental project and energy conservation should be done.

Major losses shall be dealt with by the OUT, and cost-effective solutions or recommendations on ways to reduce energy losses shall be implemented. Thus, the project is quite in line with the energy policy requirements.

3.2.8 The National Investment Promotion Policy (1996)

The policy has stressed the need for modernization of equipment and technological upgrading of the process to enable optimal use of available sources, improved efficiency operation, improvement in the quality of products and co-products, etc. The policy encourages the protection of the environment in line with the country's socio-economic policies. Under the policy, developers must undertake activities in a manner that best contributes to consumer and environmental protection. The developers are also

encouraged to use local raw materials/components. This environment impact assessment is undertaken to ensure that OUT will abide by the relevant provisions of the policy to ensure compliance with the development.

3.2.9 The National Health Policy (2017)

This Policy emphasized the need to increase community involvement in health development and improve access and equity in health and health services. One of the main objectives of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in work-places, promotes sound use of water. It promotes the construction of latrines and their use, and encourages the maintenance of clean environment; a working environment conducive to satisfactory work performance. The OUT shall observe this policy.

3.2.10 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 will result into social interactions among workforce and therefore the company will adhere to the policy.

3.2.11 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 phase and operation phases.

3.2.12 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, infrastructure and facilities for training highly qualified human resources for the country and the regional market.

3.2.13 The Urban Planning and Space Standards Policy (2012)

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

3.3 RELEVANT NATIONAL PLANS/STRATEGIES

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

3.3.1 The Tanzania Development Vision 2025

The Goal for the Tanzania Development Vision 2025 foresees the poverty alleviation through improved socio-economic opportunities, good governance, transparency, and improved public sector performance. These objectives deal with economic issues and include social challenges such as education, health, the environment, and increasing involvement of the people in working for their development. These objectives aim to attain sustainable development of the people.

This vision also speaks about that the 21st Century being dominated by the advanced technological capacity, high productivity, modern as well as efficient transport and communication infrastructure, which is quite relevant to this project, Vision 2025 seeks to mobilize the people, the private sector, and resources of the nation towards the achievement of shared goals and achieving a sustainable middle market economy by 2025. The vision outlines Tanzania's plans and strategic goals covering all sectors of the economy. It outlines institutional changes that must take place to enable Tanzania to make progress suggested in the vision. The proposed project will stimulate local economic growth and contributing to realising the Vision's objectives.

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

This Plan is the final Plan in implementing the Tanzania Development Vision 2025 as the National overall development framework. The Plan is a continuation of the Government's efforts in enduring exertion to further improve the standard of living for all Tanzanians. The theme of realising competitiveness and industrialization for human development aims to increase efficiency and productivity in manufacturing using the resources available in the country. Areas of inspiration in the Plan include increasing the country's capacity for production; building a competitive economy that will stimulate the country's participation in trade and investment; and stimulating human development. By implementing this project, the OUT is promoting the development in Tanzania, which is the focus of the FYDP III.

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

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

3.4 PRINCIPAL LEGISLATIONS

Tanzania has a number of laws touching on the environment and social issues. This includes legislation requiring developers to subject their proposed projects to environmental impact assessment. This section addresses the legal and regulatory conditions relevant to the proposed project. The proposed project will need to be planned and operated in general compliance with these legislations. Some of the relevant legislation and regulations that are relevant in the management of the environment include the following:

3.4.1 The Environmental Management Act, Cap 191

The Environmental Management Act cap 191 builds on NEP's vision of a consistent and coherent environmental management framework. The Act introduces a concept of the right of Tanzanians to a clean, safe and healthy environment and the right of Tanzanians to access various segments of environment for recreational, educational, health, spiritual, cultural and economic purposes (Section 4 (1) and (2)). The Act imposes an obligation on developers to:

i) Comply with license conditions, including the EIA certificate (S.201). The act requires the developer to conduct an EIA before 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.
ii) As land users and occupiers to protect, improve and nourish the land and use it in an environmentally sustainable manner (S. 72)
iii) Abstain from discharging any hazardous substances, chemicals, oils or their mixture into waters or any segment of the environment (S.110)
iv) Comply with environmental quality standards (S.141)
v) Control, manage, and dispose of waste including litter, liquid, gaseous & hazardous wastes (Part IX).

This Act also provides a legal framework necessary for coordinating harmonious and conflicting activities to integrate such activities into an overall sustainable environmental management system by providing key technical support to sector Ministries. As such, the OUT undertook, this study to comply with EMA requirement.

3.4.2 The Open University of Tanzania Act, [Cap. 268 R.E 2019]

The Open University of Tanzania (OUT) is a fully fledged, autonomous and accredited public University, established by an Act of Parliament Number 17 of 1992. The Act became operational on 1st March 1993 by the publication of Government Notice No. 55 in the Official Gazette. The first Chancellor was officially

installed in a full ceremony on 19th January 1994 and the first batch of students was admitted in January 1994. In January 2007, following enactment of the Universities Act No. 7 of 2005, OUT started using the OUT Charter and Rules (2007) for its operations. he Open University of Tanzania offers its certificate, diploma, degree and postgraduate courses through the open and distance learning 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). The OUT operates through a network of about 30 Regional Centres; 10 Coordinating Centres, of which one is in Zanzibar and one in Pemba; two are in Kenya (Egerton and Njoro), one is in Rwanda (Kibungo), one in Namibia and one in Uganda. Other OUT Internal Coordination Centres are the African Council for Distance Education – Technical Collaboration Committee (ACDE TCC), the Centre for Economics and Community Economic Development (CECED) and the SADC Centre of Specialization in Teacher Education (SADC ODL CoS TE). OUT has also 69 Study Centres spread throughout the United Republic of Tanzania.

3.4.3 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. This will be ensured by implementing the Environmental Management Plan as outlined in Chapter 8 of this report.

3.4.4 The Occupation Health and Safety Act, 2003 (Act No. 5/2003)

This Act deals with the protection of human health from occupational hazards. It specifically requires the employer to ensure the safety of workers by providing safety gear at the work place. Relevant sections of this Act to the project activities include Part IV which deals with general health provision, such as provision of regular medical examination of employees; Safe means of access and safe working place; Prevention of fire etc.; and Part V on health and welfare provisions, which includes provision of supply of clean and safe to workers, sanitary convenience, washing facilities and first aid facility. Section 50 deals with fire prevention issues. Section 15 gives powers to the Registrar of factories and workplace to enter any factory or workplace to perform his duties as provided by the Act. Section 16 requires that factories and workplace to register with Registrar of factories and workplaces before commencing operations. OUT will observe the provision of this Act during construction and running of the proposed project.

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

This Act establishes Urban authorities for local government, to provide for the functions of those authorities and other matters connected with or incidental to those authorities. Section 55 of the Act enumerates the basic functions of the Urban authorities. The functions that are relevant to the proposed project are to provide for the prevention and reduction of public nuisances or of nuisances, which may be detrimental to the public health or the good order of the area of the authority and to regulate any trade or business, which may be harmful and detrimental 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 (e.g., building permit) and to facilitate the regulation of any such trade or business, and for the imposition of fees in respect of such licenses. Also, the LGA has the mandate to monitor/ inspect environment and social performance. The provisions under this Act and other enacted subsidiary

legislation and by-laws relevant to the issue of project and environmental pollution have bearing to the OUT. The Company will comply with all legal local government requirements.

3.4.6 The Water Resource Management Act, 2009 (Act No. 12/2009)

The Act provides for an institutional and legal framework for sustainable management and development of water resources; outlines principles for water resources management; for prevention and control of water pollution; and provides for the participation of stakeholdersand the general public in implementing the National Water Policy. The relevant provision of this act is that the water "Shall not be polluted with any matter derived from such use. Also, to such extent, as to be likely to cause injury either directly or indirectly to public health to livestock, or fish, to crops, orchards or garden, which are irrigated by such water or to any product in the processing of which such water is used". 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.

The OUT will comply with the Water Resource Management Act of 2009. The project needs to understand the procedures for discharges to open environment and water quality maintenance provided by this Act.

3.4.7 The Workers Compensation Act, 2015

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

The OUT respects the provisions of the Workers' Compensation Act and will therefore observe its requirements in addition to safety measures provided in this report.

3.4.8 The Land Use Planning Act No.6 of 2007

The Act provides for the procedures for preparation, administration, and enforcement of land use plans; to repeal the National Land Use Planning Commission, and provide for related matters. The Act has distinctive land use planning authorities in Tanzania laid down with their functions and powers. The power vested to authorities that give them power to enforce approved land use plans, including taking defaulters to the court of law.

The OUT is committed to observing the provisions of this Act and the project is planned under the requirement of this Act. This project has contravened no land land-use plans and there is no issue of conflicts with existing Land Use plans.

3.3.9 The Urban Planning Act No. 8 of 2007

The law provides for the orderly and sustainable development of land in urban areas such as Kibaha Town, to preserve and improve amenities; to provide for the grant of consent to develop land and powers

of control over the use of land and to provide for other related matters. The Act provides for procedures for enforcement of Urban Planning; addresses different issues related to urban planning and insists on conservation and environmental protection to enhance social justice in the acquisition of land for planning purposes. This is also an important environmental provision, which introduces the requirements for environmental impact assessment at least in respect of land use matters.

The OUT is committed to observe the provisions of this Act and the project is planned in accordance with the requirement of this Act.

3.4.10 The Contractors Registration (Amendments) Act No. 15 of 2008

The Contractors Registration Board (CRB) is a government autonomous regulatory body established to register all types of contractors and regulate their conduct to protect consumers of construction services in Tanzania. The body is governed by the Contractors Registration Act No. 17 of 1997, amended and published as The Contractors Registration (Amendments) Act No. 15 of 2008. 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. On executing its construction activities, OUT shall appoint a registered contractor and make sure that the Act's provisions are adhered to.

3.4.11 The Engineers Registration Act No. 15 of 1997 and its Amendments of 2007

The Act provides a restriction that no person other than a registered engineer shall engage in professional engineering work or services, including 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. Also, processes work or projects where public interest and welfare, or the safeguarding of life, public health or property is concerned or involved, requiring the application of engineering principles and data. Furthermore, the Act stipulates that no person shall employ or continue to employ a professional engineer who is not a registered engineer.

The OUT shall therefore observe the Act's provisions when executing its activities during construction and, if need be, during operations.

3.4.12 The Public Health Act, 2008

This Act provides for the promotion, preservation, and maintenance of public health to ensure the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. The Act prohibits indirect discharges of wastewater to public drainages. It is an offence to emptied or to pass into any sewer or any drain any matter likely to injure the sewer or drain, interfere with the free flow of its contents, or effect prejudicially the treatment and disposal of its contents. Part VII of the Act contains provisions relating to the minister's powers to make regulations relating to notification of infectious diseases and communicable diseases, prevention and control of infectious diseases, control of mosquitoes, and vaccinations. It also provides for a general penalty where the specific penalty has not been specified. The OUT will comply with the above provisions through this ESIA study as indicated in the ESMP.

3.4.13 The HIV and AIDS (Prevention and Control) Act, 2008

The HIV/AIDS Act, No. 28/2008 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 shall also adhere to the requirements of the Act.

3.4.14 The Fire and Rescue Service Act No. 14 of 2007

This Act provides better organization, administration, discipline and operation of fire and rescue brigade services. Tanzania Fire and Rescue's purpose is to enhance community safety, quality of life, and confidence by minimizing the impact of hazards and emergency incidents on Tanzania's people, environment, and economy. The force manages fire emergencies in Tanzania's major cities and towns and responds to rescues, hazardous materials incidents and possible terrorist activities. The Force work with other government agencies to minimize the impact of bushfires, storms, floods, landslides, building collapses, motor vehicle accidents and other emergencies. Also run prevention and preparedness programs to prevent these emergencies and reduce their impact on the community. The project shall comply with this act as installation of fire hydrant, other firefighting equipment and facilities are integrated in the design. Should there be any fire hazards in the project site and at any time, the project proponent shall allow and comply with the requirements of this Act to enable firefighters to do their work. It should be clearly stated how proponent will make sure that,

3.4.15 The Water Supply and Sanitation Act of 2009

The Act intends for the protection of the water resources and the user so that there is a balance between different uses. In general, the Act provides the legal basis among others for - water resources management at National and Basin levels; the administration to legalize, grant, modify and diminish water rights to the use of water by those entrusted with responsibilities for water resources management; to protect water rights for all legitimate water users, hence monitoring the quality and quantity of water sources; water use conflict management and water pollution control and other related issues like water construction. The relevant objective of this Act to the project is the one which states that "preventing and controlling pollution and degradation of water resources" (Part II 4 (1) (h)). Part VI Article 39 elaborates on the need to prevent pollution and the penalties to be taken against one who pollutes the water resources. Various types of waste produced during construction of the proposed project have the potential to pollute water resources. The Contractor will take all necessary precautions to prevent any pollution from the project activities.

3.4.16 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, design, construction and operation.

3.4.17 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 Act will protect against child labour, especially during the construction period.

3.4.18 Antiquities Principal Act, 1964 and (Amendment 1979)

This Act provides for the preservation and protection of sites and articles of palaeontological, archaeological, historical, architectural, artistic, ethnological, or scientific interest. It serves to protect and preserve the Antiquities of the country. Relevant sections of the Act include Section 3 dealing with declaration of any place as a historical place, section 6 which prohibits excavation within such place without a licence, and removing or collecting of relics or search for ethnographical object without license and Section 9 which prohibits exchange of illicit etiquettes. Since the project will be situated at Bungo Mtaa, the OUT will ensure that their contractor is adequately informed of these provisions of the Act.

3.4.19 The Architects and Quantity Surveyors Act No. 16 of 1997 R.E. 2019

This Act established the Board of Architects and Quantity Surveyors responsible for registering and regulating the Architects' conduct, Quantity Surveyors and Architectural and Quantity Surveyors Consulting Firms. The project proponent is observing the requirements of this Act by engaging registered and certified Architects and Quantity Surveyors in the design of the facilities. It is ready to assist the Board during inspections of the project works.

3.5 NATIONAL REGULATIONS

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

These regulations have provided the list of projects which requires 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 study has been carried out under these regulations.

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

Section 83 of the EMA (2004) stipulates that the Environmental Impact Assessment shall be conducted by experts or firms of experts whose names and qualifications are registered by NEMC. The NEMC maintain a registry of EA and EIA experts. These regulations also set the code of practice of the experts

for which the Environmental Impact Assessment experts for this project subscribe. This study has been carried out by the registered expert by NEMC.

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

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

3.5.4 The Environmental Management (Air Quality Standards 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 Air Quality Standards Regulations (2007) and the Tanzania Bureau of Standards TZS 845:2005 specifies the highest permissible quantity for emissions and the acceptable test methods.

In addition, the project during construction will engage heavy earthmoving machinery and may need to provision for heavy-duty farm tractors and harvesters. Also, generators for standby power generation during periods of the power outage and these machines would need to comply with the 4th Schedule of the Act and Tanzania Bureau of Standards (TBS 2005) EMDC 2(1758) Air quality on vehicular exhaust emission limits which applies to motorcycles, cars and heavy-duty diesel engines. The latter is considered in Table 3.1:

Table 3.1: Emission limits for Heavy Duty (HD) Diesel Engines

Pollutant	Limit (g/kWh smoke in m^{-1})	Reference Standard
CO	4.5	Euro I
HC	1.1	Euro I
NoX	8.0	Euro I
PM	0.612	Euro I
Smoke	0.15	Euro III

Source: Environmental Management (Air Quality Standards G. N. No. 237) Regulation, 2007

Under Air Quality Standards 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).

3.5.5 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 and the National Environmental Standards Committee. These committees 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.

3.5.6 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 to the by monitoring the key parameters as detailed in chapter 9 of this report.

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

The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations (2015) formulated under Sections 140, 147 and 230 of EMA for the control of noise (loud, unreasonable, unnecessary on unusual) and vibration pollution that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Focus areas include:

i) Noise management by the owner of machinery or occupier of facility or premises to control noise and to install sound level meters for the measurements and monitoring sound.
ii) Noise emission License issued by NEMC Director-General to owner or occupier of premises whose work or activity is likely to emit noise over the permissible noise levels.
iii) Compliance order, protection order or stop order issued by NEMC or any other empowered authority when any condition of any license or permit has been breached or
iv) Prevention orders and improvement notice issued by Environmental inspector to prevent noise and vibration pollution in an amount, concentration or manner that constitute a risk to human health or environment.
v) The minister may reward any person who will report an incident of incidental concealment or inadvertent emission or noise pollution or excessive vibration.

The objective of the Quality Standards for Control of Noise and Vibration Pollution Regulations is to protect human health from noise and vibration hazards. In this case, two categories have been defined by the regulations noise and vibration for public health hazards and workers for occupational health and safety hazards. In this case, minimum limits have been established for the ambient environment to protect public health and limits for the protection of workers in the working environment. Thus, the OUT shall adhere to these standards as stipulated in Chapters 8 and 9 of this report.

3.5.8 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2019

The Regulations require every person living in Tanzania to have a stake and a duty to safeguard the environment from the adverse effects of hazardous wastes and inform the relevant authority on any activity and phenomenon resulting from hazardous waste that is likely to affect the environment and human health. Further the regulations require a generator of hazardous waste to be responsible for the sound management and disposal of such waste. They shall be liable for damage to the environment and injury to human health. The OUT shall observe the provisions of these regulations and comply if there is any hazardous waste generated.

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

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

3.5.10 The Fire and Rescue Force (Safety Inspections & Certificates) amendment Regulations, 2014

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

3.5.11 The Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations, 2021

These Regulations apply to all categories of electrical and electronic equipment wastes with respect to generation, collection, storage, transportation, importation, exportation, distribution, selling, purchasing, recycling, refurbishing, assembling, dismantling and disposal of electrical and electronic equipment waste or components, and their movement into or outside Mainland Tanzania. The amount of waste electrical and electronic equipment (widely known as WEEE or e-waste) generated every year in Tanzania is increasing rapidly. Waste from electrical and electronic equipment includes a large range of devices such as computers, printers, fridges and mobile phones at the end of their life. This type of waste contains a complex mixture of materials, some of which are hazardous. These can cause major environmental and health problems if the discarded devices are not managed properly. These regulations require the separate collection and proper treatment of WEEE and sets targets for their collection as well as for their recovery and recycling. Thus, the OUT shall comply with all these requirements during the implementation of the project.

3.6 INTERNATIONAL CONVENTIONS

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

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

Tanzania signed the CBD in 1992 and ratified it in March 1996, thereby committing to the conservation and sustainable use of biological diversity. The objective of the Convention on Biological Diversity (CBD; 1992) is to conserve biological diversity, promote the sustainable use of its components, and encourage equitable sharing of the benefits arising from the utilization of genetic resources (see *www.biodiv.org*).

Relevant to this project is Article 6 of the CBD, which provides general measures for conservation and sustainable use of biodiversity. Article 14, which requires parties to carry out EIA on all projects and development which may have adversely impact on the environment. It is expected that during construction, the project activities will involve clearing of secondary vegetation at the project site. However, landscaping and re-vegetation will be carried out upon completion of the works.

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

The UNFCCC or FCCC is an international environmental treaty produced at the UNCED, informally known as the Earth Summit, held in Rio de Janeiro from June 3 to 14, 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Article 4 commits parties to develop, periodically update, publish and make available national inventories of anthropogenic emissions of all greenhouse gases not controlled by the Montreal Protocol (by source) and inventories of their removal by sinks, using agreed methodologies. It commits parties to mitigate GHG as far as practicable. Tanzania having ratified this convention and putting into consideration the nature of the proposed project, there is an apparent need to ensure the project activities live within the carrying capacity of the environment and to avoid the emission of potentially atmospheric debilitating gases.

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

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

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

The Worst Forms of Child Labour Convention, was adopted by the International Labour Organization (ILO) in 1999 as ILO Convention No 182. The Convention supports the prohibition and elimination of the worst forms of child labour, including slavery, forced labour and trafficking in human beings. The convention was ratified by Tanzania on 12:09:2001 and by ratifying this Convention, Tanzania commits itself to taking immediate action to prohibit and eliminate the worst forms of child labour. Thus, OUT shall ensure no child is employed in the project activities.

3.6.5 ILO Convention: C138 Minimum Age Convention, 1973

This Convention C138 (the Minimum Age Convention) provides for a minimum age of 15 years for admission to employment (temporarily set at 14 for some developing countries). The minimum age for access to employment that is likely to 'jeopardise the health, safety or morals of young persons'– that is, hazardous work – is set at 18 years of age (16 under certain conditions). A difficulty arises in relation to the definition of such hazardous work, as there is no international list of the forms of work that are

considered as posing a hazard. According to the Minimum Age Convention, hazardous types of employment or work that are prohibited up to the age of 18 have to be determined by the competent national authorities after consultation with employers and workers (Article 3(2)).The Minimum Age Convention allows 'light work' to be performed by persons aged 13 to 15 (or even 12 to 14 in certain countries), provided: a) it is not likely to be harmful to their health or development; and b) it does not prejudice their attendance of school or vocational training. The convention was ratified by United Republic of Tanzania on 16:12:1998. As such, OUT shall ensure no child is employed in the project activities.

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

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

3.7 WORLD BANK ENVIRONMENTAL AND SOCIAL FRAMEWORK

3.7.1 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.

3.7.2 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 (ESSs) 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 3.2 below describes the application of the ESSs to the project.

Table 3.2: 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 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. 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 No 24, Bungo Mtaa, Mkuza Ward
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 and there is existing OUT building
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.

3.7.3 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.

3.8 INSTITUTIONAL FRAMEWORK

3.8.1 Introduction

The Tanzania EIA practice gives different functions and responsibilities to all parties involved in the EIA process of any proposed development undertaking to which EIA is obligatory. Table 3.3 provides key institutions to the proposed project. The Environmental Management Act (EMA, Cap 191) give mandate to NEMC to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision-making, exercise general supervision and coordinating over all matters relating to the environment. The Act empowers NEMC to determine whether a proposed project should be subjected to an EIA, approves consultants to undertake the EIA study, invites public comments and has 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 ESIA including site visit and handling Technical Advisory Committee (TAC) meeting, monitoring and auditing of environmental performance of the project (periodic and independent re-assessment of the undertaking).

Table 3.3: Key Institutions to the ESIA Process

Level	Institution	Role and Responsibility
National level	President's Office – Regional Administration and Local Government	• Responsible for matters relating to Regional Administration and Local Government, including giving policy guidelines necessary for the promotion, protection and sustainable management of the environment.
	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 out 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 professional indemnity insurance. • 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. • Also see 3.8.2.3 below
	Ministry of Education, Science and Technology	• 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
	Ministry of Lands, Housing and Human Settlements Development	• Issuing rights of occupancy, • Overseeing land use planning and issues relating to compensation and physical and economic resettlement (if any)
	Ministry of Water Basin Water Offices	• Responsible for issuing water use permits, • Enforcing laws and regulation of water quality and utilisation, as well as permitted discharge levels. • Co-operate between sectors at the local level. • Resolve conflicts between water users.
	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).

Level	Institution	Role and Responsibility
Regional level	Pwani Regional Secretariat Office	• Responsible for environmental coordination of all advice on environmental management in the region and liaises with the Director and the Director General on implementation and enforcement of the Environment Act. • A Regional Environment Management Expert appointed by the Minister responsible for Regional Administration heads the secretariat. • The Regional Environment Management Expert is responsible for advising the local authorities on matters relating to the implementation and enforcement of the Environment Act. The Expert links the region with the Director of Environment and Director General. • Advice on implementation of development projects and activities at Regional level.
District level	Kibaha District Commissioner office	• Oversee and advice on implementation of national policies at District level. • Proper management of the environment in their areas of jurisdiction and carrying out directives given to promote and enhance sustainable management of the environment and as provided under the Local Government. • Performing any functions as provided by the Local Government (District) Authorities Act, 1982. • Advice on implementation of development projects and activities at District level.
Town Council Level	Kibaha Town Executive Director Office	• Coordinate all development activities in the Municipal level. • Municipal Environmental Officer (MEMO) is responsible for project monitoring on environmental issues. • Responsible for all development activities, implementation and/or support in the Municipal. • Enforcement of laws and regulations. • Coordinate environmental matters at the Municipal level. • In charge of monitoring implementation of the project. • Overseeing community-investor relations.
Ward Level	Ward Development Committees – (Ward Councillor, WEO, Ward Environment Committee	• Oversee general development plans for the Ward. • Provide information on local situation and Extension services. • Technical support & advice. • Project Monitoring.
Community level	Mtaa Council (Chairman/ MEO, Environment Committee);	• Information on local social, economic, environmental situation. • View on socio-economic and cultural value of the sites and on proposed drilling operations. • Rendering assistance and advice on the implementation of the project. • Project Monitoring (watchdog for the environment, ensure well-being of residents and participate in project activities.

Level	Institution	Role and Responsibility
	Local communities, NGOs, CSOs, FBOs	• Project monitoring and management (as watchdogs) • Socioeconomic development in the area. • Provides assistance and advice on the implementation of the project. • Part of the project beneficiaries through employment opportunities, income generation and CSR projects.

3.8.2 OUT Project Implementation Unit

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 commission 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 3.4 below; -

Table 3.4: Institutional Responsibilities at 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,

Institution	Roles and responsibility
	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 (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.

Institution	Roles and responsibility
	• Carry out any corrective actions instructed by the Supervision Engineer/consultant; • In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; • Propose and carry out corrective actions in order to minimize the environmental impacts; • Send weekly reports of non-compliance to the Supervision Engineer/consultant; • Send monthly progress reports to the Supervision Engineer/consultant

3.8.3 Key players in implementing the ESMP

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

i) Funding Institutions
ii) The Open University of Tanzania
iii) National Environmental Management Council (NEMC)
iv) Contractor;

3.8.3.1 Funding Institutions

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

3.8.3.2 The Open University of Tanzania - UPIU

The proponent responsibility is to ensure that the implementation process of the ESMP and Mitigation measures are line with the relevant national policies and legislations and World Bank Environmental and Social Standard 1. The OUT has the Project implementation unit (PIU) 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 Deputy Vice Chancellor. The management meetings provide support, guidance and oversight of the progress of the PIU. Further, the PIU will designate among PIU staffs an Environmental and Social Safeguard Specialist(s)who will monitor the implementation during the construction and operation phases of the project. The PIU team has enough staffs with capacity to undertake the required monitoring and supervision roles to include Environmental and Social specialists.

3.8.3.3 NEMC

NEMC is charged with the overall role of providing oversight regarding monitoring for all project activities that have potential impacts on the environment. NEMC will undertake periodic monitoring of the project

during the mobilization, construction and operational phases to ensure that the mitigation measures set out in chapter 8 of ESMP are fully implemented. In respect to this project, NEMC has a specific role of monitoring and ensuring that the mitigation measures are fully implemented as per certificate conditions (to be issued). It will ensure that its Zonal staff are fully trained and equipped to perform its monitoring role. It will review the results of any monitoring and Audit reports generated as part of the project implementation phase and will issue directives based on the monitoring activities to ensure full compliance with the mitigation measures required and address any issues that may arise.

3.8.3.4 The Contractor

The project will be implemented by a Contractor and will be responsible to OUT for constructing the proposed project in accordance with the Technical Specifications required. The Contractor shall implement the project entirely in accordance with the ESIA mitigation measures detailed the ESMP. It is recommended that before commencement of actual construction, the Contractor should submit a work site plan that complies with the national environmental guidelines and an ESMP for the different phases of the work. The environmental plan shall specify the location of sources of materials and disposal area of construction debris as well as other related matters. The plan shall take into consideration the mitigation measures proposed in this ESIA project report. The Contractor shall nominate a Project Environmental Site Officer (ESO) and Project Social Site Officer (SSO) who will be the Contractor's focal point for all environmental and social matters. The ESO and SSO will be routinely on-site for the duration of the construction works. Both officers will have minimum of Bachelor Degree in their respective specialization. The officers among others will be responsible for the following tasks:

i) Drafting environmental and social aspects during project implementation;
ii) Managing environmental, social, health and safety aspects at the worksites;
iii) Participating in the definition of the no working-areas;
iv) Recommending solutions for specific environmental and social problems;
v) Facilitating the creation of a liaison group with the stakeholders at the project site and shall monitor the compliance of ESMP;
vi) Organizing consultations at critical stages of the project with the stakeholders and interested parties;
vii) He/She will be required to liaise with the OUT Safeguard specialist on the level of compliance with the ESMP achieved by the contractor regularly for the duration of the contract;
viii) Controlling and supervising the implementation of the ESMP;
ix) Preparing environmental and social progress or "audits" reports on the implementation status of measures and management of site works.

CHAPTER 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 (Bungo and Mkuza ward) as well as broad description of the area of influence i.e. (Kibaha Town Council, Pwani Region) for the proposed Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre project. The level of details in the various sections depends on the interactions between the project activities and the particular environmental or socio-economic aspect. Information provided in this chapter will be superimposed on to the project concept and components for impact identification, evaluation and development of mitigation measures.

4.2 ADMINISTRATIVE BOUNDARY OF THE STUDY AREA

In order to plan, organize and run its activities, OUT will communicate and associate with various local government authorities from the Regional, Town, Ward and Mtaa level. Administratively the Three Storey Science Laboratory Building is located within the boundaries of the Pwani Region, Kibaha Town Council, Mkuza Ward, Bungo Mtaa. The Kibaha Town Council is among the 7 Councils of the Coast Region. It is located 40km away from Dar es Salaam City. It is bordered by Kinondoni District to the East, Bagamoyo to the North, Kisarawe South and the Small Town of Mlandizi North. The Council has an estimated area of 750 square Kilometers and lies between latitude 6.8° South and longitude 38.2° and 38.5° East. The Council has 14 Wards, which are Tumbi, Mailimoja, Kibaha, Visiga, Mkuza, Kongowe, Misugusugu, Viziwaziwa, Picha ya Ndege, Pangani, Mbwawa and 62 Mitaa.

4.3 PHYSICAL ENVIRONMENT

4.3.1 Climate

Temperature
The area experiences hot and sunny weather almost throughout the year with maximum temperature reaching 30°C in October while the minimum temperature dropping down to about 25°C in July. The average temperature ranges within 28°C. There are four pronounced seasons, two dry seasons from July to October and January to March and likewise two rainy seasons, from November to December, and the second season is between March and June. (KTC, 2022)

Rainfall and humidity
The area experiences average annual rainfall of 800 mm as minimum and 1000 mm as maximum per year. The mean annual rainfall is about 800mm. The heavy rainfall covers 120 days between March and June every year and spreads throughout the Coast region while the light rainfall is received for 60 days and common from October to December each year. The area is in the trade winds zone, with the North – East trade winds affecting the area between December and March. Humidity in the area is high with the annual maximum relative humidity being about 90%, while the minimum is around 35%. (KTC, 2021).

Wind condition
The Kibaha weather station which is about 1.5 kilometers from the project site was used to come up with specific data on the wind condition of the area. There are two types of winds in the area which are; North East winds (originating from South West moving towards north east) which are experienced between the

periods of November to April/May with average wind speed of 5 to 6 knots per second. South East winds (originating from North West moving towards south east) which are experienced between April/May to October with average speed of 7 to 8 knots per second.

4.3.2 Topography

The general topography of Kibaha area is of undulated nature with isolated hills and scattered valleys. The land rises between 160 meters and 182 meters above the sea level. The specific project sites also feature the general condition of the area. It is located on relatively flat area with gentle slope on the eastern side that leads towards the valley forming seasonal stream on the eastern side of the site running from the north to the south.

4.3.3 Soils

The project area falls under 100 meters and above from the mean sea level which is dominated by sandy loam and sandy clay. The general area is mainly covered on the surface by reddish to yellowish silty sandy Clay soil and underneath by fractured quartzite rocks. Most predominant soil type in the project is sandy and loamy soils as a result of weathering of meta-sedimentary rocks. The soil in the project area could generally well be expressed as deep to moderately deep, well drained loams which is suitable for industrial development.

4.3.4 Hydrology

There are no rivers in the vicinity of the project area. Drainage follows the slope and runs from North to southern side towards the Ngerengere River which is located about 2 kilometres on the Southern side. The Ngerengere river joins the Mpigi river which drains to the Indian Ocean. The Mpiji is a river found in the Pwani and Dar es Salaam regions and is the border between these two regions. It originates near Maneromango and flows through Kibaha and Kerege on its way to the Indian Ocean. Its course is 12.7 km long and it collects water in a basin of 52 square kilometers. The river has a number of tributaries joining it before discharging into Indian Ocean. As an important river in a densely populated area, Mpiji has been affected by environmental damage due to the introduction of dirty water from garages and factories and the use of large amounts of water for irrigation and other purposes. Sand mining for the construction of houses also affects the ecology of the river. The area is under Wami-Ruvu basin which is one of the nine hydrological basins in Tanzania.

4.3.5 Baseline data

4.3.5.1 Noise

The approach taken in determining existing condition on the site as related to noise was to conduct a review of the available historic data. The review came up with no available data for that site. The ambient day and night noise levels within the project area and nearby surroundings were measured. Four stations were selected as sampling points of which the measurements were done; three were within the core project site and one point was 100 meters away from the project boundaries. Measurements were done using Digital Sound Level Meter (GM1357). On taking measurements, the device-meter scale was set to the “A” weighed measurement scale, which enables the device to respond in the same manner as the human ear. The device was held approximately 1.5m above the ground and at least 5m away from hard reflecting surfaces such as walls. At each point, four measurements were recorded when the equipment was providing stable readings and their average value used as a point representative value.

The recorded noise results were then compared with Environmental Management (Quality standard for the control of Noise and Vibration Pollution) Regulations, 2014 limits together with World Bank (WB) and International Finance Cooperation (IFC) guidelines. The EM (QSCNVP) Regulations, 2014 has prescribed the daytime (6:00 am – 10:00 pm) and night time (10:00 pm – 6:00 am) noise limits for different receptors. Levels less than 70 dBA during the day and 60 dBA at night are specified as limits for industrial, commercial and/or mixed residential areas whereas, 55 dBA and 35 dBA levels are taken as day time and night time limits for residential buildings respectively. According to World Bank and IFC Guideline document, day time noise level of 55 dBA and night time of 45 dBA are taken as limits at the border of residential areas while a limit less than 70dBA has been recommended for commercial, business or industries areas. Based on the results presented on appendix 4 below the average noise levels in all four sampling points' range between 38 and 601decibels.

The noise levels were found ranging between 40.01dB(A) and 48.05 dB(A) during the day time with the highest values recorded at Station 1 and the lowest at Station 4. The Station 1 location was found to demonstrate increased noise levels most likely due to its proximity to the access road. Based on the measurements all noise levels recorded at four stations were within the EM (QSCNVP) Regulations, 2014 limits and WHO/IFC guidelines.

4.3.5.2 Determination of ambient dust as particulate matter in terms of TSP, PM_{10} and $PM_{2.5}$

A baseline air quality survey was conducted to ascertain the concentration of respirable particulates 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 from four different stations and compared with prescribed available limits to check for their compliance with the TBS-NES and WHO/IFC guidelines. The dust concentration levels measured at four (4) stations, with the highest value recorded at Station 1; followed by Station 2 whereas. The highest TSP, PM_{10} and $PM_{2.5}$ levels were recorded at the station that was located about 10 meters from the earth road adjacent to the project site. These highest values can be due to proximity of the station to the road and dust laden wind.

Based on the results of appendix 4, all recorded data (PM_{10} and $PM_{2.5}$ values) was well within the prescribed local and international limits at each station. Since the project area is not degraded, it can therefore withstand an increase of dust that will be generated during project execution. However, these recorded dust levels might increase from time to time and be high for a variety of reasons including traffics along the road and dust generating activities, construction activities and natural occurrences like wind.

4.3.5.3 Ambient pollutant gases

Despite that there is no source of pollutants gases within the general area, levels of pollutant gases were also measured onsite and offsite to identify potential sources of pollutant gases. The Carbon dioxide (CO2), Carbon monoxide (CO), Oxides of Nitrogen (NO and NOX) were the dominant pollutants along with the sampling stations while Sulphur dioxide (SO2), Hydrogen Sulphide (H2S), Methane (CH4), and Ozone (O3) were below equipment's detection limit for most of the monitoring period. The recorded values were then compared with the available limits set by TBS-NES standard and WHO/IFC guidelines to check their levels of compliance (appendix 4).

4.3.5.4 Vibrations

The average daily monitoring data for ground vibrations were measured at four stations to determine the impact of vibrations at the project site. This study has compared its findings with Occupational Safety and Health (Working Environment) Regulations, 2016 limit of 5 mm/s PPV (Peak Particle Velocity) (in Tables

4.4) All the monitoring stations were far below the limit provided by the Occupational Safety and Health (Working Environment) Regulations, 2016 limit of 5 mm/s PPV. Ground vibrations measured were 0.005 mm/s PPV (AQMS1) and 0.07 mm/s PPV (AQMS2. Thus, it did not exceed the British Standard of 0.3 mm/s PPV nor the level of 0.15 mm/s PPV that human beings and/or animals can detect or may experience stress resulting to vibrations. Therefore, the resulting impacts for such values are considered less-than-significant to the extent that can easily be detected by human (appendix 4).

4.4 BIOLOGICAL CHARACTERISTICS

4.4.1 Flora

Generally, the project area and adjacent area (OUT whole Plot) is characterised by tertiary vegetation regenerating, from past clearance. Thus, area is mainly coastal scrub with few very scattered trees such as *Vachellia* spp and planted trees including *Saraca asoca* spp, *Eucalyptus* spp., *Azadirachta indica* and remnants of cashew nut. Since the vegetation is regenerating there are lot of species both opportunistic and previously dominating species regenerating as a result of disturbance. The whole area has been subjected to various disturbance both from previously anthropogenic activities in the area such as cultivation and parking during the graduation ceremony. The species composition of the area includes *Vachellia* spp*, Saraca asoca* spp, *Haggenia abyssinica, Albzia gummifera, Markhamia acuminate, Manilkara solcata, Vitex mombasae, Turraea robusta, Cassia sp, Sclerocarya birrea, Zanthoxylum holtzianum, Commiphora africana, Adensonia digitata,* and *adiantum occidentals* (cash nut tree) representing tree species.

Most of these species appeared as shrubs rather than tree. The typical shrub species recorded includes *Monanthotaxis buchananii, Allophylus africana, Grewia sp, Ochna holstii, Opilia sp, Uvaria kirkii, Monodora minor, Croton sp, Crotalaria sp, Indigofera sp, Solanum incanum, Solanum sp, Harissonia abyssinica, Dalbergia melanoxylon* and *Vernonia sp.* In most cases these shrubs are associated with climber species such as *Landolphia buchananii, Cucumis sp*, *Momodica sp* and *Virgna sp* to form shrub tangles. Herbaceous species recorded include *Plectranthus sp, Commelina benghalensis, Anailema sp, Ludwigia stolonifera, Virgina sp, Pentas sp, Leonatus sp, and bidens sp.* In some areas where not recently disturbed grass species were dominant; the common species recorded include *Digitaria macroblephara, Hyperrhenia rufa, Panicum maximum, Panicum sp, Brachyaria s* and *Sporobolus marginatus*.

4.4.2 Fauna

The proposed project area was surveyed using methodology outlined in the African Forest Biodiversity (Leon *et al.,* 2002). Literature review and interviews with the locals to get information on commonly sighted or visiting animals in the area and if there exists any migration corridor were also employed. Mammals were observed and identified while walking along transect in representative habitats and through observation of animal signs such as droppings, footprint, burrows or vocalization. During the site visit stakeholders reported the occasionally visiting fauna include

a) Small wild animals' East African spiny mouse *(Acomys ignitus),* Lesser pouched rat *(Beamys hindei),* Black rat *(Rattus rattus),* Sun squirrel *(Heliosciurus* sp*.),* cape hare (Lepus capensis), bushbuck (Tragelaphus scriptus), southern reedbuck (Redunca arundinum) and banded mongoose (Mungos mungo)
b) Reptiles (snakes and lizards (i.e., *Gerrhosaurus nigrolineatus* (Black-lined Plated Lizard), *Cordylus tropidosternum* (Tropical Girdled Lizard), *Chamaeleo dilepis* (Flap-necked Chameleon), *Thelotornis capensis* (Savanna Vine Snake), *Bitis arientans* (Puff Adder), *B. gabonica* (Gabon Viper), *Naja nigricollis* (Naja nigricollis), and *Philothamnus* sp (Green Snake)); amphibians (guttural toads);

c) Insects (butterflies and terrestrial macroinvertebrates);
d) Avifauna (Crested Guineafowl (*Guttera edouardi*), White reef heron, probably *Egretta dimorpha,* little egret *Egretta garzetta*, Whimbrel *Numenius phaeopus,* African Broadbill (*Smithornis capensis*) and Sanderling *Calidris alba*).

Moreover, droppings, footprints and/or burrows of rats, birds, rodents, hare and insects were also seen in the project area, further signalling the presence of the named fauna in the project area.

4.4.3 Threatened species

From the field observation neither of the plant nor fauna species falls under any of the IUCN threatened category was identified in the proposed project area. This may be attributed to long term disturbance of the site. The primary vegetation has been replaced with exotic plant species and grasses.

4.5 SOCIO-ECONOMIC SETTING

4.5.1 Demographic Profile

According to the 2022 Population and Housing Census, Mkuza Ward where the project is located has a total population of 31,482 people with an annual growth rate of 3.7%. Viewed from a gender perspective, the female population is 16,877 while the male population is 14,605. The gender ratio of the population of Mkuza Ward is 87 men per every 100 women. The project area and area of influence is located in the Kibaha Town Council. Based on the population census reports of 2022 the Kibaha Town Council had a total population of 265,360 (127,155 being male and 138,205 female) with Average Household Size of 3.6.

4.5.2 Ethnic Groups

The dominant culture for the communities of Kibaha is the Swahili culture, which characterizes coastal areas of East Africa. The Swahili culture is a mix of Arabic and Bantu cultures. Other tribes traditionally dominant in the area are the Zaramo, Kwere, Zigua, and Doe. However, there are now many other tribes from all over Tanzania represented in the area. The main beliefs for the people of Kibaha are predominantly Muslim, with some Christian, reflecting the ethnic and cultural mix of inhabitants in the Town.

4.5.3 Land Use

Traditionally, most of the land in Kibaha has been used both as farmland and settlements. Near the project area the land is partly used for industrial, agricultural and settlements. The KTC has a total arable land of 836,579 hectors. The area which is under crop production is 63,034 (12.6%) hectors only. The cash crops being cultivated in the area comprise of coconuts, paddy, mangoes, and the food crops include maize and beans, cowpeas, cassava and sweet potatoes. Women also grow vegetables such as tomatoes, amaranthus and spinach. Most of the farming is for subsistence purposes.

4.5.2 Economic Base

Agriculture

The KTC comprises a total area of 75,000 Ha of which arable land is 12,980 Ha (1.7% of total land area) and area under Cultivation is 7,973 Ha (61.4% of total arable land), suitable land for Irrigation is about 250 ha and area under Irrigation is 58 Ha. (23.2% of total suitable land). The percentage distributions of the population who engage in agriculture is 68%. Hand hoe accounts for 75% of the implement used by

farmer within Kibaha TC, Powertilar 5% and Tractor 20%. Also, processing machine account for 50%, the implements satisfy the requirements compared to the available land.

Food crops are cassava, rice, millet, legumes, maize and sweet potatoes. They produce 7.0 hectors per tons of cassava, 1.5 hectors per tons of paddy, 1.0 hectors per tons of maize, 8.0 hectors per tons of sweet potatoes and 0.8 hectors per tons of Sorghum. The status of the areas suitable for irrigation (ha) is 550, the area which is under cultivation (ha) is 22 and the percentage of utilization is 4.4 in Kibaha Rural and the status of the areas suitable for irrigation (ha) is 80, the area which is under cultivation (ha) is 15 and the percentage of utilization is 19 in Kibaha Town.

Livestock keeping

Livestock keeping is relatively low amongst the communities in the project area compared to other parts of the Kibaha Town Council. Cattle, sheep, pigs and goats as well as poultry are kept and grazed on the suitable areas available. The Kibaha is close to Dar es Salaam City where there is a good market for the products due to the presence of a larger number of consumers.

Employment

The main employment in the Picha ya Ndege ward and the project area are small-scale agriculture, which is practiced at subsistence level and livestock keeping, which occupies about 68% of the total population and another less than 5% are engaged in the formal employment / Civil Servants.

4.6.5 Social Services

There are number of social facilities which exist in the District, these includes the following:

Health

Health service providers in the district are the Central Government, the Private Sector, Institutions and Voluntary Organization. The OPD services are among the most important services provided in all centres. 48.2% of all OPD patients who came to receive care in the health centers are new attendances, which is equal to 102,637 patients. 25.1% of all OPD patients who came to get care in 2021 were children under 5 years of age (<5yrs). 12.6% of the attendance of OPD patients who came to get care were elderly people over 60 years old (60yrs <). The number of patients referred to Tumbi Referral Hospital increased from 1367 (2015) to 2287 (2016).

Education

The district has several educational institutions that include primary schools, secondary schools, and Vocational training centers. Most of these schools have apparently a reported similar problem of shortage of teachers and equipment, as well as infrastructure.

Telecommunication

The main provider of telecommunication in the district is Tanzania Telecommunication Company Limited (TTCL). It operates a fixed network (cable network), mobile phones and a wireless network that serves the district and links it to other part of the country. Mobile phone service is also available from other ompanies like Vodacom, Halotel, Airtel Tigo and Zantel.

Water supply

People in Kibaha generally depend on piped water from DAWASA to supplement wells, dams, rain water and water vendors. Unconnected areas depend on ponds, shallow wells and dams for water supply. The main challenge to piped water is proximity of the DAWASA pipeline. Areas away from the pipeline are not connected.

Energy for cooking and lighting

Alternative to electricity, people use hurricane lamps, firewood, solar, candles and wick lamps. About 36.14% use kerosene as the major source of energy for lighting. Electricity, kerosene or paraffin, gas and firewood are the main sources of energy for cooking. 61.65% use charcoal as the major source of energy. Only 1.17% use electricity. Gas and other sources are 0.29%. Charcoal is the source of energy and unfortunately as the source of income of a major group of young people in Kibaha. Meanwhile it contributes as the source of revenue for the Council. Charcoal causes environmental degradation due to excessive cutting of trees resulting in bare lands but also wood burning pollutes the air (KTC, 2021).

4.5.6 Waste management

Solid Waste

Solid wastes generated in the district can be categorized into organic wastes which constitute mainly domestic solid wastes like vegetable, food left overs etc. and inorganic wastes i.e., industrial wastes like glasses, paper, scrappers and plastic materials. Within the town the total solid waste produced per day is 43.8 tons of which only 18.3 tons of the waste is collected per day by the Town Council. Apart from industrial and health facilities waste; other types of hazardous waste encountered in waste management in the Town (District CBD) include motor vehicle batteries, dry cells, oil from auto-machines and discarded oil repellent cans. At present the district does not undertake treatment of solid waste. The official solid waste disposal site is at Miembe Saba where the waste is basically dumped on the ground. It is dumped without provision for coverage to prevent it from being blown away by wind. The waste is burnt and at times some is reduced to ashes while other half burnt. The district's growing rate is high while solid waste management is at present poor and with no proper future plans in place. This poses a great challenge to the district and residents of the area.

Liquid Waste

There are two types of sanitation that serve Kibaha at present and these include the on-site sanitation systems in the form of septic tank systems and pit latrines. The central sewerage system covers small area of the Kibaha Town and serves a population of about 4000 people in Kibaha Education Centre area only. The system comprises of septic, anaerobic, facultative and maturation ponds. The on-site sanitation systems are estimated to cover about 74% of the district and they use septic tanks systems compromising of a land soak-away pit. Likewise, at the project site there is no centralized system and residents in the area use pit latrines (KTC, 2022).

4.5.7 Labour and working condition

In recent years, the Government of the United Republic of Tanzania has made efforts to adjust the regulatory framework for working conditions through a number of important reforms, in the shape of the Employment and Labour Relations Act of 2004, the Labour Institutions Act of 2004, and the National Employment Policy of 2008. These reforms were influenced by the country's international obligations, including ratified ILO Conventions and its commitments under the Millennium Development Goals. The reforms were also a response to the effects of globalization, African trends towards regionalization, and perhaps most significantly the government's National Strategy for Growth and Reduction of Poverty 2005 – 2010.

Child labour in Tanzania continues to affect an estimated 4.2 million children aged 5–17 years, about 29 percent of this age group. This share is only one percentage point lower than that of a decade earlier, suggesting that progress against child labour has stalled in the country. It should be underscored in interpreting these numbers that they represent conservative estimates of child labour, because they

exclude so-called "worst forms of child labour other than hazardous work." These forms of child labour include child trafficking, commercial sexual exploitation, child slavery and the involvement of children in illicit activities. In Tanzania, as in most countries, information on children involved in the worst forms of child labour other than hazardous is limited due to both methodological difficulties and cultural sensitivity.

The Employment and Labour Relation Act, 2004 covers prohibition of child labour (minimum age-14 years' old), forced labour, equal opportunity and eliminating discrimination, freedom of association, good working condition (such as hours of work, paid leave). Tanzania ratified the ILO Convention No. 182, known in short as the Worst Forms of Child Labour Convention (see section 3.7.4) on 12:09:2001. However, Child labour in Tanzania continues to affect an estimated 4.2 million children aged 5–17 years old, about 29 percent of this age group as reported in 2014 (ILO, 2018) (Table 4.17). The progress against preventing child labour in Tanzania has been very slow and the estimates provided excludes the worst forms of child labour covering sexual exploitation and child slavery. The majority of children in child labour have been identified in family-based agriculture. Nearly 95 percent of children in child labour are in the agricultural sector and nearly 93 percent are unremunerated according to ILO 2018.

Table 4.1 Child labour estimates in Tanzania

	Children in child labour (in employment) (5-11 years)		Children in child labour (in employment) (12-13 years)		Children in child labour % (5-13 years)		Children in child labour (14 -17) %		Total children in child labour (5-17) % (numbers)	
	%	No.	%	No.	%	No.	%	No.	%	No.
Male	22.6	1,008074	37.6	458,884	25.8	1,466,958	39.8	745,380	29.3	2,212,338
Female	21.5	922,164	34.1	374,984	24.1	1,297,148	41.6	721,433	28.4	2,018,581
Urban	9.4	250,948	17.7	127,750	11.1	378,689	23.1	294,932	14.4	673,630
Rural	27.7	1,679,290	44.2	706,118	31.1	2,385,408	50.4	1,171,881	35.6	3,557,289
Total	22.1	1,930,238	36.0	833,868	25.0	2,764,106	40.7	1,466,813	28.8	4,230,919

Source: Based on Tanzania Integrated Labour Force Survey (ILFS), 2014.

According to the World Bank 2021 based on ILOSTAT database, the number of people in forced labour has dramatically increased in Tanzania from approximately 20 million in 2009 to 28 million in 2020.In the general project area, the majority of local people work in agriculture industry and some have petty businesses. The OUT shall enter into a contract with all workers and follow the remuneration policy as developed by the OUT.

4.5.8 Gender and related GBV issues

4.5.8.1 Background

In Tanzania, more than one-third of all women (39%) have suffered from physical violence at some point since age 15. One-third (33%) of women suffered from acts of violence during the previous 12 months. This proportion is substantially higher for divorced, separated or widowed women (46%) than single women (21%). More than four-fifths of women who have ever experienced physical violence report that the perpetrator of the violence was a current or former husband/partner. Ten percent (10%) of women had their first sexual intercourse forced against their will (NBS, 2011). In Tanzania, 36.9 percent of parliamentary seats are held by women, and 12.0 percent of adult women have reached at least a secondary level of education compared to 16.9percent of their male counterparts. For every 100,000 live births, 524.0 women die from pregnancy related causes; and the adolescent birth rate is 118.4 births per 1,000 women of ages 15-19. Female participation in the labour market is 79.6 percent compared to 87.3

for men (UNDP, 2020). There is a recognition in Tanzania of gender discrimination and gender equity in different facets of life (World Bank, 2004).

According to the United Nations Development Programme (UNDP 2020), Tanzania has a GII value of 0.556, ranking it 140 out of 162 countries in the 2019 index. The GII for Tanzania shows a low score in relation to gender equality in comparison to global standards. There are key challenges for gender equality in Tanzania including girl's access to education, high unemployment rate among young women and challenges for women accessing finances. According to VEOs, women in the project area spend more time in attending home activities and play multiple roles in the community such as income generation activities, parenting, social and political activities. The decision making in a household is mainly by men.

The 2010 Human Development Report introduced the gender inequality index (GII), which reflects gender-based inequalities in three dimensions – reproductive health, empowerment, and economic activity. Reproductive health is measured by maternal mortality and adolescent birth rates; empowerment is measured by the share of parliamentary seats held by women and attainment in secondary and higher education by each gender and economic activity is measured by the labour market participation rate for women and men (UN Women, 2021). GBV has a greater impact on women and girls, as they are most of often the survivors and suffer of great physical damage than men when victimized (Odunga, 2021). GBV results from gender norms and social and economic inequities that give privilege to men over women. The World Bank gender assessment report (2022) provide that 40% of women ages 15-49 have experienced physical violence at some point, 22 percent have experienced physical violence in the last year and 17 percent have experienced sexual violence. Sexual and physical abuse is even higher among married women. Violence against children is also prevalent whereby nearly 75% of girls and boys experience physical violence by the age of 18, and 30% of girls' experience sexual violence before adulthood. The Government of Tanzania developed the NPA-VAWC, 2017/18-2021/22 to reinforce its commitment to eliminating violence against women and children. The plan incorporates strategies to help local authorities and police, service providers, and communities better provide prevention and response services that have the greatest potential for reducing violence against women and children. To put the plan in action, OUT should with relevant government officials, social welfare officers, religious leaders, and police officers during implementation of the proposed project to end existing Violence against Women and Children.

At the District level there is a Department of Community Development, Social Welfare and Youth. The department has a role for raising awareness for development activities for the purpose of eradicating poverty and improving livelihood. The Department also facilitates programmes to improve local livelihood as well as sustaining the welfare of women, youth and children, vulnerable groups as well as wider community.

4.5.8.2 Existing GBV service provider and support system

In Tanzania, gender-based violence is widespread; the most recent Tanzania Demographic and Health Survey found that 44% of ever-married women have experienced physical and/or sexual violence from an intimate partner in their lifetime. Over 20% of Tanzanian women aged 15-49 years reported having experienced sexual violence in their lifetime and nearly 40% reported having experienced physical violence. Gender-based violence (GBV) is a grave reality in the lives of many women in Tanzania. It results from gender norms and social and economic inequities that give privilege to men over women. There is a mounting recognition in Tanzania of gender discrimination and gender inequity in different facets of life. This awakening includes a growing acknowledgement of how prevalent GBV is and the

ways and extent to which it harms not only women and girls but also men and boys and, furthermore, the country's developing economy and health and social welfare systems.

The government has put in place mechanisms to improve the likelihood that high-level policies on GBV, such as the NPA/VAWC, are successfully translated into improvements on the ground. Women and Children Protection Committees have been established at all levels (Mtaa, ward, council, Region and National level) and have an inclusive membership, with representatives from government, community leaders, and the community members themselves (World Bank, 2022). However, at the project site the Women and Children Protection Committee has not yet been established. During consultation, stakeholders provided that the family is the primary source of support and comfort for the GBV survivors. The family has a role of providing advice, emotional support, and, in the case of domestic violence, help mediate between the woman and her husband. For the existing practice, married women are expected to first speak with their husband's family members before reporting violence to the police. If the matter remains unsettled, a survivor may then report the matter to her parents and, thereafter, a family meeting for both families can be arranged. Other close relatives and friends such as friends, neighbours, and recognised elders may be invited to participate in the mediation meetings.

Failure to resolve the matter at the joint family meetings, is it socially acceptable to approach external sources of support and the immediate is the Mtaa Government Office. GBV survivors of violence go to their local leaders primarily for advice, referrals (within the local government hierarchy) and marital reconciliation services. The leaders at Mtaa include Ten Cell leader, Mtaa Chairman and Mtaa Executive Officer. All attempts would be made to settle the GBV issue at this stage. If the matter not solved, then the matter will be brought before the legal and local courts for settlement. Legal aid mentioned by stakeholders include Ward Reconciliation Councils, Primary and District Courts, Gender and Children's Desks at police stations and legal aid services. Legal aid is most often accessed through CBOs and NGOs.

4.5.8.3 Gender gap at the OUT

The significant statistics show that the percentage of female Science students at the university level is very low. The construction of Science laboratories in the proposed seven zones will be considerably giving special attention to the involvement of female students as part of OUT efforts to promote empowerment of women and girls through science education. The female students pursuing foundation course (OFP) will be considered in special training program on science subjects towards attending laboratory practical's effectively that will enable more females to join up University education in various sciences programmes such as Information and Communication Technologies (ICT) studies. The gender disparity is alarming, there is a need for substantive efforts towards increasing female participation to skills training for employment, science innovation, social wellbeing, inclusive growth and sustainable development. The University will also ensure that during the construction of facilities; access to the facilities as well as provision services take into account needs of female students, staff and visitors as well easy access of people - with special needs such as blind and disabled. Such requirements will also be nested within the framework of programme delivery.

CHAPTER 5
STAKEHOLDER ANALYSIS

5.1 INTRODUCTION

Stakeholder consultation and participation is a fundamental principle of the environmental and social assessment process. It largely contributes to the successful design, implementation, operation and management of proposed project. 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. Further, the World Bank's Environmental and Social Framework (ESF) includes the Environmental and Social Standard (ESS) 10, "Stakeholder Engagement and Information Disclosure", which recognizes "the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice".

For this project, a plan for public involvement was developed early. It 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 time to ask relevant questions regarding the proposed project to enable the consultants to clarify any issues they may not have adequately understood.

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:

a) Improving project design and, thereby, minimize conflicts and delays in implementation;
b) Determining the scope of the environmental assessment.
c) Deriving specialist knowledge about the site.
d) Clarifying any misconceptions, misunderstandings, myths and the like, that may have arisen from misinformation about the project or local species beliefs
e) Facilitating the development of appropriate and acceptable entitlement options;
f) Increasing long term project sustainability and ownership;
g) Reducing problems of institutional coordination; and
h) 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 categorised 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 (name of organization, person contacted, etc.) are presented in table 5.1 below:

Table 5.1: List of Stakeholders Consulted

Level	Stakeholders
Central Government: Ministries, Departments and Agency	Occupational Safety and Health Authority (OSHA) (Eastern zone office)
	Government Chemist Laboratory Authority (Eastern Zonal office
	Fire Rescue- Pwani Region office
Kibaha Town Council	Townl Director Office
Mkuza Ward Authorities	Ward Development Committee (represented by the Ward Executive Officer)
Bungo Mtaa Authorities	(Chairman, VEO, Environment Committee) Other leaders (religious, teachers, traditional chiefs, elders, etc)
	Other Village member involved
Other Stakeholders	OUT- Coast kibaha centre

5.4 STAKEHOLDERS AND PUBLIC CONCERNS

The study has identified main concerns and issues raised by the different stakeholders. Generally, stakeholders view the proposed project as important project for economic development of the area and national at large as the laboratory 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. They added that science labs give students the time, space, and resources to explore and experiment. Summary of the issues are covered here-under, detailed stakeholders' issues and concerns are presented as appendix 3 of this report.

5.4.1 Pollution of the land and water sources

During interviews, stakeholders were quick to associate the project with the negative impacts likely to pollution of the land and water sources. One of the commonest negative impacts mentioned is the pollution of the land due to untreated waste water from the operations of the laboratory.

5.4.2 Development of the Kibaha Town Council

Some stakeholders consulted were in support of the project recognizing that the Town Council also will have a reputable zonal science laboratory and thus will add value to the Municipality. This will be one of the developments within the area other than the major planned activities in the area. In general, the project will contribute to the development of the Municipality. Development of the area with infrastructure

and institutions like these will attract other developments and thus reduce the congestion of Kibaha which is currently causing nuisance to the general operations of business.

5.4.3 Air pollution from dust during construction

Stakeholders mentioned that the development of the Zonal Laboratory will involve large scale construction and thus carriage of materials from the source to the project site. Movement of vehicles along the village area might cause disturbance and health problems due to the dust generated by heavy vehicles. Thus, stakeholders were proposing the roads to be improved to overcome the dust which can also be used by the community after the project.

5.4.4 Environmental pollution from poor solid and liquid disposal

Stakeholders expressed that the project is expected to generate liquid and solid waste during construction and during operation phase. The bulk of the waste generated during the operation of the project will consist of paper, plastic, and organic wastes. The stakeholders advised for proper management of the wastes. It was also advised by some stakeholders that the proponent should collaborate with the Mtaa leadership for waste management to avoid possible impacts to the nearby community.

5.4.5 Occupational Health and safety aspects

Stakeholders pointed out that during construction/, it is expected that construction workers are likely to have accidental injuries and hazards because of accidental occurrences, handling hazardous waste, lack or neglect of the use of protective wear etc. All necessary health and safety guidelines should be adhered to so as to avoid such circumstances. The project proponent and contractor are required to register the work place with OSHA to get some guidance on how to contain health hazards related with construction works. They added that health and safety is a joint responsibility of management and the workers and all should be actively involved in identifying and resolving health and safety concerns at workplace. Further, it was advised for the proponent to abide to the OHS Act of 2003 to start with registration of workplace which is done online.

5.4.6 Increased employment opportunities

The local stakeholders were optimistic that the construction and operation of the proposed project will open up new fields of employment. Despite the fact that most of the project works will need skilled labour force, the people expressed hope that they will be able to access employment once the project commences mostly as casual workers. This will be a source of income for several individuals and households and hence is expected to boost the GDP and improve the living standards of the local people.

5.4.7 Unplanned settlement

Mushrooming of unplanned settlement close to the project area is also another negative impact associated to the project. Stakeholders were of the opinion that as there will be more people and activities in the area during construction and operation phases of the project, more people will be attracted to build temporary structures in the surrounding environment.

5.4.8 Increased exposure to diseases

The stakeholders raised concern that many of the workers/visitors particularly during construction will be new to the project environment and since they will interact with each other they may spread HIV/AIDS and other sexually transmitted diseases. Interaction between people working on the project, community member and visitors of the facilities is inevitable. Additionally, pointed out that the project will fortunately increase income to employed local individuals; this may also contribute to increased cases of HIV/AIDS transmission. To contain the situation, it was proposed that the developer should employ awareness campaign in the premises to its workers and general public.

5.4.9 Benefit to local producers and suppliers of goods and services

Procurement of materials from local sources will be a positive aspect of the project, as it will reduce the cost of the project and benefit local producers and suppliers. The part of the operating cost of the project will be in Tanzania shillings, particularly on goods and services, consumables and labour. Some of the project services have been already contracted to Tanzanian suppliers and contractors.

5.4.10 GBV, SEA and Workplace Sexual Harassment Issues and Concerns Raised

Stakeholders also raised issues regarding existence of Gender-Based Violence (GBV) in the area. They mentioned that these include those associated with Sexual Exploitation and Abuse (SEA), and Workplace Sexual Harassment (WSH). They pointed out that women and girls at various construction site have been promised employment opportunity in exchange for sex. Most females and girls are trapped for being assured with the job or protect job after being employed. Sexual harassment and abuse have been exacerbated by the traditionally male working environment. For example, females being economically exploited, verbally abused, and sexually harassed, mostly by co-workers or construction Supervisors. Stakeholder added that the new project will involve an influx of predominantly male workers into a community area, exposing women and girls living in the community and providing services (e.g., traders, sex workers) to risks of sexual exploitation and violence since they are potentially highly vulnerable and lack a local support network.

At the construction site, women and girls are paid less on average than men in the same role as results they are vulnerable to poverty/low income and this leads to sexual bribery regarding salary improvement. Improvements of women including food vendors' income due to short-term employment on the work teams, acquisition of new sales of goods and services to workers. Also, women and girls often face greater barriers than men and boys to accessing health information and services. These barriers include restrictions on mobility; lack of access to decision-making power. Women and girls face greater risks of unintended pregnancies, sexually transmitted infections, including HIV/AIDS. Unwanted and unexpected pregnancies because men (financially fit) will decide either or not to use condoms because females/girls are economic disadvantaged.

Stakeholders requested that the proposed project should have female gender focal person who will be addressing females/girls' issues when arises. Also, the proposed project, should provide equal employment opportunities to males and women. This can be achieved through the tendering process and the contractor should abide with local content act by considering employing local people from within the project area.


Figure 5.1: Public consultation meeting at OUT Coastal Centre in Pwani region

Source: Consultant 04th October, 2023


Figure 5.2: Public meeting at Bungo Mtaa office

source: Consultant 04th October, 2023

CHAPTER 6
ASSESSMENTS OF ENVIRONMENTAL IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1 ASSESSMENT METHODOLOGY

This section of the report assesses the significance of the environmental impacts that have been identified by the specialists that formed part of the team, which conducted the environmental impact assessment process. The team members conducted literature reviews of available information related to the site conditions and with respect to similar project operations prior to visiting the site. During the site visit, the team spent the time on site gathering information through field studies, including the gathering of samples for identification at their offices in Dar es Salaam. The combined site visits by all specialists assisted in integration of ideas and findings between the specialists. The EIA team undertook a social survey through conducting interviews with a broad spectrum of community members.

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

6.1.1 Environmental impact rating scale

To ensure a direct comparison between various EIA 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;*
- 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, political 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.

6.1.2 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 not just "compensation", but 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.

6.1.3 Spatial scale

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

Table 6.1: Spatial scale

Individual	Individuals in the area could be affected
Household	Households in the area could be affected
Localised	The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	Includes the entire Bungo Mtaa and Mkuza Ward
District	Includes area within the Kibaha Town Council
Regional	The impacts will be of such a nature that it may affect the Pwani Region.
National	The impacts will be of such a nature that it may affect the entire Tanzania.
International	The impact would affect resources and processes outside the border of Tanzania

6.1.4 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 5 years.
Medium term	Between 5 and 20 years
Long term	Between 20 and 40 years, and from a human perspective essentially permanent
Permanent	More than 40 years, and resulting in a permanent and lasting change.

6.1.5 Significance

Significance is an indication of the overall importance of the impact taking into account all the above mentioned assessment criteria. Significance was assessed in the relevant context, as an impact can be relevant to the ecological environment, the social environment or both. By ensuring that all specialists adhered to the abovementioned objective criteria, subjectivity was reduced as far as possible. There is, however, always an element of judgement that cannot be completely removed from the assessment of

significance. Significance of an impact is not always directly proportionate to severity, despite the fact that one would expect a direct relationship i.e. an impact with severe *severity* would be expected to be of *high significance*. However, this is not always the case. For example, changes to the geology might be *severe,* but the significance is regarded as *low,* since the change in the environment is considered by society as being unimportant.

Table 6.3: Significance of an impact

Significance	Explanation	Examples
Very high	These impacts would be considered by society as constituting a major and usually permanent change to the natural and/or social environment, and usually result in severe or very severe effects, or beneficial to highly beneficial effects.	• The loss of species will be viewed by informed society as being VERY HIGH significance. • The establishment of a large amount of infrastructure in a rural area, which previously had few services, would be regarded by affected parties as resulting in benefits with VERY HIGH significance.
High	These impacts will usually result in long-term effects on the natural and/or social environment that will only be mitigated over very long periods of time.	• The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated. • The change to soil conditions may have a severe impact on the natural system, and the impact on the affected parties (on the case of people harvesting natural herbs on the soil) would therefore also be HIGH. However, if no land available elsewhere, this impact could be rated as VERY HIGH.
Moderate	These impacts will usually result in medium to longterm effects on the natural and/or social environment. These impacts are real but not substantial, and usually result in moderately severe effects or moderately beneficial effects.	• The loss of a sparse, open vegetation type may be regarded as very severe by the specialist, but due to the nature of the vegetation and habitats, its significance could be regarded as only being of MODERATE significance. • The provision of an efficient health service in a rural area would be regarded as being moderately beneficial, and result in a benefit of MODERATE significance.
Low	These impacts will usually result in medium to short term effects on the natural and/or social environment. These impacts are considered to cause fairly unimportant and usually short term change to the (natural and/ or social) environment. These impacts are not substantial and are likely to have little real effect.	• The temporary change in the water table of a wetland would be rated as slight, as these systems are adapted to fluctuating water levels. The significance of this impact s therefore LOW. • The increased earning potential of people employed as a result of development would only be slightly beneficial to people who live some distance away, resulting in a benefit of LOW significance.

No significance	There are no primary or secondary effects at all that are important to scientists or the public.	A loss of Species of Special Concern (SSC) will not take place, since none occur in the study area, resulting in NO significant impact.

6.2 SITE PREPARATION/MOBILIZATION PHASE

6.2.1 Negative environmental impacts during site preparation/mobilization phase

6.2.1.1 Loss of vegetation

Site clearance to give a way for construction works to commence is usually associated with the removal of existing vegetation cover and topsoil. Main potential impact is Loss of vegetation. However, the earmarked land for development of the proposed project has long been cleared off to give way to other land uses previously practiced on the area. Indigenous trees and bush have been removed and only re-generated grass and plated exotic trees exists on site. Since the active project site is mainly covered by grasses there will be no loss of native vegetation cover or ecologically significance flora species and thus clearance will not result into significant loss of biodiversity. Further, the cleared area will be specific to the project area which is relatively small compared to the vegetation cover of the entire area. *The impact is considered to be negative, long-term and of low significance.*

6.2.1.2 Depletion / degradation at points of source of construction materials

The project will require various standard construction materials including gravel, aggregates, sand, bitumen and water. It is expected that the contractor will obtain materials for construction purposes such as aggregates, stones, sand, timber etc. from licensed suppliers or from authorized areas. Extractions of construction materials from both authorized borrow pits and quarries on government land, communal land and on private-owned land are associated with rampant degradation at points of source with no efforts of restoration/re-vegetation. Most exploited borrow pits are found on private owned /communal land of natural vegetation or planted with crops which have been cleared/disturbed. Around the project area there are no suitable bed-rock for ballast (gravel and sand*)* or suitable sand (free of humus and salt). The gravel and aggregate borrow pits in these sites have signs of rampant and haphazard exploitation methods gravel is already depleted. Pollution risks include sediment overload into the stream during rains and contamination by oils from excavators and loaders.

It should be noted that the aggregate-rich borrow pit in some areas had to be closed due to rampant and haphazard exploitation methods that posed pollution risks. And in some instances sand was extracted from riverbeds. Most of these areas are declared by the government as a danger zones and exploitation is prohibited. The OUT shall not encourage suppliers of these materials to use closed down burrow pit or sand extracted from river bed. Instead, it shall use licensed suppliers. In any case environmental impacts associated with extraction of materials for construction of the project will be a matter of cumulative effect because resources extraction is open to all contractors / users, thus, the project will be adding on to existing problems. Thus, impacts associated with resource extraction from off-site locations are considered as: *Secondary or indirect negative impacts, cumulative, short to medium-term but of medium significance.*

6.2.1.3 Noise pollution

During the mobilization stage of the project, noise associated with equipment working on site will be generated, which will affect the nearby receptors and also the working personnel. Noise generation will

essentially result from the operation of the project and equipment involved on the construction site, namely excavators, concrete mixers and Lorries. However, the size of the construction to be made shows that relatively few equipment's and trucks will be involved in transporting the construction materials. *This impact is considered to be negative, cumulative and of short-term duration and of low significance.*

6.2.1.4 Impaired air quality

Construction materials such as cement, steel, wood, sand, stones, and aggregates etc. will be brought from different sources in Pwani Region. The trucks and earth moving equipment will emit dust, noise and exhaust fumes which are unwanted atmospheric pollutants. Atmospheric pollutants from engines of vehicles 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. Table 6.2 shows the emission factors of the various construction equipment and vehicles. Table 6.3 shows the approximated emissions.

Table 6.2: Emission factors of construction equipment's and vehicles

S/n	Type	Quantity	Emission factors			
			CO-g/hp-hr	NOx- g/hp-hr	PM_{10} - g/hp-hr	$PM_{2.5}$ - g/hp-hr
1	Excavator	1	0.75	4.31	0.101	0.093
2	Wheel loader	1	0.94	4.67	0.087	0.88
3	Trucks	5	11.24	15.27	0.3338	0.3071
4	Motor grader	1	0.75	4.31	0.101	0.093
5	Compactor	1	0.94	4.67	0.087	0.88

Table 6.3: Total emissions from construction equipment's and vehicles

S/N	Type	Total Emission			
		CO tons	NOx tons	PM_{10} tons	$PM_{2.5}$ tons
1	Excavator	0.268	1.539	0.036	0.033
2	Wheel loader	0.597	2.965	0.055	0.051
3	Trucks	0.007	0.0095	0.002	0.0002
4	Motor grader	0.597	2.965	0.055	0.051
5	Compactor	0.597	2.965	0.055	0.051

The above indicate that the emissions may affect local air quality but will have no significant impact on global air quality issues. Mobilization of the proposed project equipment and machinery will be a one – off event, requiring very limited number of trucks. However, it should be noted already there are hundreds of vehicles plying along the same road which emit same air pollutants. *This impact is considered to be negative, cumulative, short-term but of low significance.*

6.2.1.5 Increased alien plant invasion

There are no invasive species that were recorded within the core project area. However, alien plants are likely to invade the project site due to disturbance created during site preparation. The disturbance created at the site during mobilization phase would leave the site vulnerable to alien plant invasion. Also, delivery of construction materials such as sand, timber and poles from outside, some of which may contain seeds or propagates of alien plant species. Several well-known invasive alien species have been identified outside the project area, in the vicinity of Kibaha Town and elsewhere. There is a danger that these may spread into the project area. There is a significant risk that these infestations will become more

severe with time as the plant populations mature and spread. High-risk aliens occurring within the area include *Acacia mearnsii*, *Eucalyptus* spp*., Lonicera japonica*, and *Lantana Camara. The impact is considered to be negative, long-term and of low significance.*

6.2.1.6 Increased erosion risk as a result of soil disturbance and loss of vegetation cover

Mobilisation and site preparation involves a lot of earth movement, both intentional and unintentional. This movement often leads to erosion, which can impact both the site and the natural areas around it. Earth movement is not the only cause of construction site erosion. Changing the land levels through grading leads to wind and water erosion as well. All of these changes can be harmful to the environment, ruining soil quality, causing water pollution, and impacting both plants and animals. Soil texture is one of the major factors which determine the erodibility of a certain soil. Project site is dominated by sandy loam soils which is much more susceptible to erosion. It's the contractor's responsibility to limit erosion through responsible practices. However, clearance and levelling the area will not be left in a denuded condition for a significant amount of time but will be covered with planted grass and trees. *The impact is considered to be negative, short term and of low significance.*

6.2.2 Negative social impacts during site preparation/mobilization phase

6.2.2.1 Increased income to locals from employment opportunities

One of the main positive impacts during projects mobilization phase will be the availability of employment opportunities especially to casual workers and several other specialized workers (including designers, architects, contractor crew, and other related workers). It is estimated that 100 personnel will be involve with the project structure development and recruitment of skilled labour is mostly of Contractor's choice. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the construction sites for the period from the start of the project to the end. Apart from casual labour, semi-skilled and unskilled labour, formal employees are also expected to obtain gainful employment during the period of construction. Food vendors who are mostly women will benefit through supply of food to the workforce. *This Impact is considered to be positive, cumulative, and short-term to long-term and of moderate significance.*

6.3 CONSTRUCTION PHASE

6.3.1 Negative environmental impacts during construction phase

6.3.1.1 Dust pollution

During construction work, concrete batching plant will be used and such plant has the potential to emit dust, in the form of cement, sand and aggregates dust. Dust pollution is mostly likely to occur during the delivery of raw materials in trucks, trailers and tankers. Any quantity of dust emissions will have the potential impact on the air environment and affect sensitive receptors in the proximity areas, such as the site workers, users of the nearby road and nearby residents. Fine dust particles (PM_{10}) from concrete batching operations can enter neighbouring premises and adversely affect amenity as well as adverse health impacts. Dust also has the potential to settle on nearby project structures and landscaped grounds. However, the government authorities of Tanzania (TBS Standards) have published the maximum tolerable emission of particulate matter for industrial plant as 250mg/Nm^3, a value unlikely to be reached or exceeded during construction works. Given the relatively small scale of the project area and its location,

the level of pollution is very unlikely to be above the normal tolerable level. *The impact of dust pollution is therefore predicted to be negative of short-term duration and of moderate significance.*

6.3.1.2 Nuisance and disturbance on/offsite receptors from noise pollution

In a general context, construction activities will involve construction of foundations for the project and its associated facilities. Existing road network will be used and no new access roads are required for construction purposes and, therefore, noise and vibration effects associated with road construction are not expected. There are no blasting requirements during the construction process. Noise and vibration effects associated with blasting are, therefore, not expected during construction activities. Mechanical equipment which is planned to be involved in the construction of the proposed project includes, but is not limited to: track loader, excavator, hydraulic hammer and breaker, mobile crane, air compressor, dump trucks, generators, concrete pump, etc. The table 6.4 below gives an overview of the noise levels at a reference distance of 16m from the source for various machines that will be most frequently used in construction. The values in the table are based on data from the available literature.

Table 6.4: Noise levels from construction equipment

Noise during construction	Level of noise (dBA) at 16 m from the source
Compressor	81
Excavator	80
Ballast equalizer	82
Compactor	82
Concrete mixing	85
Pump for concrete	82
Vibrator for concrete	76
Crane	88
Mobile crane	83
Bulldozer	85
Generator	81
Machine for flattening	85
Circular saw (metal cutting)	76
Woodcutter	84
Track loader	85
Truck	88

However, the size of the construction to be made shows that relatively few equipment's and trucks will be involved in transporting the construction materials. Albeit annoying, this negative impact will be short-term (limited to the duration of the construction works and is not considered to be a significant threat to the health or well-being of humans. *The potential impact associated with increased noise, is predicted to be negative, short term and of moderate significance.*

6.3.1.3 Deterioration/impairment of local air quality

During construction, vehicles and equipment's with internal combustion engines have potential to emit noxious gases such as CO_2, CO, NOx, SO_2, VOC and CH_4. Emission levels, however, is a function speed, condition of the road, application etc. Main impact is impairment of local air quality, the extent of which will depend on: number of vehicles operating at a particular time; prevailing atmospheric conditions - wind regime, temperature and rainfall; atmospheric conditions and duration of construction works. The general guidelines for air quality standards for Tanzania (Environmental Management (Air Quality Standards G.

N. No. 237) Regulation, 2007) and as recommended by the World Health Organization (WHO) are listed in Table 6.5 below:

Table 6.5: Air quality standards

Pollutant	Tanzania	WHO/IFC
PM_{10}	Annual mean of 60 to 90µg/Nm^3 (0.05 – 0.116 mg/kg)	• 24-hour mean of 150 µg/m^3 • Annual mean of 50 µg/m^3
SO_2	• 24 – hour average 100 µg/Nm^3 (0.129mg/kg) or • Annual mean of 40–60 µg/Nm^3 (0.05-0.08 mg/kg)	• 24 – hour average 150 µg/m^3 or • Annual mean of 50µg/m^3
NO_2	• 150 µg/Nm^3 for 24-hours average value or • 120µg/Nm^3 for 8 hours	• 150 µg/m^3 for 24h average value • Annual 100 µg/m^3
CO	Time-weighed exposures at the following levels: • 100 mg/Nm^3 for 15 minutes • 60 mg/Nm^3 for 30 minutes; • 30 mg/Nm^3 for 60 minutes • 10 mg/Nm^3 for 8 hours.	

It is expected that the number of vehicle movements during construction will be approximately 1-2 vehicle per day, and also the equipment and machinery planned to be used will be limited. With the low forecast number of vehicle movements, the limited quantity of equipment/machinery, and adoption of good maintenance regimes, the emissions of air pollutants from these sources will be limited. Additionally, from the above standards and based on the location and duration of works on the project site, it is unlikely that the above threshold value will be exceeded. It can be concluded that the emissions may affect local air quality but will have no significant impact on global air quality. *The impact is predicted to be negative, cumulative, short-term duration and of moderate significance*.

6.3.1.4 Pollution of soil and water resources (surface and ground water) from hydrocarbons

Refuelling and maintenance of vehicles and machines will take place at the construction site and therefore fuel and lubricants will have to be stored on the site. This will create the opportunity for accidental spills of hydrocarbons and contaminants could be washed into the environment. Taking into consideration of the number of vehicles that will be involved, these will be in small quantities and they can easily be handled. *As such they are considered to be negative, short-term duration and of low significance.*

6.3.1.5 Loss of visual amenity due to haphazard disposal of construction waste

Solid waste generated during site preparation and construction work would include cut vegetation and typical construction waste (e.g., wasted concrete, steel, wooden scaffolding and forms, bags, waste earth materials, lumber, paper, plastics etc.). This waste would negatively impact the site and surrounding environment if not properly managed and disposed of at an approved dumpsite. Cleared vegetation burnt onsite would generate smoke, possibly impacting negatively on ambient air quality and human health. Waste, if allowed to accumulate in drainage ways, could cause pooling and flooding. Pooling of water, in turn, would create conditions conducive to the breeding of nuisance and health-threatening pests such as mosquitoes. *The impact is considered to be negative, short term and of moderate significance.*

6.3.1.6 Environmental pollution from poor management of construction materials

The improper siting of stockpiles and storage of sand, gravel, cement, etc., at the construction site could lead to fine materials being washed away, during heavy rainfall events. This would not only represent a waste of materials but would also contribute to turbidity and sedimentation with consequent negative impacts on environment quality of the area. *The impact is considered to be negative, short-term duration and of moderate significance.*

6.3.2 Negative social impacts during construction phase

6.3.2.1 Road traffic safety risks

The principal means of transport proposed to service project construction is by road. Transportation and delivery of the project machines and equipment's will be by using standard vehicles and, therefore no specialized vehicles which would have non-standard dimensions are required. The construction phase of the proposed project will necessarily increase the volume of traffic in the vicinity of the project site, as well as change the nature of the traffic. This will likely result in the deterioration of roads (including an increase in potholes), which poses a safety risk for other road users. The mere presence of construction traffic may also result in an increased safety risk, or other roads users may feel as though they are at a greater safety risk, whether this is the actual case or not. However, these effects would be discontinuous, limited to the duration of the construction works and with moderate magnitude, and would be controlled through traffic management measures where appropriate. *The impact is considered to be negative, short term and of moderate significance.*

6.3.2.2 Occupational accidents at the work place

Construction activities are rife with activities that may cause risk of serious injuries, fatalities to workers these include motored/ sharp edged equipment's etc. Construction works use various noise-emitting heavy power equipment's, tools and engines such as compressor, generator and mixing machinery. Injuries and other health hazards to construction workers may result from moving equipment and dust and noise from excavation and transportation equipment. According to the 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; improper method of lifting; sharp edges; improper use of personal protective equipment PPE; inadequate provisions of Personal Protective Equipment PPE; falling through uncovered openings especially at upper floor levels and carelessness of workers. *This impact is considered to be negative, long term and of high significance.*

6.3.2.3 Increased spread of HIV/AIDs and STDs

During construction a number of workers about 100 will be involved at the project site. Some workers will come from other places apart from Bungo Mtaa. This will result into social interactions and intermingling. In this case social interactions cannot be avoided which can result into spread of HIV/AIDs and STDs. However, construction of this project will only last for few months and about 30 to 50 workers is relatively small number in the area. Thus, the expected interactions might be minimal. *The impact is considered to be negative, long term but of low significance.*

6.3.2.4 Increased local population due to labour influx

There is a possibility of the project to attract people during construction and implementation phases. 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; increase of health risks (i.e., spread of diseases such as HIV/AIDS) and feel of unrest for local women as a result of workers moving to the area, as due to the nature of the project, it is not expected that there will be large workforce required for the project. Estimated that 100 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 operation stage will require much less workers compared to the construction stage and will be accommodated within the area. Despite the fact that labor influx is associated with negative impacts, the labor influx also can have a positive impact on community wellbeing through supporting local enterprise, local content support (community capacity and human capital) and employment opportunities for local communities. *The impact is predicted to be negative, long term but of low significance.*

6.3.2.5 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. However, based on the fact that the majority of unskilled workers will be sourced from Mkuza Ward, Kibaha Town Council, there is little risk of influx of migrants from other districts and far off areas. Aside from locals, there will be a small fraction of workers who will be skilled specialists from outside the Pwani region. Given the relatively small scale of the project area there will be less risk associated with child labour and forced labour within supply chain. During operation phase, the majority of contracts will be expected to be permanent and therefore easier to regularly monitor labour performance. *The impact is predicted to be negative, long term but of moderate significance.*

6.3.2.6 Potential GBV/SEA/SH related incidences

The GBV committee has been formed and meets regularly to solve the emerging GBV cases. The proposed project is expected to employ not more than 100 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 who may be present at the project site. Such risks are known to occur on construction projects. Some potential GBV/SEAH related incidences during construction phase include: denial of resources, opportunities or services; physical assault; requests for sexual favours'; 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, long term but of moderate significance.*

6.3.2.7 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.*

6.4 OPERATION PHASE

6.4.1 Negative environmental impacts during operation phase

6.4.1.1 Contaminations of land from poor solid wastes management

The laboratory apart from using it for experiments and trainings also will have office space, where office-related waste such as paper, toner cartridges, universal wastes (light bulbs, and electronics), plastics (in many forms), aluminium cans, glass, textile, food remains and general trash will be generated. Several types of waste may be produced at the residential building, such as organic (vegetables and food wastes) from the kitchen, wastewater, rubber, and woodworks. These have the potential for soil/groundwater pollution, creating visual and odour impacts if not well managed. However, considering the size of the proposed project, wastes expected to be generated will be small in quantity. They will be disposed of according to the requirements of statutory authorities. Also, during the site inspection, the ESIA team noted that the OUT Pwani Centre has a well-established solid waste management system. Dust bins of different sizes will be placed in strategic areas to ensure all wastes generated are collected at the source. Data on the quantity of waste generation at the project site will be collected daily. The bins will be emptied daily and waste will be transported to the dumping site. Hence, it is anticipated that the proposed project will not affect the soil environment. *This impact is predicted to be negative, long-term of moderate significance.*

6.4.1.2 Deteriorated/impaired water quality (surface and ground) from wastewater disposal

This pollution will be mainly a result of sanitation system (Septic tank system) that will be used during project operation. This is due to the fact the proposed project will increase number of students with time. Onsite sanitation systems always cause groundwater pollution due to infiltration of the effluent during disposal. Also, surface water is at risk of pollution due to drainage of contaminated impervious surfaces. In this case, the main pollutants include solid matters, floating and macro waste, heavy metals and organic matters. During the rainy season, the surface waters will drain the pollutants directly towards the natural discharge system if the project does not envisage pre-treatment of rain water. Thus, the risk of water degradation is assessed as important, which may have an indirect impact on the water table too. *This impact is predicted to be negative, long-term, and of high significance.*

6.4.1.3 Compromise quality of soil, ground water and surface water from laboratory effluents

Most of effluents resulting from science laboratory experiments are considered hazardous, so the generation, storage and disposal of effluents require a special consideration in every experiments. The proposed project will develop its own septic tank to dispose its own effluents. Septic tanks will be constructed according to international standard and will be monitored to avoid ground water pollution. However, several risk factors can reduce the efficiency of the septic tank. The risk can be imparted during designing or operation phase. During designing phase if risks such as inadequate tank volume geometry and compartmentalization, inconsideration of tank access space and plan that involves the use of substandard construction materials are not managed properly it can reduce the efficiency of the septic tank treatment system.

In addition, a faulty designing can result also in cracking of the tank, leakage (ground infiltration), tank flotation and inadequate retention time of effluent. Faults from designing and operation of the septic tank can last for long-term and have high impact on the quality of ground water table, soil and receiving surface water. However, if proper risk mitigation strategies are in place and with the good septic tank management

techniques built in the project, the occurrence of impacts on the receptors will be low. *This impact is predicted to be negative, long-term, and of high significance.*

6.4.1.4 Public health hazards from reject materials/expired chemicals

Impacts from reject materials / expired laboratory chemicals shall be the main risk during the operation phase. Measures to contain, transport and dispose them shall be required during this phase. Reject materials are products which are out of specification, or have deteriorated during storage and/or handling in such a way that they can be considered potentially hazardous. They cannot be used in the laboratory and may require treatment to render them safe. Examples include; unopened chemicals that have reached the manufacturers expiration date, those which contain more than the maximum permitted level of active ingredient; those which have physically degraded into fines and could fail to produce the required results, the resistance to test, where applicable, and products grossly contaminated with reactive substances.

Those that do not comply with such specifications shall be rejected to prevent their use in operations for which they are unsuitable. These materials shall not be incinerated as they have a potential significant risk to the surrounding air quality from generation of fly ash. The major impact that will arise from the incinerator is the emissions of air pollutants from fly ash whose particulate matter has a potential to air related diseases such as lung related illness, heart related diseases, birth defects and other potential congenital abnormalities and hormonal defects. *These impacts are predicted to be negative, long-term of moderate significance.*

6.4.1.5 Health and safety risks due to fire hazards

During the operational phase of the laboratory, there is a potential risk of fire that may result from the use of the highly flammable biological and chemical reagents. Also, electrical fault is by large the main culprit in fire accidents in buildings in Tanzania. Buildings are very prone to fire hazards because of different types of combustible materials and machines, which are used and installed, respectively. The components of a fire are fuel (combustible substance), heat and oxygen. Unless all three are present fire will not occur. Fire can cause the following effects loss of lives; serious Injuries; and loss of properties etc. The risk to fire will be properly mitigated and will take into account the resilience of the building materials to withstand fire for a certain period. In addition, the building require sufficient fire emergency exists in case of an outbreak of fire. *This impact is predicted to be negative, long term and of high significance*

6.4.1.6 Occupational health and safety hazards due to inadequacies in provisions for working conditions

Employee well-being requires consideration of the occupational health and safety of workers and contractors, workplace conditions (e.g., wages, benefits, security, rights and growth opportunities), as well as job satisfaction and pride. Most OHS impacts encountered in factories include dust emissions, noise, working at height, moving machines, revolving parts, heat, electrical hazards, coolants, transport equipment's and inhalation of noxious gases. The health and safety risks in a project during operations include potential for respiratory diseases, burns, allergies and industrial accidents. Also, it is known that workers exposed to noise levels beyond 85dB could impair their hearing ability irreversibly. Dust exposure, particularly dust and fumes may result in bronchitis complications. Temperatures above 1,000°C may affect the health of the workers.

A system to measure, monitor and report on health and safety performance will be developed within the project, covering common definitions, reporting indicators, and guidelines for occupational health and safety management systems and for general health. In general, OUT will put in place a policy on OHS, procedures for management of the same which will be deployed for the proposed project. All such hazards will be successfully controlled by the adoption of safe project methods and occupational health and safety management systems. Also, workers will be provided with health and safety training and personal protective equipment suitable for the types of activities that they will participate in. *These impacts are predicted to be negative, long term and of high significance.*

6.4.2 Negative social impacts during operation phase

6.4.2.1 Health and safety hazards from chemical handling in the laboratories

The handling of chemicals will be a typical routine activity for many laboratory workers to be employed. Many organic and inorganic laboratory chemicals according to the Material Safety Data Sheet (MSDS) are corrosive to the skin and to the eyes, and can be toxic. Chemical hazards represent potential for illness or injury due to single acute exposure or chronic repetitive exposure to toxic, corrosive, sensitizing or oxidative substances. They also represent a risk of uncontrolled reaction, including the risk of fire and explosion, if incompatible chemicals are inadvertently mixed. Occupational chemical exposure may result from laboratory procedures performing and handling of chemicals.

The proposed project operators would have procedure to prevent chemical hazardous. This control measures would be designed and implemented accordingly and the OUT would continue providing training on the appropriate usage, handling and storage of chemicals. Chemical hazards can most effectively be prevented through a hierarchical approach that includes: Duration of the impact would be long-term lasting through the entire life of the affected person or short-term depending on the hazard exposed to. The intensity of the impact is low if appropriate ''facility design'' is adopted and PPE used by workers. *This impact is predicted to be negative, long-term, and of high significance.*

6.4.2.2 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 and will be of high significance. 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. Other public health hazards could occur due to high congestion of people into a small area where disease like TB, eye disease, upper respiratory tract infections etc may occur. Also, poor sanitation, haphazard disposal of waste and excreta could lead to the outbreak of cholera and diarrhea. *Considering that human health is involved the impacts are predicted to be negative, of long-term duration and high significance.*

6.4.2.3 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 project components to avoid the elimination of all forms of discrimination and social exclusion. Further, in Tanzania, women and girls face inequity in society. A girl with a disability is less likely to attend school. Additionally, physical barriers may restrict people with disabilities movement in building and hinder their performance. Consideration to PWD shall be given a high priority during designing and if no any mitigation will be taken, then, the impact has high significance. *The impacts are predicted to be negative, cumulative, long-term, and of moderate significance.*

6.4.2.4 Risk of SEA/SH at the project site

Students in particular female students are at risk of SEA/SH while using the proposed Zonal laboratory. 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.*

6.4.3 Positive social impacts during operation phase

6.4.3.1 Increased aesthetic value of the project area

The proposed project will be developed on land characterized by urban agricultural and with a number of undeveloped plots. The proposed project includes a plan to landscape the developed areas using trees and lawns. This will bring about long-term changes to landscape character of the general area by re-configuring features and elements within the area. The project development will also involve modernisation and other measures that will increase the value of the building in real terms. The aim is to achieve technical and visual improvements to structural components. Humans are naturally inclined to enjoy beauty in nature and all have attractive qualities in the form of their symmetry and colour. *This impact is predicted to be positive, cumulative, long-term, and of high significance.*

6.4.3.2 Increase of admission of Students to OUT

The proposed project components will provide adequate academic facilities to Open University of Tanzania Pwani Regional Centre, people and the country at large. These will increase admission of students from high schools and other college as a result more Tanzanian people will be benefited. Also, the proposed project components shall provide adequate and conducive space for meetings, trainings, seminars, workshops etc. In order to maximise benefits, it is essential that increased admissions are inclusive and consider the needs of vulnerable groups and people. To this end it is important that curricula is inclusive, buildings are accessible and persons with disabilities are able to fully participate in learning opportunities. *This impact is predicted to be positive, cumulative, long-term, and of high significance.*

6.4.3.3 Increase of revenue to the Open University of Tanzania

The OUT will increase students' enrolment which in return will increase revenues through university fees. This will increase the Open University of Tanzania financial standing which will good governance and efficient running of the University. Thus, the goals of academic institutions to become centre for seeking knowledge and disseminating it to a wide spectrum of beneficiaries at national and regional levels are going to be fully realized. *This impact is predicted to be positive, cumulative, long-term, and of high significance.*

6.5 DECOMMISSIONING PHASE

The proposed project may exist for a very long time since rehabilitation and upgrading is done when need arise. However, the laboratory may be stopped if the OUT or the Tanzania Government decides so for one reason or the other, or change in technology may necessitate discontinuation of the project. Also, the project may be decommissioned due to constraints in resources or approach changes in the core operations of the project. If this happens environmental as well as social impacts may occur as follows.

6.5.1 Negative environmental impacts during decommissioning phase

6.5.1.1 Environmental pollution from haphazard disposal of demolished waste

Demolition of the project structures particularly the project office administration building, foundations and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia, which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality. *These impacts are predicted to be negative, long term and of high significance.*

6.5.1.2 Noise pollution

During the various stages of the decommissioning works, noise sources and potential impacts associated with the demolition works are likely to occur. This includes noise from site traffic (including light and heavy vehicles), noise from the operation of machinery/equipment and from dismantling and demolition activities. The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. *The impact is predicted to be negative, short-term duration and of high significance.*

6.5.1.3 Air pollution due to dust

The air quality will be most affected during the demolition work with the emission of dust particles from machinery like excavators, electric grinders and mixer. The impact receptors are likely to include site workers. The substance, which will most significantly contribute to air pollution, will be Particulate Matter. PM_{10} may cause health hazards when inhaled in significant amounts and can also reduce the visibility. Most of those dust particulate will come from dust particulates which themselves come from the concrete rubbles and blocks. *The impact is predicted to be negative, short-term duration and of high significance.*

6.5.1.4 Soil and water pollution

The potential impacts on the soil and groundwater environment during demolition activities may include: - water and soil quality impacts from the demolition/removal of structures within project site; changes in soils and groundwater regime due to excavation works during the demolition activities; contamination of soil and groundwater quality with hazardous materials such as oils, heavy metals, etc on site during the demolition activities; site drainage; disposal of wastewater and sewage disposal; and accidental spillages of fuel, oil and chemicals. *The impact is predicted to be negative, short-term and of high significance.*

6.5.1.5 Occupational health and safety

During decommissioning phase, risks of accidents and ill health as a result of demolition activities, noise and dust, are likely to take place. Demolition workers and neighbouring residents are also likely to be affected by the dust generated. *The impact is predicted to be negative, short-term and of low significance.*

6.5.2 Negative social impacts during decommissioning phase

6.5.2.1 Loss of employment

The employee and their family will be depending directly or indirectly on the project for their living. Decommissioning of the project means they will lose their means of generating income and this may result into social stress/unrest to the community and may give rise to conflict with investor. *Loss of job is predicted to be negative, long-term duration and since survival of the people is very important here the impact is considered of high significance.*

Table 6.6: Summary of potential impacts

Phase	Potential Impacts	Significance Value
Preparation / Mobilization	Increased income to local communities from employment opportunities	This impact is predicted to be positive, cumulative, and short-term to long-term and of moderate significance
	Conflicts due to access restrictions	This impact is predicted to be negative, long-term and of moderate significance
	Damage / loss of valuable vegetation cover and contained biodiversity	This impact is predicted to be negative, short term and of low significance
	Deterioration/impairment of local air quality from equipment's/vehicular emissions	This impact is predicted to be negative, cumulative, short-term and of low significance
	Deterioration/impairment of local air quality from dust pollution	The impact is predicted to be negative, short-term and of moderate significance
	Disturbance/nuisance to receptors from increased noise levels	This impact is predicted to be negative, cumulative, short-term duration and low significance.
	Increased soil erosion of exposed surfaces	The impact is predicted to be negative, short term and of moderate significance
Construction	Increased income to local suppliers and service providers	The impact is predicted to be positive, short term and of high significance
	Impacts on air quality from construction emissions	The impact is predicted to be negative, cumulative, short-term duration, and moderate significance

Phase	Potential Impacts	Significance Value
	Nuisance and disturbance on/offsite receptors from increased noise level	The potential impact is predicted to be negative, short term, cumulative, and moderate significance
	Deteriorated/impaired air quality from dust pollution	The impact is predicted to be negative, short-term duration and of moderate significance.
	Nuisances and health hazards due to increased vibrations	The impact is predicted to be negative, short term and of low significance.
	Visual effects during construction	The impact is predicted to be negative, short term and of low significance
	Deteriorated/impaired water quality (surface and ground) due to accidental spills of hydrocarbons	The impact is predicted to be negative, short-term duration and of moderate significance
	Loss of aesthetics due to improper disposal of construction waste	The impact is predicted to be negative, short term and of moderate significance
	Traffic accident impacts	Therefore, potential impact is predicted to be negative, cumulative, short term but of moderate significance
	Occupational health and safety impacts during construction	This impact is predicted to be negative, long term and of high significance
	Increased incidence of diseases transmission including HIV/AIDs and STDs	The impacts are predicted to be negative, cumulative, long-term, and of moderate significance
	Potential risks and hazards associated with child labour	The impact is predicted to be negative, long term but of moderate significance
	Increased local population due to labour influx	The impact is predicted to be negative, long term but of low significance
	Potential GBV/SEA/SH related incidences	The impact is predicted to be negative, long term but of moderate significance
	Gender inequity in employment	The impact is predicted to be negative, long term but of moderate significance
Operation	Increased aesthetic value of the project area	This impact is predicted to be positive, cumulative, long-term, and of high significance
	Increase of admission of Students to OUT	This impact is predicted to be positive, cumulative, long-term, and of high significance
	Increase of revenue to the Open University of Tanzania	This impact is predicted to be positive, cumulative, long-term, and of high significance
	Risk of SEA/SH within the project site	This impact is predicted to be negative, cumulative, long-term, and of high significance
	Health and safety hazards from chemical handling in the laboratories	This impact is predicted to be negative, long-term, and of high significance
	Contaminations of land from poor solid wastes management	This impact is predicted to be negative, long-term of moderate significance
	Deteriorated/impaired water quality (surface and ground) from wastewater disposal	This impact is predicted to be negative, long-term, and of high significance
	Compromise quality of soil, ground water and surface water from laboratory effluents	This impact is predicted to be negative, long-term, and of high significance
	Public health hazards from reject materials/expired chemicals	These impacts are predicted to be negative, long-term of moderate significance

Phase	Potential Impacts	Significance Value
	Health and safety risks due to fire hazards	This impact is predicted to be negative, long term and of high significance
	Occupational health and safety hazards due to inadequacies in provisions for working conditions	These impacts are predicted to be negative, long term and of high significance
	Health Hazards due to social interaction among workers and users	The impacts are predicted to be negative, of long-term duration and high significance
	Non-user-friendly buildings for Persons with Disabilities (PWDs)	The impacts are predicted to be negative, cumulative, long-term, and of moderate significance
Decommissioning	Environmental pollution from haphazard disposal of demolished waste	These impacts are predicted to be negative, long term and of high significance
	Noise pollution	The impact is predicted to be negative, short-term duration and of high significance
	Air pollution due to dust	The impact is predicted to be negative, short-term duration and of high significance
	Soil and water pollution	The impact is predicted to be negative, short-term and of high significance
	Occupational health and safety	The impact is predicted to be negative, short-term and of low significance
	Loss of employment	This impact is predicted to be negative, long-term duration and of high significance.

6.6 CONSIDERATION OF ALTERNATIVES

6.6.1 Introduction

In the early stages of the development of the proposed Construction of the Three Storey Science Laboratory Building at Plot No 24, Bungo Mtaa, Mkuza Ward, Mkuza Ward, different project alternative option has been considered from the point of view of site layouts, alternative designs, alternative processes and materials. The “no action” alternative was also considered to evaluate the scenario in the absence of the project taking place. With this in mind, the general principle involved in identifying the option(s) of the proposed project is 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 OUT, 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

6.6.2 Assessment of the no-go alternative

The no-go alternative is the option of not proceeding with the development of the proposed establishment of the Science Laboratory Building. The ‘do nothing’ alternative does not involve capital investment costs and in such a scenario the potential environmental and social impact directly associated with the project will not occur. In addition, none of the anticipated benefits of the project, as described in section 6.5 above will be realised. Based on the above motivations, it would be beneficial to pursue projects such as the propose Science Laboratory Building project that may assist to meet tremendous demand of the Science Laboratory Building at the OUT. The practical aspects of the science laboratory training programs have been ineffective due to lack of access to the lab facilities. Hence the need for having the laboratory facility

at the zonal area for effective deliverance of the science courses. The presence of Zonal Science laboratory will give the public to access the services offered by the OUT in Pwani Region. This project also has the potential to provide much needed training and employment opportunities for local communities in the Kibaha Town Council. The aspiration and desires to proceed with this sustainable project became apparent during public consultations and site visits to the study area.

6.6.3 Site selection

The project options should be provided within the constraints of the aim and broad economic, technical and environmental factors". The construction of the Three Storey Science Laboratory Building at Bungo Mtaa, Mkuza Ward, Kibaha Town Council was identified after examining and eliminating another site choice. In the context of this study therefore the choice of site has been dictated by the following the factors:

a) Ownership of the site. This site is privately owned by the OUT as such it does not involve complicated issues of displacing people, compensation and settlement.
b) The project site is located on the land designated for academic institution development. It is surveyed and planned for academic institution development. All developments on plots are according to the letters of offer (titles) and building permits.
c) The allocated land was designed and planned to accommodate further expansions of the project or support facilities such as the proposed project. There are no changes in land use as such. This gives an opportunity to OUT to continue planning and also to accommodate new development within their area.
d) The site is easily accessible, and has all utilities needed.
e) Size of available land was desirable for the proposed project

6.6.4 Design considerations alternatives

The design options for the proposed Science Laboratory Building have followed laboratory design and construction experience in which international codes, references, standards and guidelines are strictly considered. Every effort was made to follow these codes and standards; however, enforcement was based on a case-by-case basis, after weighing the benefit against the inevitable cost implications. In all cases, however, safety was not compromised. As a result, several design layouts were considered during the design phase. The preferred site layout (attached) of the proposed building consists of the Botany laboratory, Zoology Laboratory, Food science laboratory and Preparation rooms and technical offices for each laboratory on the ground floor. The first floor will comprise the ICT Multimedia state of the art laboratory, DRC and staff offices, Min library and Modern conference facilities. The building also will have 38 total parking bays for the users and visitors. Other associated facilities to support the project are retaining wall, concrete paving blocks, security guard post, changing room, water storage tank with a pumping system, toilets, solid waste collection area, waste water drainage system, fire system and utilities network.

Moreover, sustainable design concepts incorporated for implementation during construction and operation phases of the Science Laboratory Building includes:

- Locally available materials will be selected to reduce transportation and processing costs.
- Material that uses recycled materials and generally use sustainable laboratory processes will be given priority over those that do not.
- existing trees will be saved as many as practical.

- Light shelves will be considered to reflect light deeper in to the buildings to reduce use of artificial lighting during the day.
- Building management Systems (BMS) will be considered to control and maximize efficiency of lighting and HVAC operation.
- Water saving plumbing fixtures such as automatic faucets and low consumption toilets and urinals will be considered.
- Rain water and grey water recycling will be considered, at least, for landscaping purposes.

6.6.5 Management technology alternative

The overall laboratory technologies, instruments, laboratory layout and operational procedures to be utilized and installed during the operational phases will also determine the impacts of the proposed project on environment and public health. The lab instruments and layouts, the laboratory operational procedures as well as the waste treatment and disposal facility options to be selected for use by the proposed project will have a direct and/or indirect influence on the environment and public health.

Several alternatives and standards were considered to determine the design and technology selection criteria for developing the proposed laboratory. The type of waste treatment and disposal facilities, its operational efficiency as well as easiness for use and maintenance will also influence the occurrence of negative impacts on the environment and public health. As a result, the development of the proposed laboratory has considered various available technology options and make choices that guarantee high level efficiency and biosafety in waste treatment and disposal operations and the following alternatives were considered.

6.6.5.1 Solid waste management alternative

Sanitary landfill alternative
Sanitary landfills, if properly constructed and operated, could provide a relatively safe disposal method for municipal solid waste including laboratory wastes. This method, however, requires a larger space for compaction of each day's waste and there is no readily available sanitary land fill in Kibaha Town Council that can receive and safely dispose wastes. Hence, this option was not selected.

Waste Incineration alternative
Incinerators, if operated properly, eliminate pathogens from the waste and reduce waste to ashes. However, certain types of waste e.g., chemical waste from the laboratory require higher temperatures for complete destruction. Higher operating temperatures and cleaning of exhaust gases limit the atmospheric pollution and odors produced by the incineration process. This option is a preferred alternative because of the many additional advantages of incinerators in safely disposing laboratory wastes. However, the incinerators to be installed at OUT need to full fill the minimum emission standard specified in the World Bank Group EHS guideline. Nevertheless, this option is risky and expensive based on the small amount of waste to be generated at the project site and in the context of the proposed project.

Recycling alternative
Secondly, recycling, reuse, and compositing waste will be the second alternative in priority. This will call for a source separation programme to be put in place. Recycling of wastes such as paper, glass (produced from laboratory and offices), metal (maintenance site), plastics, wood, waste oil and solvents (from maintenance and engineering operations), kitchen wastes and vegetable oils is to be effectively carried out.

Source reduction alternative

First, the OUT will prioritize reduction at the source of the materials. This option will demand a solid waste management awareness programme for management and the employees.

6.6.5.2 Wastewater (effluent) management alternatives

Use of a public sewer line alternative
Use of a public sewer line is one of the options considered for treating and disposing liquid waste generated from the proposed laboratory. This involves the construction of system to connect the municipal sewer line and it is inexpensive. However, this alternative is not possible currently because there is no municipal main to which the proposed project could be connected.

Use of septic tanks alternatives
The proposed project will develop its own containment septic tank to dispose its own effluents. Septic tanks will be constructed according to international standard and will be monitored to avoid ground water pollution. For sewage the project will involves the construction of underground concrete-made tanks to store the sludge with soakaway pits. It is expensive to construct and requires regular emptying in large discharge points, is also expensive and time consuming. However, the OUT may choose to have this well thought of option to operate to relieve the sewage blockages in the area and water shortages.

Waste water treatment plant alternatives
This can be constructed for the purpose of using chemicals to treat effluent water to acceptable levels before discharging the water into the open environment. This process is expensive and requires vigilant attention and use of substantial amount of space. An enclosed channel will have to be constructed all the way to the stream.

Constructed wetland alternatives
Constructed wetlands are engineered system designed and constructed to mimic natural processes taking place in the natural wetlands. Constructed Wetlands remove pollutants in wastewater through the combination of physical, biological and chemical processes. Two types of constructed wetlands exist based on the flow of wastewater through them. They are either subsurface flow where the flow is below the surface of soil or surface flow where the flow of wastewater is above the soil.

Use of stabilization ponds/lagoons alternatives
This refers to the use of a series of ponds/lagoons which allow several biological processes to take place, before the water is released back to the water body. Speaking of space, this method requires a larger field for natural treatment to take place. Furthermore; lagoons will present vulnerable situations due to tress passers. They are usually a nuisance to the public because of smell from the lagoons/ponds. However, with strict and professional management, they are the most economical and environmentally sound in the long term.

6.6.6 The "No Action Alternative"

The "no action" alternative is required to ensure the consideration of the original environment without any development. This is necessary for the decision-makers in considering all possibilities. The selection of the "No Action" alternative would mean the discontinuation of project designs and result in the site being retained in its existing form. The "No-action" alternative is challenging to consider as a viable option due to the existing situation. The Institute has planned to establish a Zonal Science laboratory to address the challenges resulting facing students enrolled on science courses at the University.

Further, currently the land use at Plot No 24, Bungo Mtaa, Mkuza Ward, mainly include a sizable built-up area mixed with agricultural development and undeveloped parts. Thus, the No-action alternative option will not have much significance in helping to preserve environmentally sensitive or aesthetically attractive plots of land. Instead, the no-project alternative will prolong the underutilization of the available land resource in the Bungo Mtaa for designated type of land uses by the Kibaha Town Council. In summary, the "No-action" option will undermine the huge social benefits that OUT and the country at large can harness from the development and operationalization of the proposed project. Due to the proposed quality of the development, it is considered that the positive benefits of zonal science laboratory development outweigh the potential adverse environmental and social effects. Therefore, the no-development option is not recommended.

6.6.7 Overview preferred Alternative

This alternative would see the construction of the development as proposed by the OUT, and as outlined in this document. This option has good support by the institutions which would be most affected by its implementation, i.e., Pwani Regional Commissioner Office, Kibaha Town Council, Mkuza Ward and community in Bungo Mtaa. The proposed development is being designed and built to meet or exceed local and international standards and regulations.

Based on the above comparison the proposed project as described in chapter two will provide adequate academic facilities to Open University of Tanzania Pwani Regional Centre, people and the country at large. These will increase admission of students from high schools and other college as a result more Tanzanian people will be benefited. Also, the proposed project components shall provide adequate and conducive space for meetings, trainings, seminars, workshops etc. However, the potential negative impacts identified will be mitigated by the proposed mitigation measures in chapter seven. Appropriate Environmental and Social Management Plans have been prepared as per the proposed project.

CHAPTER 7
ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES

7.1 INTRODUCTION

The impacts which are most likely to affect the environment in the execution of the Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region have been identified and analysed in Chapter 6. Based on the analysis and hence classification of the most likely environmental impacts, this chapter proposes the mitigation measures for the negative impacts. This chapter provides a summary of possible mitigation measures of those impacts which are considered to be of moderate to high significance, by matching the predicted impact, with possible mitigation measure, the target levels, responsible entity and approximate cost. 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, which accompanies this report as chapter 8.

7.2 PREPARATION / MOBILIZATION

7.2.1 Negative environmental impacts during site preparation/mobilization phase

7.2.1.1 Loss of vegetation

To mitigate the impact the contractor and the OUT during mobilization shall ensure that clearance of the site for construction purposes shall be kept to a minimum and areas that will not be impacted by the project shall not be disturbed. The Contractor shall clearly mark out the extent of clearing within the approved work-site and instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas. Also, the OUT will rehabilitate by seeding or planting ornamental trees to all areas that will not be occupied by the buildings and other project facilities on the project site. The contractor will avoid planting non-native and exotic species on the site as well as those that constitute obstacles according to the farm operations. The project will consult experts for advice and for potential flora stocks.

7.2.1.2 Depletion / degradation at points of source of construction materials

In order to effectively mitigate the above impacts exploitation of construction materials will be from the authorized source only. These authorized dealers should have the Mining license from the Ministry of Energy and Minerals. The licensed suppliers who hold the ESIA certificate and the Mining License comply with ILO labour conditions. Also, restoration of the borrow pits/quarries after use constituting levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (natural resources department) and local environmental NGOs. If appropriate the levelled area will be left for natural re-vegetation.

7.2.1.3 Noise pollution

Best practice procedures will be implemented in order to reduce mobilization noise. Such measure will include hydraulic construction to be used in preference to percussive techniques where practical. Also, all plant and equipment will be properly maintained, silenced where appropriate and operated to prevent excessive noise and switched off when not in use. Loading and unloading of vehicles, dismantling of

equipment such as scaffolding or moving equipment or materials around the site will be conducted as far as practicable during day time hours; and noise complaints will be immediately investigated.

7.2.1.4 Impaired air quality

Reduction of air emissions from exhausts shall be achieved by contracting new equipment or well serviced and maintained equipment. No vehicles or equipment's to be used that generate excessive black smoke. Where practical, contract will inspect machines and vehicles on delivery. Also, contractor will enforce vehicle load restrictions to avoid excess emissions from engine overloading.

7.2.1.5 Increased alien plant invasion

Construction materials shall be obtained from known sources and which have been surveyed to eliminate the possible spread of invasive species. When alien plants are detected, these will be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur. Areas invaded by alien species shall be cleared appropriately and rehabilitated with indigenous species. Cleared areas shall be stabilized and rehabilitated as soon as possible to minimize the risk of an increase in alien vegetation. Regular monitoring for alien plants shall be carried out within the project area.

7.2.1.6 Increased erosion risk as a result of soil disturbance and loss of vegetation cover

The proponent will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include terracing and levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. Deliberately the proponent will re-cover exposed soils with grass and other appropriate species as soon as possible and temporarily will bind exposed soil and redirect flows from heavy runoff areas that threaten to erode or result in substantial surface runoff to adjacent water courses. In addition, mobilization vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off. The proponent will monitor areas of exposed soil during periods of heavy rainfall throughout the remaining construction phase.

7.3 CONSTRUCTION PHASE

7.3.1 Negative environmental impacts during construction phase

7.3.1.1 Dust pollution

Dust generating activities (excavation, handling and transport of soils) shall not be carried out during times of strong winds. The Contractor shall suspend earthworks operations wherever visible dust is affecting properties adjoining the project site. Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the OUT Supervisor. Vehicles delivering soil materials will be covered to reduce spills and windblown dust and vehicle speeds will be limited to minimize the generation of dust on site and haul routes. Any complaints received by the Contractor regarding dust will be recorded and communicated to the OUT Supervisor. Also Asphalt plants and concrete batching plants will be well sealed and equipped with a dust removal device.

7.3.1.2 Nuisance and disturbance on/offsite receptors from noise pollution

The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase. The noise-suppression techniques that will be employed to minimize the impact of temporary construction noise at the project site include installation of portable barriers to shield compressors and other small stationary equipment where necessary, use of quiet equipment (i.e., equipment designed with noise control elements) and the proponent will ensure all vehicles have properly functioning mufflers. Also, will limit pick up trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible. Construction works shall be done during the day when people are away and also the outside environment is also noisy. Workers operating equipment that generates noise will be equipped with the appropriate noise protection gear.

7.3.1.3 Deterioration/impairment of local air quality

The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines. Also, equipment shall be properly tuned and maintained. No vehicles to be used that generate excessive black smoke. The proponent shall enforce vehicle load restrictions to avoid excess emissions from engine overloading. Where practical, switch off engines when not in use. This will also be achieved through proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.

7.3.1.4 Pollution of soil and water resources (surface and ground water) from hydrocarbons

The OUT and contractor shall ensure that re-fuelling and services for vehicles is done off site at the fuel depot. 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. Fuel is stored at designated area that will have concrete surface with the containment bund.

7.3.1.5 Loss of visual amenity due to haphazard disposal of construction waste

During the construction, the contractors shall maintain the project development area in neat and tidy condition through general housekeeping, to reduce any negative visual impacts. The visual impacts will also be mitigated by removing any equipment and machinery that is not in use, as soon as possible. Furthermore, the proponent shall erecting a boundary fence which will provide a good visual screen for the works, as well as offering a degree of protection to outside areas from noise and dust.

7.3.1.6 Environmental pollution from poor management of construction materials

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 and will include instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process; and introduction of waste disposal bins, warning notices, “DOs & DoNTs” etc posted at strategic points, through the project area. To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where levelling of the project site is required. Cleared vegetation, top soil and rubble from demolished

buildings at the project area will be used to fill up any other infrastructures (roads, pits etc) that needs filling. No, on site burial or open burning of solid waste shall be permitted at the project site. OUT will make use of the existing solid waste disposal and collection system. Wastes not suitable for incinerations and general waste damping (e.g., Batteries, plastics, rubbers, tyres, etc) shall be removed from the site for recycling, treatment, and/or disposal by licensed contractor as appropriate. Waste management training for all personnel, operators and services providers at the project site will be provided.

7.3.2 Negative social impacts during construction phase

7.3.2.1 Road traffic safety risks

Traffic accidents will be avoided by ensuring good driver awareness and maintaining speed limits for main roads and on material access roads. Also, by providing both road and safety signs to public as well as drivers at the core activity project site(s). All large or over-size transport vehicles will be accompanied by escort cars equipped with flashing yellow warning lights while in transit on public roads. Delivery of construction plant, equipment and goods will be planned so as to minimize the total number of required trips and will be scheduled outside of peak hour traffic times.

7.3.2.2 Occupational accidents at the work place

To mitigate this impact, the OUT and contractor shall comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements including the provision of Personal Protective Equipment's (PPE), reasonable working hours and good working conditions and facilities. Also, to develop and implement in-house manual/ guard lines on Health and Safety (H&S).

7.3.2.3 Increased spread of HIV/AIDs and STDs

The project proponent 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, project proponent 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.

7.3.2.4 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. The 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. Employment of child labour (children below the age of 18), pregnant women and elder citizens in hard labour and dangerous activities will be prohibited.

7.3.2.5 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 village 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. The OUT in collaboration with the local authority shall be advised to monitor movement of new comers/people in out of the project area. This will minimise to large extent the influx of people within the project area.

7.3.2.6 Potential 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 observe 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 of Influence and collect 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.

7.3.2.7 Gender inequity in employment

The OUT will ensure that women are given adequate 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.

7.4 OPERATION PHASE

7.4.1 Negative environmental impacts during operation phase

7.4.1.1 Health and safety hazards from chemical handling in the laboratories

Only small amounts of chemicals necessary for daily use would be stored in the laboratory. Bulk stocks would be kept in specially designated rooms away from the laboratory. The proponent will replacement of the hazardous substance with a less hazardous substitute and will implement engineering and administrative control measures to avoid or minimize the release of hazardous substances into the work environment keeping the level of exposure below internationally established or recognized limits. Where corrosive, oxidizing, or reactive chemicals are used, handled, or stored, qualified first aid would always be ensured. Appropriately equipped first-aid stations would be easily accessible throughout the place of work, and eye-wash stations and/or emergency showers would be provided close to all workstations where the recommended first-aid response is immediate flushing with water. The proponent will communicate chemical hazards to workers and student through labelling and marking according to national and internationally recognized requirements and standards, including the International Chemical Safety Cards (ICSC), Material Safety Data Sheets (MSDS) or equivalent. Any means of written communication would be in an easily understood language and be readily available to exposed students,

workers and first-aid personnel. Also, workers will be trained in the use of the available information (such as MSDSs), safe work practices, and appropriate use of PPE. Full safety wear shall be provided to any members of the team or student handling chemicals, and provisions to treat any exposure or clean spillages should be present in the laboratory.

7.4.1.2 Contaminations of land from poor solid wastes management

The proponent will be responsible for the efficient management of solid waste generated by the project during its operation. In this regard, solid waste will be collected and sorted out in different containers so that non-biodegradable wastes such as plastics and others will be handled separately. Also, the proponent will provide an adequate number of bins at convenient distances to discourage uncontrolled waste disposal. Storage areas shall be of adequate size and capacity to accommodate the required number of containers consistent with the waste generated and collection schedules. Containers shall be clearly labelled for their intended use (e.g., plastics, paper glass and garbage) and equipped with lids. Containers and waste storage areas shall be cleaned regularly; and waste material shall be removed to the disposal site at the earliest opportunity. The OUT will put in place a monitoring system to ensure all observe the proposed solid waste measures.

7.4.1.3 Deteriorated/impaired water quality (surface and ground) from wastewater disposal

The project proponent shall take reasonable precautions to prevent the pollution of the ground and/or water resources located adjacent to the site due to the project activities. Sanitary arrangements shall be to the satisfaction of the requirement of the Environmental Management (Soil Quality Standards) Regulation, 2007 and the Environmental Management (Water Quality Standards G. N. No. 238) Regulation, 2007. Septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites. The Pwani Regional Centre will establish a continuous environmental monitoring program to ensure that OUT management are well informed of the environmental performance of the project at all levels and at all times.

7.4.1.4 Compromise quality of soil, ground water and surface water from laboratory effluents

The proponent will consider proper retention tank volume, geometry and compartmentalization to impart adequate hydraulic residence time for sedimentation. The elongated tank with length-to-width ratios of 3:1 or more will be used to reduce short circuiting of the effluent. Two compartments will be used to achieve, better suspended solids removal rates. Manways 18 to 24 inches in diameter or square will be designed to access the tank for regular monitoring and maintenance. Tank joints will be designed for water tightness and tank will be located where it can be accessed easily for septage removal and sited away from drainage or depressions where water can collect.

The proponent will maintain minimum horizontal setback distances requirement from buildings, property boundaries, wells, water lines, and the like. The backfill material will be free flowing and free of stones larger than 3 inches in diameter and debris. The OUT will establish a continuous environmental monitoring program to ensure that OUT management are well informed of the environmental performance of the project at all levels and at all times.

7.4.1.5 Public health hazards from reject materials/expired chemicals

Proper disposal of reject materials/expired chemicals can be expensive. So, the project proponent will minimize the need for proper disposal, by minimizing chemical purchases. The University will purchase chemicals for the lab according to the need of that particular time. Also, as the University has other Zonal

laboratories, centralizing chemical purchasing will be an effective way to do this. Having a single person assigned to purchase all chemicals for all laboratories will help and ensure that duplicate orders are not made by different members of the laboratory staffs. The OUT will maintain an inventory of all the chemicals in use or stored in the laboratory. Procurement personnel will record the receipt of all purchased chemicals. The inventory will incorporate the date into the inventory to manage materials that expire. Chemicals from the inventory when they are used will be removed to keep track of materials and this will be monitored regularly. This inventory will be used to inform laboratory manager and staff members when samples become so old/expired that disposal is necessary. Thus, these expired chemicals will be stockpiled in the dedicated store room for further guidance from regulatory authority.

7.4.1.6 Health and safety risks due to fire hazards

All staff will have training in fire control through regular firefighting drills. Fire extinguishers would be available in accessible area near to fire risk area and ensure that all fire-fighting equipment is regularly maintained and serviced. Fire emergency telephone numbers would be displayed in communal areas. Some of the applicable techniques related to building safety, including hydrant system for protection of the building against fire will be implemented and automatic fire alarm system for the entire laboratory will be installed. Fire hazard signs such as 'No Smoking' signs will be provided. Directions to exit in case of any fire incidence and emergency contact numbers will be provided. The contact/emergency numbers will be displayed within the laboratory.

To avoid short circuiting, an earthing system shall be designed and installed. Grid resistance will be decided based on soil resistivity and allowance for corrosion. Electrical equipment's shall be flame proof in and around the project. To avoid road accidents due to spillage of chemicals / substances and blockages of road, proper parking and road safety signs both inside and outside the project shall be provided.

7.4.1.7 Occupational health and safety hazards due to inadequacies in provisions for working conditions

To protect workers from occupational hazards, the OUT shall provide and enforce use of appropriate PPE. Appropriate safety measures will be developed based on a risk assessment and may include adequate ventilation in the laboratory, office or in workers' long exposed working area, and guidance on safe working in confined spaces; establish safe working procedures/guidelines which will be followed by all employees working in the project premises. The OUT will also monitor occupational hazards risks and provide timely rectification before waiting for incidence. Further, OUT shall formulate the Occupational Health and Safety Policy (requirement of section 96 of OHS Act 2003). The medical examination shall be carried out every six months by Occupational Health Physician as per section 24 of the Occupational Health and Safety Act, 2003. Manuals and training regarding the correct handling of materials and packages shall be in place and updated as new or updated material safety data sheets becomes available; and maintenance of hygiene conditions at all workplace – washroom.

7.4.2 Negative environmental impacts during operation phase

7.4.2.1 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 company 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.

7.4.2.2 Non-user-friendly buildings 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.

7.4.2.3 Risk of SEA/SH within the project area

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. 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 NGO to report workers' misconduct and complaints/reports on GBV or harassment through the GRM.

7.5 DECOMMISSIONING PHASE

7.5.1 Negative social impacts during decommissioning phase

7.5.1.1 Loss of employment

In order to minimise the impacts that may result from this eventuality the proponent shall prepare the workers to be employed anywhere else in the similar project through provision of extensive training. Also, the project will prepare workers for forced retirement by providing skills for self-employment, wise investment. Further shall ensure that all employees are members of the Pension Fund and the employees shall ensure that the developer's contributions are made. In time of decommission of this project, OUT may consider its employees in development of new projects.

7.5.2 Negative environmental impacts during decommissioning phase

7.5.2.1 Environmental pollution from haphazard disposal of demolished waste

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

7.5.2.2 Noise pollution

The OUT will coordinate activities that produce the most noise levels. Use of equipment designed with noise control elements will be adopted where necessary and demolition exercise will be limited at day time only. All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise.

7.5.2.3 Air pollution due to dust

The contractor will douse the surface with water to suppress excessive dust and whenever possible, water sprinklers shall be used. Also, the contractor will provide protective gear (i.e., breathing masks) to workers working in dusty environment.

7.5.2.4 Soil and water pollution

Demolished materials shall be kept within planned boundaries and with a clear separation. If it is essential to stockpile materials close to runoff, control measures shall be implemented, such as excavation of a shallow water/ sediment collection ditch around the boundaries of stockpiles to contain run-off water for a sufficient length of time to allow for settlement of solids. Stockpiles or other storage compounds (e.g., demolished material) boundaries shall be clearly marked out with physical boundary markers such as posts. Windbreaks or fencing shall be erected between the stockpiles and the predominant wind direction. Monitoring and auditing of the works and site practices shall be undertaken, including monitoring the water quality during the works. This will be necessary to enforce good site practice and principles as well as good and compliant behaviour.

7.5.2.5 Occupational health and safety

All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors. The proponent shall establish safe working procedures/guidelines which will be followed by all employees and any subcontractor working in the facility premises

7.6 ENHANCEMENT OF POSITIVE SOCIO-ECONOMIC IMPACTS

7.6.1 Contributing to local economic growth

Where possible the construction contractor will be advised through contractual means to maximize the application and use of locally produced construction material supplies. This will increase the quantity of materials to be procured from the various local suppliers and hence it will enhance the income generation capacity of local suppliers. The use of locally available materials and labour for the proposed project development will contribute to the economy's growth by contributing to the 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, while the cost of these raw materials will be payable directly to the producers. Other opportunities can be enhanced to contribute to the growth of the economy at local, district, regional and national level includes food vendors (mama Lishe), Kiosk, Taxes from the workers' salary, tax, procurement of goods and services, charges, fees, levies.

7.6.2 Increased income by utilization of local resources

It is expected that, materials such as cement, aluminium, roofing sheets, timber, paving blocks tiles, sanitary, plumbing and electrical appliances, steel, and other miscellaneous materials required for

construction can be sourced locally e.g., Kibaha Town or other parts of Tanzania, depending on the type of materials required. Therefore, such a demand would create a market for local people and should be enhanced.

7.6.3 Support to local social services and livelihood

The project has a potential of enhancing development of the area through increased business activities and direct employment. As a corporate citizen, OUT will work all along with the Government to achieve the millennium development goals mainly in the area of poverty reduction. This will be done through a non-partisan scheme set by the University, tailored towards extending support to disadvantaged sections of various communities in the area to enable them access education, health care and clean safe water.

7.6.4 Induce development

To enhance this positive impact to the community living in the vicinity and area of influence; OUT shall ensure efficient operation of the Science Laboratory Building at the Bungo Mtaa, and good security within the project area and area of influence

7.6.5 Corporate Responsibility

As part of social corporate responsibility, it is expected for the OUT to establish a separate budget to implement its social commitment in the area. Its priority should focus on the pressing needs in the community such as supporting the community on the ongoing social projects including supporting building dispensaries, classrooms, and water related projects to mention some.

7.6.6 Employment/Income generation

Offering local people, the opportunity for employment during the construction or providing services such as supplying construction materials etc., will provide an additional income-generating opportunity to a significant number of persons who may be affected in these targeted areas. This will almost certainly be the case where skilled labour is concerned when there will be no local skilled labour.

This minor impact could be turned into a positive impact if the contractor of project is both encouraged to and committed to hiring local labour (especially marginalized groups such as youth), particularly when only semi-skilled or unskilled labour is required. During the tendering process for project construction, special clause that requires residents to be employed as labourers shall be included in the contractor's contract

CHAPTER 8
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 INTRODUCTION

The Environmental and Social Management Plan (table 8.1 below) provides way forward for implementation of the identified mitigation measures. The OUT shall be responsible for overall implementation of the ESMP. The Contractor shall implement components relevant to mobilization and construction. OUT Designated Environmental Management Officer shall be designated to make day to day follow ups (e.g., supervision and liaising with stakeholders). The Environmental Officer will also ensure that all employees at the project site have their environmental responsibilities and accountabilities clearly outlined. These descriptions will form part of the contractual obligations upon which individual employees are engaged. Specific accountabilities and responsibilities outlined in the specific ESMP will be communicated to responsible staffs. The estimated costs for implementing the mitigation measures are just indicative. Appropriate bills of quantities should clearly give the actual figures. In any case the consultant used informed judgement to come up with these figures.

8.2 PURPOSE OF THE ESMP

The purpose of the ESMP is to describe the measures that the contractors and the OUT should implement during the development and implementation of the project to eliminate or reduce, to acceptable levels, key potential impacts as well as social and health impacts related to project activities. All the project parties must fully adhere to the specific measures set out in the ESMP. In particular, the project must strive to avoid significant impacts on the biophysical, socioeconomic, health or safety aspects during implementation. Avoidance through well-detailed design of site-specific works and thorough preparation of the detailed site-specific ESMPs will be key to success in this area. Where impacts cannot be avoided, they must be mitigated by 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, policies and procedures;
ii) To guide on EHS issues as required by the IFC, World Bank Group EHS Guidelines and the Equator Principles (June 2006);
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; and
iv) To provide an operational reference and tool for environmental and social management during implementation of project activities.

All contractual and legal obligations relating to the ESMP apply to the proponent, the main contractors and any sub-contractors. It is the responsibility of the 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 proponent's responsibility, any contractors 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 3.8.2. 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 Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
Preparation / Mobilization	***Negative environmental impact***				
	Loss of vegetation	The contractor and OUT shall ensure that clearance of the site for construction purposes shall be kept to a minimum and areas that will not be impacted by the project shall not be disturbed. The Contractor shall clearly mark out the extent of clearing within the approved work-site and instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas. Also, OUT will rehabilitate by seeding or planting ornamental trees to all areas that will not be occupied by the buildings and other project facilities on the project site.	Type, number, distribution etc. of species	Contractor/ Environmental Consultants / OUT	5,000,000
	Depletion / degradation at points of source of construction materials	Exploitation of construction materials will be from the authorized source only. These authorized dealers should have the Mining license from the Ministry of Energy and Minerals. Restoration of the borrow pits/quarries after use constituting levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (natural resources department) and local environmental NGOs.	Materials to be sourced in licensed area, No complaints from the local people.	Contractor/ Environmental Consultants / OUT	5,000,000
	Noise pollution	All plant and equipment will be properly maintained, silenced where appropriate and operated to prevent excessive noise and switched off when not in use. Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the site will be conducted as far as practicable during day time hours; and noise complaints will be immediately investigated.	shall not exceed 75 dB(A)(peak readings), daytime or 55 dB(A) (peak readings) at night, No complaints from local people	Contractor/ Environmental Consultants / OUT	4,000,000
	Impaired air quality	Reduction of air emissions from exhausts shall be achieved by contracting new equipment or well serviced and maintained equipment. No vehicles or equipment's to be used that generate excessive black smoke. Where practical, contract will inspect machines and vehicles on delivery. Also, contractor will enforce vehicle load restrictions to avoid excess emissions from engine overloading.	SO_2: average 100 μg/Nm^3 (0.129mg/kg) for 24hour		
			NO_2: 150 μg/Nm^3 for 24-hours average value		
			CO: 10mg/Nm^3 for 8 hours		
			Black smoke PM_{10}: 40 to 60 μg/Nm^3		
	Increased alien plant invasion	Areas invaded by alien species shall be cleared in the appropriate manner and rehabilitated with indigenous species. Cleared areas shall be stabilized and rehabilitated as soon as possible in order to minimize the risk of an increase in alien vegetation.	Type, number, distribution etc. of species	Contractor/ Environmental Consultants / OUT	3,000,000

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Increased erosion risk as a result of soil disturbance and loss of vegetation cover	Terracing and levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. Re-cover exposed soils with grass and other appropriate species as soon as possible and temporarily will bind exposed soil and redirect flows from heavy runoff areas that threaten to erode or result in substantial surface runoff to adjacent water courses. Mobilization vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off. Monitor areas of exposed soil during periods of heavy rainfall throughout the remaining construction phase.	No erosion tendencies	Contractor/ Environmental Consultants / OUT	3,000,000
Construction	***Negative environmental impact***				
	Dust pollution	Dust generating activities shall not be carried out during times of strong winds. The Contractor shall suspend earthworks operations wherever visible dust is affecting properties adjoining the project site. Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site in the opinion of the OUT Supervisor. Vehicles delivering soil materials will be covered to reduce spills and windblown dust and vehicle speeds will be limited to minimize the generation of dust on site and haul routes. Any complaints received by the Contractor regarding dust will be recorded and communicated to OUT Supervisor.	$PM_{2.5}$ not to exceed 250 mg/Nm3 (peak readings),	Contractor/ Environmental Consultants / OUT	5,000,000
	Nuisance and disturbance on/offsite receptors from noise pollution	Installation of portable barriers to shield compressors and other small stationary equipment where necessary, use of quiet equipment and the proponent will ensure all vehicles have properly functioning mufflers. Also, will limit pick up trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible. Construction works shall be done during the day when people are away and also the outside environment is also noisy. Workers operating equipment that generates noise will be equipped with the appropriate noise protection gear.	shall not exceed 75 dB(A)(peak readings), daytime or 55 dB(A) (peak readings) at night, No complaints from the local people	Contractor/ Environmental Consultants / OUT	4,000,000
	Deterioration/impairment of local air quality	All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines.	$SO_{2:}$ -average 100 μg/Nm^3 for 24hour NO_2 : 150 μg/Nm^3 for 24-hours average value CO: 10mg/Nm^3 for 8 hours Black smoke PM_{10} : 40 to 60 μg/Nm^3	Contractor/ Environmental Consultants / OUT	4,000,000

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Pollution of soil and water resources (surface and ground water) from hydrocarbons	The OUT and contractor shall ensure that re-fueling and services for vehicles is done off site at the fuel depot. 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. Fuel is stored at designated area that will have concrete surface with the containment bund.	Maximum 15 ppm for hydro-carbons No leakage /spillage of hydrocarbons	Contractor/ Environmental Consultants / OUT	4,000,000
	Loss of visual amenity due to haphazard disposal of construction waste	During the construction, the contractors shall maintain the project development area in neat and tidy condition through general housekeeping, to reduce any negative visual impacts. The visual impacts will also be mitigated by removing any equipment and machinery that is not in use, as soon as possible. Furthermore, the proponent shall erecting a boundary fence which will provide a good visual screen for the works, as well as offering a degree of protection to outside areas from noise and dust.	Adequate solid waste collection bins and sanitation facilities	Contractor/ Environmental Consultants / OUT	3,000,000
	Environmental pollution from poor management of construction materials	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 and will include instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process; and introduction of waste disposal bins, warning notices, "DOs & DoNTs" etc posted at strategic points, through the project area. To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where levelling of the project site is required.	As minimum as possible	Contractor/ Environmental Consultants / OUT	5,000,000
	Negative social impact				
	Road traffic safety risks	Traffic accidents will be avoided by ensuring good driver awareness and maintaining speed limits for main roads and on material access roads. Also, by providing both road and safety signs to public as well as drivers at the core activity project site(s). All large or over-size transport vehicles will be accompanied by escort cars equipped with flashing yellow warning lights while in transit on public roads.	No injury and sufficient no of road signs	Contractor/ Environmental Consultants / OUT	4,000,000
	Occupational accidents at the work place	OUT and contractor shall comply with relevant Tanzania (OSHA, 2003) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements including the provision of Personal Protective Equipment's (PPE), reasonable working hours and good working conditions and facilities. Also, to develop and implement in-house manual/ guard lines on Health and Safety (H&S).	Tanzania OSHA 2003, Low risk to workers and no exposure	Contractor/ Environmental Consultants / OUT	5,000,000
	Increased spread of HIV/AIDs and STDs	The project proponent and contactor will devote time in raising awareness of the dangers of the HIV/AIDS within the project premises. Although basic knowledge of	Tanzania AIDS/HIV	Contractor/ Environmenta	4,000,000

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
		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, project proponent 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.	Policy, No HIV/AIDS victims	I Consultants / OUT	
	Potential 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.	Zero child labour in the construction activities	OUT	4,000,000
	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 village 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.	High recruitment from local community; no complaints from the local people	OUT	4,000,000
	Potential 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 observe national/and international labour standards.	As minimum as possible; No GBV victims	OUT	5,000,000
	Gender inequity in employment	The OUT will ensure that women are given adequate 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.	Increased women opportunities	OUT	5,000,000
Operation	***Negative environmental impact***				

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Health and safety hazards from chemical handling in the laboratories	Only small amounts of chemicals necessary for daily use would be stored in the laboratory. Bulk stocks would be kept in specially designated rooms away from the laboratory. The proponent will replacement of the hazardous substance with a less hazardous substitute and will implement engineering and administrative control measures to avoid or minimize the release of hazardous substances into the work environment keeping the level of exposure below internationally established or recognized limits.	OSHA 2003, Low risk to workers No exposure	OUT	4,000,000
	Contaminations of land from poor solid wastes management	The proponent will be responsible for the efficient management of solid waste generated by the project during its operation. In this regard, solid waste will be collected and sorted out in different containers so that non-biodegradable wastes such as plastics and others will be handled separately. Also, the proponent will provide an adequate number of bins at convenient distances to discourage uncontrolled waste disposal.	EM (SWM), 2016 No haphazard disposal of waste; no complaints from the local people	OUT	4,000,000
	Deteriorated/impaired water quality (surface and ground) from wastewater disposal	The project proponent shall take reasonable precautions to prevent the pollution of the ground and/or water resources located adjacent to the site due to the project activities. Sanitary arrangements shall be to the satisfaction of the requirement of the EM (SQS), 2007 and EM (WQS) 2007. Septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites.	EM (WQS), As minimum as possible; no complaints from the local people	OUT	4,000,000
	Compromise quality of soil, ground water and surface water from laboratory effluents	The proponent will consider proper retention tank volume, geometry and compartmentalization to impart adequate hydraulic residence time for sedimentation. The elongated tank with length-to-width ratios of 3:1 or more is will be used to reduce short circuiting of the effluent. Two compartments will be used to achieve, better suspended solids removal rates.	EM (WQS) As minimum as possible; no complaints from the local people	OUT	4,000,000
	Public health hazards from reject materials/expired chemicals	Proper disposal of reject materials/expired chemicals can be expensive. So, the project proponent will minimize the need for proper disposal, by minimizing chemical purchases. The University will purchase chemicals for the lab according to the need of that particular time. This inventory will be used to inform laboratory manager and staff members when samples become so old/expired that disposal is necessary. Thus, these expired chemicals will be stockpiled in the dedicated store room for further guidance from regulatory authority.	Tanzania OSHA 2003, Low risk to workers and no exposure	OUT	5,000,000

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Health and safety risks due to fire hazards	All staff will have training in fire control through regular firefighting drills. Fire extinguishers would be available in accessible area near to fire risk area and ensure that all fire-fighting equipment is regularly maintained and serviced. Fire emergency telephone numbers would be displayed in communal areas. Some of the applicable techniques related to building safety, including hydrant system for protection of the building against fire will be implemented and automatic fire alarm system for the entire laboratory will be installed.	Zero accidents, Zero exposure	OUT	5,000,000
	Occupational health and safety hazards due to inadequacies in provisions for working conditions	OUT shall provide and enforce use of appropriate PPE. Appropriate safety measures will be developed based on a risk assessment and may include adequate ventilation in the laboratory, office or in workers' long exposed working area, and guidance on safe working in confined spaces; establish safe working procedures/guidelines which will be followed by all employees working in the project premises. The OUT will also monitor occupational hazards risks and provide timely rectification before waiting for incidence.	OSHA 2003, Low risk to workers No exposure	OUT	4,000,000
	Negative social impact				
	Health Hazards due to social interaction among workers and users	The 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.	Tanzania AIDS/ HIV Policy, No HIV/AIDS victims	OUT	5,000,000
	Non-user-friendly buildings 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	OUT	4,000,000
	Risk of SEA/SH within the project area	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.	As minimum as possible; No GBV/ SEA/SH victims	OUT	5,000,000
	Enhancement measures for potential positive impacts				

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Contributing to local economic growth	Where possible the construction contractor will be advised through contractual means to maximize the application and use of locally produced construction material supplies. This will increase the quantity of materials to be procured from the various local suppliers and hence it will enhance the income generation capacity of local suppliers. The use of locally available materials and labour for the proposed project development will contribute to the economy's growth by contributing to the gross domestic product.	As maximum as possible	OUT	4,000,000
	Increased income by utilization of local resources	It is expected that, materials such as cement, aluminium, roofing sheets, timber, paving blocks tiles, sanitary, plumbing and electrical appliances, steel, and other miscellaneous materials required for construction can be sourced locally e.g., Municipality or other parts of Tanzania, depending on the type of materials required. Therefore, such a demand would create a market for local people and should be enhanced.	As maximum as possible	OUT	4,000,000
	Support to local social services and livelihood	The project has a potential of enhancing development of the area through increased business activities and direct employment. As a corporate citizen, OUT will work all along with the Government to achieve the millennium development goals mainly in the area of poverty reduction. This will be done through a non-partisan scheme set by the University, tailored towards extending support to disadvantaged sections of various communities in the area to enable them access education, health care and clean safe water.	As maximum as possible	OUT	4,000,000
	Induce development	To enhance this positive impact to the community living in the vicinity and area of influence; OUT shall ensure efficient operation of the Science Laboratory Building and good security within the project area and area of influence	As maximum as possible	OUT	3,000,000
	Corporate Responsibility	As part of social corporate responsibility, it is expected for the OUT to establish a separate budget to implement its social commitment in the area. Its priority should focus on the pressing needs in the community such as supporting the community on the ongoing social projects including supporting building dispensaries, classrooms, and water related projects to mention some	As maximum as possible	OUT	4,000,000
	Employment/Income generation	This impact is high and of great importance and therefore it will be enhanced by encouraging on job training through observation and trial under supervision. Also, the contractor of the project will be encouraged to and committed to hiring local labour (especially marginalized groups such as youth), particularly when only semi-skilled or unskilled labour is required. During the tendering process for project construction,	Local people to be employed as much as possible	OUT	5,000,000

Phase	Potential Impacts	Management Measure	Target Level/ standard	Responsibility	Estimated Costs (TZS)
		special clause that requires residents to be employed as labourers shall be included in the contractor's contract			
Decommissioning	***Negative environmental impact***				
	Environmental pollution from haphazard disposal of demolished waste	The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work. All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors.	EM (SWM), 2016 No haphazard disposal of waste,	Contractor / Consultants / OUT	5,000,000
	Noise pollution	The OUT will coordinate activities that produce the most noise levels. Use of equipment designed with noise control elements will be adopted where necessary and demolition exercise will be limited at day time only. All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise.	EM(SCNVP), 2015 not exceed 75 dB(A) daytime or 55 dB(A) at night	Contractor / Consultants / OUT	4,000,000
	Air pollution due to dust	The contractor will douse the surface with water to suppress excessive dust and whenever possible, water sprinklers shall be used. Also, the contractor will provide protective gear (i.e. breathing masks) to workers working in dusty environment.	EM (AQS), 2007 $PM_{2.5}$ not to exceed 250 mg/Nm3 (peak readings)	Contractor / Consultants / OUT	4,000,000
	Soil and water pollution	Demolished materials shall be kept within planned boundaries and with a clear separation. If it is essential to stockpile materials close to runoff, control measures shall be implemented, such as excavation of a shallow water/ sediment collection ditch around the boundaries of stockpiles to contain run-off water for a sufficient length of time to allow for settlement of solids.	EM (SQS), 2007; EM (WQS) 2007; Nitrate 30 mg/l, Lead 0.05 mg/l, Sulphate 600 mg/l, Turbidity 30 NTU	Contractor / Consultants / OUT	5,000,000
	Occupational health and safety	All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors. The proponent shall establish safe working procedures/guidelines which will be followed by all employees and any subcontractor working in the facility premises	Tanzania OSHA 2003, Low risk to workers and no exposure	Contractor / Consultants / OUT	4,000,000
	Loss of employment	The proponent shall prepare the workers to be employed anywhere else in the laboratory through provision of extensive training. Also, the project will prepare workers for forced retirement by providing skills for self-employment, wise investment. Further shall ensure that all employees are members of the Pension Fund and the employees shall ensure that the developer's contributions are made.	All employees covered	Contractor / Consultants / OUT	4,000,000

Notes:

EM (AQS), 2007	=	The Environmental Management (Air Quality Standards G. N. No. 237) Regulation, 2007
EM (SQS), 2007	=	The Environmental Management (Soil Quality Standards) Regulation, 2007
EM (WQS) 2007	=	The Environmental Management (Water Quality Standards G. N. No. 238) Regulation, 2007
EM(SCNVP), 2015	=	The Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015
EM (HWCM) R	=	The Environmental Management (Hazardous Waste Control and Management) Regulations, 2019

CHAPTER 9
ENVIRONMENTAL MONITORING PLAN

9.1 INTRODUCTION

The correct and successful implementation of impact mitigation measures in order to reduce adverse impacts on environmental 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 of higher significance 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, 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.

- negative impacts on the physical, biological and socio-economic environments are mitigated;
- benefits that will arise from the development of the proposed project are enhanced;
- support smooth implementation of project with minimum losses to environmental and social infrastructure;
- compliance and guided by National, International laws, standards and guidelines e.g., effluents standards, noise level standards, occupational and safety standards etc and best practice is achieved; and
- 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 OUT shall supervise and monitor components of the monitoring plan and keep record of monitoring outcome. The OUT 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 OUT is committed to protect, and will enhance the environment. Detailed parameters to be monitored have been considered along with responsible institution (s).

The OUT will endeavour 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 issues, environmental 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.

Table 9.1: Environmental Monitoring Plan

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Methods	Target Level/ standard	Responsibility	Estimated Costs (TZS)
Preparation / Mobilization	***Negative environmental impact***								
	Loss of vegetation	Size of land cleared; number of trees planted	Weekly inspection	Project site	M_2, Number of affected species	Site inspection, Visual observation	Type, number, distribution etc. of species	Contractor/ OUT	4,000,000
	Depletion / degradation at points of source of construction materials	Documented procurement practices	Weekly checks	Materials sourcing area	Affected resource	Visual observation	No degradation of local resources, No complaints from local people	Contractor/ OUT	5,000,000
	Noise pollution	Noise level	Weekly checks	Project site	dBA	Noise level meter	shall not exceed 75 dB(A) daytime	Contractor/ OUT	4,000,000
	Impaired air quality	SO_2	Weekly inspection	Project site	Mg/l	Detector tubes	average 100 μg/Nm^3 (0.129mg/kg) for 24hour	Contractor/ OUT	6,000,000
		NO_2	Weekly inspection	Project site	Mg/l	Detector tubes	150 μg/Nm^3 for 24-hours average value		
		CO	Weekly inspection	Project site	ppm	Mini-Vol Sampler	10mg/Nm^3 for 8 hours		
		Black smoke PM_{10}	Weekly inspection	Project site	ppm	Mini-Vol Sampler	40 to 60 μg/Nm^3		
	Increased alien plant invasion	Alien plant	monthly inspection	Project site	M_2, affected species	Site inspection, Visual observation	Type, number, distribution etc.	Contractor/ OUT	5,000,000
	Increased erosion risk as a result of soil disturbance and loss of vegetation cover	Visible erosion	Daily for quarries and borrow pits	borrow pits and quarries	Level of erosions – visible erosion	Site inspection, visual observation	No erosion tendencies	Contractor/ OUT	3,000,000
Construction	***Negative environmental impacts***								
	Dust pollution	Dust level	Twice daily	Project site	μg/m^3	Dust level meter/ Mini-Vol Sampler	PM 2.5 not to exceed 250 mg/Nm3 (peak readings)	Contractor/ OUT	4,000,000
	Nuisance and disturbance on/offsite	Noise level	Weekly checks	Project site	dBA	Noise level meter	shall not exceed 75 dB(A) daytime or 55	Contractor/ OUT	5,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Methods	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	receptors from noise pollution						dB(A) at night, No complaints		
	Deterioration/impairment of local air quality	SO_2	Weekly inspection	Project site	Mg/l	Detector tubes	average 100 μg/Nm^3 (0.129mg/kg) for 24hour	Contractor/ OUT	
		NO_2	Weekly inspection	Project site	Mg/l	Detector tubes	150 μg/Nm^3 for 24-hours average value		
		CO	Weekly inspection	Project site	ppm	Mini-Vol Sampler	10mg/Nm^3 for 8 hours		
		Black smoke PM_{10}	Weekly inspection	Project site	ppm	Mini-Vol Sampler	40 to 60 μg/Nm^3		
	Pollution of soil and water resources (surface and ground water) from hydrocarbons	Fuel material storage areas, re-fuelling and delivery areas,	Monthly inspections of spill response equipment	Project site, discharge area	mg/l	Sampling and analysis (Spectrophotometer)	Maximum 15 ppm for hydro-carbons No leakage /spillage of hydrocarbons	Contractor/ OUT	4,000,000
	Loss of visual amenity due to haphazard disposal of construction waste	Amount of solid waste generated	Weekly inspections	General project site	Volume/ weight of waste	Site inspection, Observation, Quantity analysis	Adequate solid waste collection bins and sanitation facilities	Contractor/ OUT	4,000,000
	Environmental pollution from poor management of construction materials	Aesthetics of the area, storage site,	Continuously during construction	General project area	None	Site inspection, Observation, Quantity analysis	As minimum as possible	Contractor/ OUT	5,000,000
	Negative social impacts								
	Road traffic safety risks	Traffic control measures in place	Weekly checks	Transport routes and project site	Number and duration of disruption	Visual inspection	As minimum disruption as possible	Contractor/ OUT	4,000,000
	Occupational accidents at the work place	Registered worker Injury, use PPE	Continuously	Project site	cases / injuries, PPE users	Medical records, and site inspection	OSHA 2003, Low risk to workers No exposure	Contractor/ OUT	10,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Methods	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Increased spread of HIV/AIDs and STDs	medical reports of HIV/AIDS or other disease,	Every 6months	Project records	Number of people infected	HIV blood tests and surveys	Tanzania AIDS/HIV Policy, No HIV/AIDS victims	Contractor/ OUT	4,000,000
	Potential risks and hazards associated with child labour	Recruitment/procurement rules and procedures	Monthly inspections	Project site	Number of children employed	Workers register book	Zero child labour in the construction activities	Contractor/ OUT	4,000,000
	Increased local population due to labour influx	Recruitment/ procurement rules and procedures	Monthly inspections	Project site	Number of people coming on the area	Workers register book	High recruitment from local community; no complaints from the local people	Contractor/ OUT	4,000,000
	Potential GBV/SEA/SH related incidences	Assaults/harassment, GBV and VAC cases	Monthly inspections	Project site	Number of women employed	GBV reports/ cases	As minimum as possible; No GBV victims	Contractor/ OUT	5,000,000
	Gender inequity in employment	Recruitment rules and procedures	Monthly inspections	Project site	Number of GBV cases	GBV reports/ cases	Increased women opportunities	Contractor/ OUT	5,000,000
Operation	***Negative social impacts***								
	Risk of SEA/SH within the project site	Assaults/harassment, GBV and VAC cases	Quarter inspection	Project site	Number of women employed	GBV reports/ cases	As minimum as possible; No GBV victims	OUT	5,000,000
	Health and safety hazards from chemical handling in the laboratories	Registered worker Injury /illness, Proper use PPE	Quarter inspection	Project site	Number of cases/injuries	Medical records, and site inspection	OSHA 2003, Low risk to workers No exposure	OUT	4,000,000
	Negative environmental impacts								
	Contaminations of land from poor solid wastes management	Record of solid waste generated & disposal	Quarter inspection	Project site	Number of occurrences	Site inspection	No haphazard disposal of waste; no complaints from the local people	OUT	4,000,000
	Deteriorated/impaired water quality (surface and ground) from wastewater disposal	BODs, faecal coliform, monitoring	Quarter inspection	Project site	Number of occurrences	Site inspection	EM (WQS), faecal coliform level of not more than 100FC per 100ml;	OUT	4,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Methods	Target Level/ standard	Responsibility	Estimated Costs (TZS)
		schedule in place							
	Compromise quality of soil, ground water and surface water from laboratory effluents	Containment tanks, piping system, pH, BOD, COD, TSS,	Quarter inspection	Project site	Number of occurrences	Site inspection, pH Meter, pH Meter Sampling and analysis	EM (WQS) As minimum as possible; no complaints from the local people	OUT	4,000,000
	Public health hazards from reject materials/ expired chemicals	Amount and contents of expired chemicals	Quarter inspection	Project area	Amount /volume	Site inspection	Tanzania OSHA 2003, Low risk to workers and no exposure	OUT	5,000,000
	Health and safety risks due to fire hazards	Fire protection measures	Continuously	Project site	Incidence	Site inspection	Zero accidents, Zero exposure	OUT	5,000,000
	Occupational health and safety hazards due to inadequacies in provisions for working conditions	Registered worker Injury /illness Proper use PPE	Quarter inspection	Work sites	Number of cases/injuries, workers using PPE	Medical records, and site inspection	OSHA 2003, Low risk to workers No exposure	OUT	4,000,000
	Negative social impacts								
	Health Hazards due to social interaction among workers and users	medical reports of HIV/AIDS or other diseases,	Every 6months	Project site	Number of people infected	HIV blood tests and surveys	Tanzania AIDS/ HIV Policy, No HIV/AIDS victims	OUT	5,000,000
	Non-user-friendly buildings for Persons with Disabilities (PWDs)	Ramps and other special facilities such as toilets	First-year of operation	Project site	Number of users	Site inspection, Observation	Easy access to all users	OUT	4,000,000
	Enhancement measures for potential positive impacts								
	Contributing to local economic growth	Income of local people	During operation	Project records	Amount	Site inspection, Observation	As maximum as possible	OUT	4,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Methods	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Increased income by utilization of local resources	Procurement records	Continuously during operation	Project records	Amount	Site inspection, Observation	As maximum as possible	OUT	4,000,000
	Support to local social services and livelihood	Records of type and amount of support	Continuously during operation	Project records	Amount and numbers	Numbers of local people benefitted from the project	As maximum as possible	OUT	4,000,000
	Induce development	Type of development	Continuously during operation	Project records	Number	Site inspection, Observation		OUT	4,000,000
	Corporate Responsibility	Records of kind and amount of support	Continuously during operation	Project records	Amount and numbers of support	Numbers of local people benefitted from the project	As maximum as possible	OUT	4,000,000
	Employment/Income generation	Local people employed and training conducted	Continuously during operation	Project records	Numbers of local people employed	Numbers of local people employed	As maximum as possible	OUT	4,000,000
Decommissioning	***Negative environmental impacts***								
	Environmental pollution from haphazard disposal of demolished waste	Amount of solid waste generated and disposed off	Monthly inspection	Dumpsite, general project site	Volume/ weight of waste	Site inspection, Observation, Quantity analysis	No waste at the site	Contractor/ OUT	5,000,000
	Noise pollution	Noise levels	Monthly inspection	Project site	dBA	Noise level meter	EM(SCNVP), 2015 not exceed 75 dB(A) daytime or 55 dB(A) at night	Contractor/ OUT	4,000,000
	Air pollution due to dust	Dust level	Monthly inspection	Project site	µg/m^3	Dust level meter/ Mini-Vol Sampler	EM (AQS), 2007 $PM_{2.5}$ not to exceed 250 mg/Nm^3	Contractor/ OUT	4,000,000
	Soil and water pollution	pH, BOD, COD, TSS and monitoring schedule in place	Monthly inspection	Project site	NTU, mg/l	Sampling and analysis (Spectrophotometer)	EM (SQS), 2007; EM (WQS) 2007; BOD < 30mg/ litre	Contractor/ OUT	5,000,000

Phase	Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Methods	Target Level/ standard	Responsibility	Estimated Costs (TZS)
	Occupational health and safety	Registered worker Injury / Proper use PPE	Monthly inspection	Project site	Number of injuries, PPE users	Medical records, and site inspection	Tanzania OSHA 2003, Low risk to workers and no exposure	Contractor/ OUT	4,000,000
	Negative social impacts								
	Loss of employment	Pension fund remittance	Monthly inspection	Project site	Employees registered with pension fund	Workers register book	All workers	Contractor/ OUT	4,000,000

CHAPTER 10
COST BENEFIT ANALYSIS

10.1 INTRODUCTION

The cost-benefit analysis of this project focuses on economic costs benefits and social benefits other than income and externality 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 project's total economic and social impact is likely to exceed the economic benefits substantially. 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 include direct project costs (IDA credit and grant), 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 buildings will provide adequate space and equipped facilities for the labs 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 also associated with running it
- the environmental costs would include a definite loss of biodiversity as establishment of proposed project would entail the clearance of natural 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 financial 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 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 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 firms, Architectures, Soil surveyors, ESIA Consultants, etc. who in turn will pay taxes which the Government 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. The benefits that will be obtained from the implementation of management and monitoring plan include improved air quality, health conditions of workers, and the surrounding environment. 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, especially in the tourism sector.

CHAPTER 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 proposed project are considered during the initial design and construction of that project. The preliminary plan will remain a "living document," and revisions will be made throughout the operating life of the proposed project. It must be reviewed periodically and revised to reflect any changes in project construction or operation that might affect decommissioning. Prior to the initiation of actual decommissioning activities for the proposed project, 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 and include safety evaluations of planned decommissioning methods, new technology, and the proposed project 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 proposed project. The plan has the following purposes:

a) The primary purpose of the preliminary plan is to ensure that the proposed 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 proposed 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 proposed project.

11.3 CONTENT OF THE PRELIMINARY

The preliminary 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. 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 proposed project 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 proponent 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 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 EMP.

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

2. Employees will be terminated from their employments and to them the future will look blunt. Three things will be observed: their contributions to the pension fund will be made monthly as required by law; a training programme will be made to continuously advance them into apt skills and professions; and the termination benefits including transport and disturbance allowances will be made.

3. On decommissioning the proponent will search for experts' opinions in order to convert the entire area into another or other uses.

4. The restoration 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, Municipal Council etc.

Project removal will begin six months after closure and continue for twelve months. Within the six months from closure, proponent will inventory 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 six months). The fourth phase — project removal and associated protective actions — will take place twelve 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 one year.

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, TRA, TANESCO, Pension Fund, Municipal 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 twelve months.

(5) Post-Removal Activities: Post-Project removal monitoring will continue for one year

Proponent shall remove the project 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 multiple use; and pays all dues (workers, government, suppliers etc.).

CHAPTER 12
SUMMARY AND CONCLUSION

The success of any development is hinged on its compliance with both legislative and regulation, regulatory frame work and its acceptability to the community and its sustainability. The proposed the construction of Three Storey Science Laboratory Building at Plot No 24, Bungo Mtaa was subjected to this study to ascertain its compliance with the set legal, legislative and regulatory frameworks and assessment of its probable impact on the social, economic and biophysical environment. The proposed project's likely positive and negative impacts are identified and quantified to the extent possible. The issues/ impacts have been assessed and described in some detail to gain an adequate understanding of possible environmental effects of the proposed project – from mobilization to decommissioning to formulate mitigation measures in response to negative aspects that have emerged.

A number of mitigation measures are recommended against the adverse activities/impacts during the project's entire lifespan. The proposed mitigation measures are included in an environmental and social management plan (ESMP). The ESMP consists of mitigation, monitoring, and institutional measures to be taken during all phases of the planned facility to eliminate, offset, or reduce adverse environmental and social impacts. The plan also includes the actions needed to implement these measures. Moreover, the ESIA outlines specific environmental management and monitoring plans and identifies any necessary reporting requirements and schedules.

The Environmental Monitoring Plan provides parameters to be implemented and responsibility. The ESMP provides the way forward to implement the identified mitigation measures. The ESMP shall be implemented as a prerequisite for a positive Record of Decision (RoD) by the appropriate authorities. The estimated costs for implementing the mitigation measures are just indicative. Appropriate bills of quantities shall be gives the actual figures. In any case, the consultant used informed judgment to develop these figures.

This scoping report concludes that many environmental impacts have been identified and assessed; none of these are considered to be that severe after mitigation to prevent the further planning, design, and development of the Three Storey Science Laboratory Building at Plot No 24, Bungo Mtaa. Thus, the project in the area can be considered suitable subject to implementing the mitigation measures as indicated in the Environmental and Social Management Plan. Further, to further sustainability of the project in the area, it is recommended that the proposed Monitoring Plan should be implemented accordingly for consistent efficacy of mitigation measures or timely corrective measures before significant impacts to the environment and social components.

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APPENDICIES

APPENDIX 1: TERMS OF REFERENCE

TERMS OF REFERENCE FOR THE PROPOSED CONSTRUCTION OF THREE STOREY SCIENCE LABORATORY BUILDING AT THE OPEN UNIVERSITY OF TANZANIA PWANI REGIONAL CENTRE PLOT NO 24, BUNGO MTAA, MKUZA WARD, KIBAHA TOWN COUNCIL, PWANI REGION, TANZANIA

1. INTRODUCTION

1.1 Project Background

The Open University of Tanzania (OUT) is intending to use part of Tanzania Higher Education for Economic Transformation (HEET) project fund to construct a three Storey Science Laboratory Building at the Open University of Tanzania Pwani Regional Centre Plot No 24, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania. The OUT is a fully fledged, autonomous and accredited public University, established by an Act of Parliament Number 17 of 1992. The OUT as public learning institution has received financial support from the World Bank (WB) through the HEET project in which part of it will be used for construction of multipurpose science laboratories in seven regions of Tanzania. The plot area which is the proposed project site, measures forty-One decimal point three eight four (41.384) hectares and the proposed three Storey (Ground + 2) laboratory building will use only 2,000 m^2. The laboratory will be used as zonal science laboratory for science students, researchers, secondary schools and community in the project's area. The project components will cover; - Zoology Laboratory, Food science laboratory, Chemistry Laboratory and Preparation rooms and technical offices for each laboratory on the ground floor. The first floor will comprise the ICT Multimedia state of the art laboratory and Modern conference facilities. Second floor will comprise DRC and staff offices, Min library and Multipurpose/Examination Halls. The building also will have 51 total parking bays for the users and visitors. Other associated facilities to support the project are retaining wall, concrete paving blocks, security guard post, changing room, water storage tank with a pumping system, toilets, solid waste collection area, waste water drainage system, fire system and utilities network. The building shall be built to the highest acceptable standards using the best available environmentally friendly materials and offering a comfortable and high-quality laboratory and teaching space.

During preparation of the scoping report and Terms of reference several key environmental issues were identified after site reconnaissance, holding preliminary consultations with stakeholders of the project and reviewing various literatures related to the project. Similarly, expert opinion was sought on various key issues identified as requiring specialized knowledge. 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 EIA of the proposed project on the range of issues that must be addressed in the EIA 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. The assessment exercise was used to develop ToR.

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 will be situated at the Open University of Tanzania Pwani Regional Centre, Bungo Mtaa, Mkuza Ward, Kibaha Town Council, Pwani Region, Tanzania. The specific coordinates of the site are 06°46´58.36´´S and longitude 38°55´25.18´´E having elevation of 534 ft AMSL. The environmental and socio-economic influence of the project is anticipated to extend beyond the scope of the project area. The area of influence is a wider area than the project area. The Consultant shall: further determine and set the project boundaries particularly spatial boundaries (i.e., impact area coverage and area of influence).

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 EIA 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 EIS 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 four months.

1.7 Personnel Requirement

The consultants shall deploy consultants/experts with the demonstrable practical experience in conducing EIA studies. Specific experience/competence in civil works, civil engineering, electrical engineering, environmental management and sociology will be deployed.

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 copies 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. SesiliaJeremia 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: LAND OWNERSHIP DOCUMENTS

TITLE No. 53562

REGISTERED 14-8-2000

AT 8:00 AM

Senior Asst. Registrar of Titles

L.O. No. 183403.

L.D. No. KDC/7031.

TANGANYIKA STAMP DUTY ACT.

Stamp Duty Rs. 100/= Paid

and Revenue Receipt No. 08317867

of 18-8-2000 issued.

Stamp Duty Officer

THE UNITED REPUBLIC OF TANZANIA

CERTIFICATE OF OCCUPANCY

(Section 9 of the Land Ordinance)

The 12th day of December, One thousand

~~Nine hundred and~~ Two thousand and ~~ninety~~ two. Title No. 53562

THIS IS TO CERTIFY that THE OPEN UNIVERSITY OF TANZANIA a board established under Act No.17 of 1992 and having its office in Dar es Salaam OF P.O. BOX 23409 DAR ES SALAAM.

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

1. The Occupier having paid rent up to the thirtieth day of June, 2001, shall thereafter pay rent of Shillings One hundred and five thousand (Shs.105,000/-) a year in advance on the first day of July in every year of the term without any deduction PROVIDED that the rent may be revised by the Minister for the time being responsible for Lands (hereinafter called "the Minister") on the first day of July in each of the years 2011, 2021, 2031, 2041, 2051, 2061, 2071, 2081 and 2091 ----- or within three years thereafter in each case.

2. The Occupier shall:—

(i) Erect on the land buildings (hereinafter called "the buildings") in permanent materials designed for use in accordance with the conditions of the Right and which conform to the building line (if any) decided by The Kibaha District Council (hereinafter called "the Authority");

(ii) By the thirtieth day of June, 2001, ~~of~~ submit to the Authority such plans for the buildings (including block plans showing the position of the buildings) and such drawings, elevations and specifications of them as will satisfy the Authority and as are in accordance with the building condition in sub-paragraph (i) above which said plans and specifications shall be submitted in triplicate;

(iii) Within six months from the date of notification by the Authority of approval of the plans and specifications referred to in sub-paragraph (ii) above begin building on the land in accordance with such plans and specifications;

(iv) Complete the buildings according to the plans and specifications so that they are ready for use and occupation by the thirty first day of October, 2003; ~~of~~

(v) At all times during the term after the thirty first day of October, 2003, ~~of~~ have on the land buildings as approved by the Authority and maintain them in good order and repair to the satisfaction of the Commissioner for Lands (hereinafter called "the Commissioner").

TANGANYIKA STAMP DUTY ACT.

Stamp Duty Rs. 5240/= Paid

on original Receipt No. 08317867

of 18-8-2000

(vi) Not erect or commence to erect on the land any building except in accordance with building plans and specifications which shall have been first approved by the Authority as hereinbefore provided;

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

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

3.—(i) The Occupier shall not subdivide the land or assign, sublet or otherwise dispose of or deal with the whole or any part of it or of any building on it without the previous written consent of the Commissioner PROVIDED that after condition 2(iv) has been complied with by the Occupier the consent of the Commissioner shall not be necessary:—

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

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

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

4. Except as hereinbefore provided the Commissioner shall have an absolute discretion to give or withhold consent under condition 3(i). Any dealing or agreement (other than a mortgage or charge) entered into before compliance with condition 2(iv) will not receive consent except in special circumstances of which the Commissioner shall be the sole judge.

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

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

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

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

6. USER: The land and the buildings to be erected thereon shall be used for EDUCATIONAL purposes only, Use Group 'Y' Use Classes (a) and (b) as defined in the Town and Country Planning (Use Classes) Regulations, 1960 as amended in 1963.

7. The President may revoke the Right for good cause and in public interest.

SCHEDULE

ALL that land known as Plot No. 24 at BUNGU/MKUZA KIBAHA DISTRICT containing fourty one decimal point three eight four (41.384) Hectres ——— ~~square feet~~ shown for identification only edged on the plan attached to this Certificate and defined on the registered survey plan numbered 31927 ——— deposited at the Office of the Commissioner for Surveys and Mapping at Dar es Salaam.

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

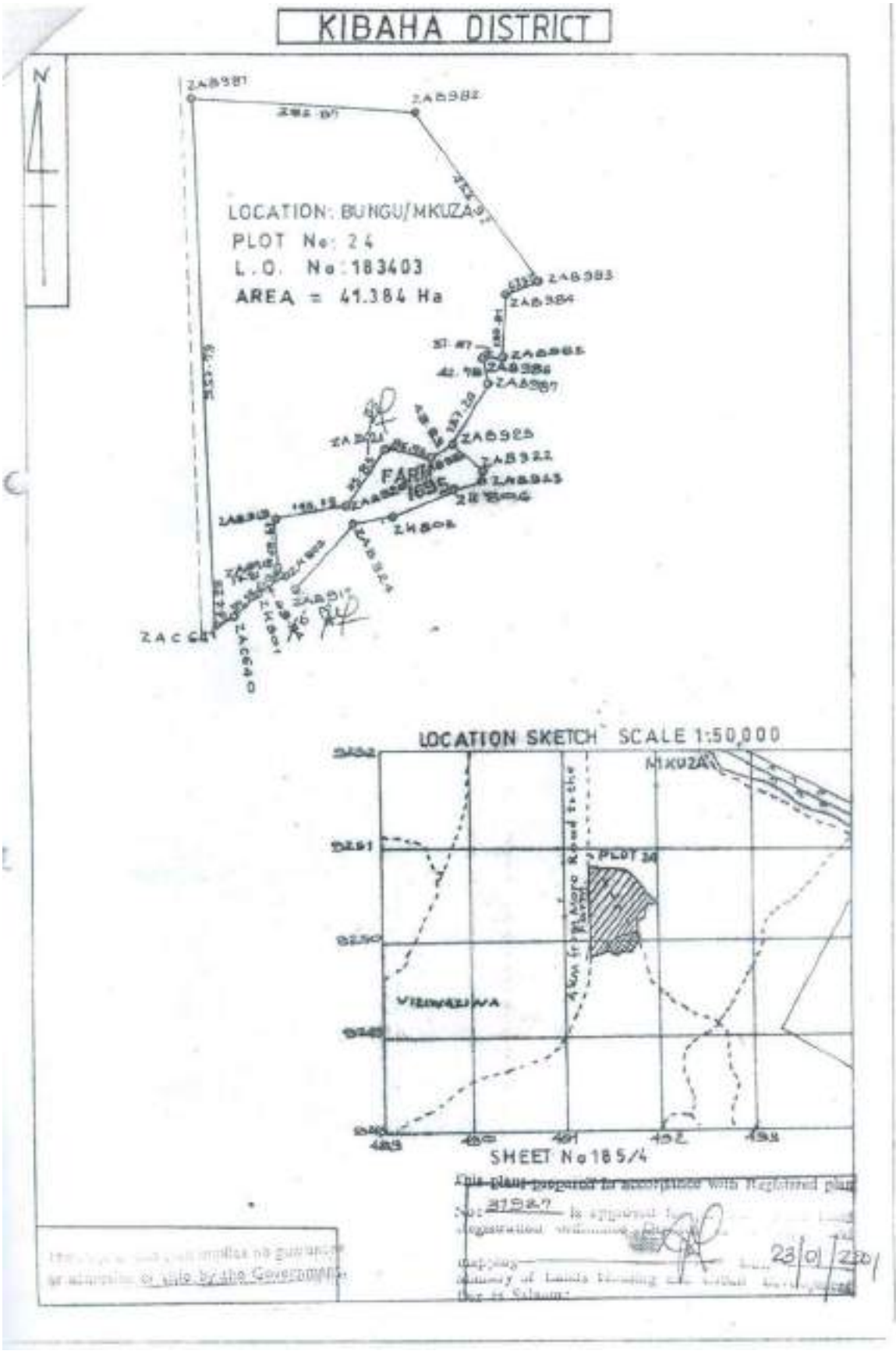
COMMISSIONER FOR LANDS

The within named 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 OPEN UNIVERSITY OF TANZANIA and DELIVERED in the presence of us this 1st MARCH day of MARCH 2001.

Signature: ....
Postal Address: P.O.Box 23409
Qualification: VICE CHANCELLOR

Signature: ....
Postal Address: P.O. Box 23409 DSM
Qualification: REGISTRAR


KIBAHA DISTRICT
N
LOCATION: BUNGU/MKUZA
PLOT No: 24
L.O. No: 183403
AREA = 41.384 Ha
FARM 1035
LOCATION SKETCH SCALE 1:50,000
MKUZA
PLOT 24
VIZIWAZIWA
SHEET No 185/4
23/01/2001

APPENDIX 3: DETAILED STAKEHOLDER`S CONSULTATION

The team of TRES consultants undertook stakeholder's consultation to ensure key project stakeholders are fully involved with the project. The stakeholders consulted include: - Kibaha Town Council- Town Director office, Government Chemist Laboratory Authority (GCLA) – Coastal Zonal office, Fire and Rescue Office-Kibaha in Pwani region, Occupation Safety and Health Authority (OSHA)- Coastal Zonal office, Mkuza Ward Office, Bungo Mtaa office, and Open University of Tanzania- Director office (Kibaha centre). Below are the views and concerns from the consulted stakeholders;

A. Kibaha Town Council – Council Town Director Office

The team of TRES consultants visited Njombe Town Council and met with Mr. Protas L. Dibogo, the acting Town Director. The team held a short brief meeting where the purpose of the visit was explained and the permit to allow his office staff responsible to collaborate with team during ESIA process were requested. The following were the views and concerns from the acting Director regarding the proposed project at Kibaha Town Council at Mkuza Ward, Bungo Mtaa area;

- The Director accepted and welcomed the proposed project;
- The Director recommended that, the design of a laboratory should be able to solve socioeconomic challenges, especially in the industrial sector (to be able measure the quality of waste water, air pollution released to the environment from industry, etc.)
- The university should build an excellent laboratory for quality check of construction materials. (to check the quality of steel bar),

B. Government Chemist Laboratory Authority (GCLA)-Coast Zone office

The team of TRES consultants visited the Government Chemist Laboratory Authority-Coastal Zonal office in Dar es Salaam region and held a brief discussion with the Acting Eastern Zone Manager Mr. Emmanuel Lewanga. The following were the views and concerns on the proposed project;

- Based on the information provided the officer recommended that, fume wood is compulsory to be installed;
- The Contractor should include a proper design of a laboratory waste management system;
- The officer recommended that the height of benches in the laboratory should be between 15cm-20cm and Laboratory floor should be non-slippery and chemical resistant;
- There should be a mini chemical store for reagents and a chemical cabinet should be included;
- The doors of the laboratory should open both sides. Also, there should be an emergency exit door;
- Health and Safety issues should be adhered during laboratory operations.

C. Fire and Rescue Force Office-Kibaha

The team of consultants visited the Fire and Rescue Force Office in Kibaha Town and held discussion with the SSF. Jenifer Valerian. The following were the views and concerns on the proposed project;

- The Proponent is required to submit the proposed project architectural drawings to determine the fire protection layout of the prospective project and Plan review fees should be paid when the Proponents submits the drawings;
- The proponent should ensure the site accessibility during all project implementation phases;
- During the implementation of the project, buildings should be equipped with automatic fire sprinklers system;

- During the implementation of the project, in the area of the proposed site water storage tanks/ receivers have to be installed for firefighting;
- Emergency lighting signs should be present to show the way out (exit signs) and strategic designed assembly point;
- Proponent should provide a fire detectors equipment's in the project area

D. Occupation Safety and Health Authority (OSHA)- Coastal Zonal 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. At OSHA- Southern Coastal Zonal office (Dar es Salaam), the team met Honest W. Meena. The officer provided the views and concern on the proposed development as follows; -

- During project construction phase, the contractor and or/proponent is required to adhere to all OSHA requirement as indicated in the Enforcement of Occupational Health and Safety Act, 2003 (Act No. 5/2003);
- Inspector from OSHA shall visit the workplace for the purpose of inspection to include general environment, hygiene and electrical system inspections;
- 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;
- The project Proponent and or contractor should provide the First Aid kit with full equipped at workplace during construction and operation phase;
- 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;
- 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;
- The contractor is required to undertake a risks assessment of the project activities before commencement;
- The contractor should prepare Occupation and Health Safety (OHS) policy in both English and Swahili languages and should be displayed at workplace;
- The contractor should provide appropriate Personal Protective Equipment (PPE) to all workers and enforce the use of PPE during project implementation;
- The contractor and or proponent should conduct medical examination for workers during pre-employment and during employment period once per year and post-employment;
- Provide clean and safe drinking water to staff for free and ensure there is conducive sanitary facility such as changing room for workers; and
- The contractor is required to report any accidents that occurred at the workplace during project construction.

E. Open University Tanzania Staff-Kibaha Town Council

The team held a meeting with the staffs of the OUT in order to obtain views and concerns on the project as among of the users of the laboratory building. The staffs had the following views and concerns on the project;

- The staff recommended the use of gate number two which is on the Western side to avoid disturbance (noise and air pollution) during project construction phase,
- The staff recommended construction period to be in normal work hours before night;

- The team was informed that construction project will start in January 2024;
- The project should have an alternative backup plan of electricity such as solar energy which is environmentally friendly;
- Sewage system should be very considered and designed properly for liquid waste management and this should start from the design stage. Dumping place for solid waste should be designed;
- The laboratory will help increase the enrollment of more students, especially in science subjects;
- Urbanization of the area so the laboratory project will stimulate the development of the economy and society especially in the relevant community;
- During construction, the laboratory building will be designed so that people with disabilities can access their activities;
- Gender should also be considered throughout the implementation of the project;
- The existing road is small, especially for heavy vehicles, so it can lead to traffic jams, therefore the staff recommended regular road maintenance during all project phases;

F. Mkuza Ward Office

The team of consultant also visited the Ward of Mkuza and held discussion with the Ms. Mwanavita Jambia (Ward Executive Officer); Mr. Issa Sama (Chairman) and Mr. Salum Abasi (Balozi). The following are views and concerns on the project;

- The project was well welcomed by Ward Office with anticipation of various benefits that will be accrued by the surrounding community to include employment opportunity.
- The members insisted that the issue of employment should be well considered by the OUT by sourcing laborer's from within the surrounding community through Ward or *Mitaa* offices other than sourcing others areas.
- OUT should consider to support the socioeconomic projects for the local community such as drilling boreholes and supplying the water to the community.
- The OUT should also support improve the Ward Office as part of Corporate Social Responsibility as well as other *Mitaa* offices.
- The proponent should implement on the ground the actual measures for impact containment to avoid conflict with the locals thereafter. Likewise, what has been recommended in the EIA report should be monitored during implementation.
- Copy of EIA report should also be submitted to the Ward office in order to understand what has been recommended for easy follow up.
- The Ward plea for the project to have proper management of wastes at the project site, otherwise the waste will be washed with storm water towards the valleys with ponds that are depended by the residents for secondary and tertiary water uses.
- The WEO guaranteed a support from her office with the project management and plea for the good corporation with the same management during project implementation.

G. Bungo Mtaa Office

The team visited the Bungo Mtaa office where the proposed project is located administratively and held a meeting with members from Bungo *Mtaa*. The following are views and concerns on the early mentioned proposed project;

- Once the project starts, it will help to chase wild animals that are bothering the residences;
- The project is harmless because it is an educational project and not a factory, so the project is welcomed;

- The member emphasized that, the employment should be provided especially to young people;
- The team was informed that, there is good relationship between the citizens and the open university;
- Citizens recommended to have an Auxiliary Police Station to improve security and safety for the Open University and the community;
- Access road should be provided especially for the community surrounding the open university;
- All members have agreed to implement the project.

Finally, the Bungo members accepted the project and insisted the proponent to acquire all relevant permits for the construction phases. Additionally, the office promised the cooperation to all project implementation phase.

APPENDIX 4: BASELINE DATA ON AIR QUALITY, NOISE AND VIBRATION

Appendix 4.1: Average noise levels (in dBA) recorded for the proposed new project

Average Noise Levels Measured at Offsite Stations		
Code	**Location**	**Daytime Noise in (dBA)**
AQMS1	Northeast of the site - 06°46´56.78´´S & 38°55´25.85´´E	48.05
AQMS2	Northwest of the site - 06°46´58.22´´S & 38°55´24.29´´E	45.31
AQMS3	Southeast of the site - 06°46´58.16´´S & 38°55´26.48´´E	47.24
AQMS4	Southwest of the site (06°46´59.75´´S & 38°55´24.48´´E)	40.01
TBS-NES Limits		**<70**
WB/IFC Guideline		**<70**

Source: Field measurements done by TRES, November, 2023

Appendix 4.2: Average ambient particulate matter measured at onsite and offsite stations

Code	Locations	TSP	PM_{10}	$PM_{2.5}$
		mg/m^3	mg/m^3	mg/m^3
AQMS1	Northeast of the site - 06°46´56.78´´S & 38°55´25.85´´E	0.020	0.009	0.004
AQMS2	Northwest of the site - 06°46´58.22´´S & 38°55´24.29´´E	0.010	0.005	0.002
AQMS3	Southeast of the site - 06°46´58.16´´S & 38°55´26.48´´E	0.009	0.002	0.001
AQMS4	Southwest of the site - 06°46´59.75´´S & 38°55´24.48´´E	0.009	0.002	0.001
Environmental Management (Air Quality Standards), 2007		0.5	0.15	0.075
WHO/IFC (2007) and WB AQG 2006		0.23	0.05	0.025
$\%DAE_{TBS}$		0.00%	0.00%	0.00%
$\%DAE_{WHO/IFC\ (2007)\ and\ WB\ 2006}$		0.00%	0.00%	0.00%

Source: Field measurements done by TRES, November, 2023

Appendix 4.3: Findings of 24 hours Average Ambient Pollutant Gases Monitoring Data

Code	Location	CO	CO_2	NO	NO_X	SO_2	H_2S	O_3	CH4
		mg/m^3	%	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
AQMS1	Northeast of the site	1.00	0.02	0.02	0.08	0.00	0.00	0.00	0.00
AQMS2	Northwest of the site	1.00	0.02	0.02	0.07	0.00	0.00	0.00	0.00
AQMS3	Southeast of the site	0.60	0.01	0.01	0.03	0.00	0.00	0.00	0.00
AQMS4	Southwest of the site	0.50	0.00	0.01	0.03	0.00	0.00	0.00	0.00
TBS_{Limits}		**15**	**-**	**0.12**	**0.12**	**0.5**	**-**	**0.12**	**-**
WB/IFC_{Limits}		**30**	**-**	**0.2**	**0.2**	**0.5**	**-**	**0.1**	**-**
DAE_{TBS}%		**0**	**-**	**0**	**0**	**0**	**-**	**0**	**-**
$DAE_{WB/IFC}$%		**0**	**-**	**0**	**0**	**0**	**-**	**0**	**-**

DAE_T%: Percentage of Daily (24Hrs) Averages Exceedances as per Tanzanian Limits for Air Quality
$DAE_{WB/IFC}$%: Percentage of Daily (24Hrs) Averages Exceedances as per WHO Limits for Air Quality
TBS_{Limits}: Tanzania Bureau of Standards Limits for Ambient Air Quality
WB/IFC_{Limits}: World Bank Group/International Finance Corporation Limits for Ambient Air Quality

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

Code	Location	(mm/s)
AQMS1	Northeast of the site - 06°46´56.78´´S & 38°55´25.85´´E	0.05
AQMS2	Northwest of the site - 06°46´58.22´´S & 38°55´24.29´´E	0.04
AQMS3	Southeast of the site - 06°46´58.16´´S & 38°55´26.48´´E	<0.01
AQMS4	Southwest of the site - 06°46´59.75´´S & 38°55´24.48´´E	<0.01
Human detection level		<0.15
TBS-NES Limit		< 5.0
% of Stations > Human detection level		0.00%
% of Stations > TBS-NES Limit		0.00%

Source: Field measurements done by TRES, November, 2023

APPENDIX 5: SITE LAYOUT PLAN