

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
UNIVERSITY OF DAR ES SALAAM



University of Dar es Salaam,
P.O. Box 35091, Dar es Salaam,
Tanzania
E-mail: vc@udsm.ac.tz
Website: <https://www.udsm.ac.tz/>



PROPOSED CONSTRUCTION OF HOSTEL BUILDINGS AND COMPLETING CONSTRUCTION OF PHASE II BUILDING FOR LECTURE ROOMS, CONFERENCE HALL AND STAFF OFFICES FOR THE INSTITUTE OF MARINE SCIENCES AT PLOT NO.530 BUYU, MAGHARIBI "B", MJINI MAGHARIBI, AT BUYU VILLAGE IN ZANZIBAR



Environmental and Social Impact Assessment Report

Project Proponent

University of Dar es Salaam
P.O. Box 35091, Dar es Salaam, Tanzania.
Tel: +255-22-2410700
Fax: +255-22-2410078
E-mail: vc@udsm.ac.tz
Website: www.udsm.ac.tz

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EXECUTIVE SUMMARY

Introduction

The IMS Buyu in Zanzibar Site Sub-project is one of the Higher Education for Economic Transformation (HEET) Projects being implemented by the UDSM at various locations in the country, under the World Bank Financial Support (HEET-P166415). The Project Development Objective (PDO) of the HEET Project is to strengthen the learning environment and labour market alignment of priority programs at beneficiary higher education institutions and improve the management of the higher education system. The UDSM HEET Project is divided into two lots whereby Lot 1 covers the MJNM Campus, CoICT-Kijitonyama, SoAF-Kunduchi, and Lot 2 covers Ngongo Site, in Lindi Municipality, Likunja Site in Ruangwa District, and IMS Buyu in Zanzibar.

According to the WB requirements, the environmental and social impacts assessment must be conducted for this project in accordance with the World Bank Environmental and Social Framework (ESF), the project's Environmental and Social Management Framework (ESMF), Environmental and Social Safeguarding Policies and relevant Environmental and Social Standards (ESSs), which aim to offset the anticipated social and environmental risks and impacts.

The project will involve excavation activities and vegetation clearance on the site as a requirement for the construction of new buildings. Building construction and associated activities will certainly have adverse environmental, social, and economic impacts, which need to be identified and mitigation measures put in place to ensure the sustainability of the project. The Zanzibar Environmental Management Act No.3 of 2015 requires project developers to carry out an Environmental and Social Impact Assessment (ESIA) before project implementation.

Similarly, the World Bank provides an Environmental and Social Framework (ESF), Environmental and Social Safeguarding Policies and relevant Environmental and Social Standards (ESSs), which aim to offset the anticipated social and environmental risks and impacts. The ESS1 for example, sets out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and development of mitigation measures. Therefore, Zanzibar Environmental Management Act No.3 of 2015, World Bank Environment and Social Framework (ESF), Environmental and Social Standards as well as the HEET project's Environmental and Social Management Framework (ESMF) were observed in the study.

Project Description

The objective of this project is to undertake the construction of two blocks of student hostels and complete the construction of the phase II administration building for the Institute of Marine Sciences (IMS) at the Buyu Campus in Zanzibar. The proposed project site is located at Buyu Village, Shakani Shehia, in Magharibi B District in Unguja, Zanzibar. The IMS-Buyu Campus forms boundaries with the Indian Ocean to the north and east, individual plots to the south, and the Airport–Shakani Road to the west.

The proposed construction of the phase II administration building has been designed to have a total floor area of about 6,350 square metres. The building will be comprised of staff offices, a lecture room, staff toilets, students' toilets, a ramp, a planter and a corridor. The lecture room will have a capacity to accommodate 50 students.

The proposed student hostels will comprise two identical buildings, each one for female and male student hostel blocks. The hostel buildings have been designed to have a total area of about 750 square metres with a capacity to accommodate 200 students. Each of the hostel buildings will be provided with sewage manholes connected to a septic tank system.

The total construction cost of the proposed buildings at the IMS-Buyu campus is estimated to be United States Dollars (USD) 4,970,000.00 or Tanzania Shillings (TZS) 11,580,100,000.00 at Bank of Tanzania (BOT) Exchange Rate of 1 US D = TZS 2,330. The project will be co-financed by the World Bank and the Government of the United Republic of Tanzania through the University of Dar es Salaam (UDSM) in collaboration with the Ministry of Education, Science and Technology (MoEST). The UDSM will be the implementing Agency through the dedicated Project Implementation Unit (PIU).

The construction period is estimated to be about 18 Months, whereby 1 month will be for the mobilization period, 16 months will be for the construction period, and 1 month will be for the demobilization period. After the construction period, the IMS-Buyu administration building and student hostels will be operated for an estimated period of 50 years. Thereafter, the administration and hostel buildings will have to undergo renovation. The IMS-Buyu campus is subject to further development, depending on future funding.

Policy, Legal and Institutional Framework

Chapter Three of this ESIA report presents a review of relevant Zanzibar policies, legislations and institutional framework that govern environmental and social management.

Furthermore, this ESIA study has also complied with the following tools:
World Bank's new Environmental and Social Framework (ESF);
WB relevant Environmental and Social Standards.

This ESIA study has applied 7 relevant standards out of 10 Environmental and Social Standards (ESSs), which are:

- ESS1: The Assessment and Management of Environmental and Social Risks and Impacts Standard;
- ESS2: Labour and Working Conditions Standard;
- ESS3: Resource Efficiency and Pollution Prevention and Management Standard;
- ESS4: Community Health and Safety;
- ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- ESS 8: Cultural Heritage; and
- ESS10: Stakeholder Engagement and Information Disclosure

Baseline Environmental and Social Conditions

The proposed project sites are found within land plot of IMS-Buyu campus. In contrast, area for construction of student hostel blocks is still pristine and occupied by natural vegetation composed of trees, shrubs and grass. Baobab tree is the only plant species found near construction sites that has been declared as endangered species by IUCN. Different bird species, including house sparrow, Indian crow and vented bulbul, are found within the project area. The proposed site for completing phase II administration building construction features a foundation structure surrounded by grass vegetation. Generally, individual plots, farm land, the community road, and the sea are near the surrounding environment for the IMS-Buyu Campus. The topography of proposed project area is relatively flat with an average altitude of 1.5m above mean sea level which receives an annual rainfall of 1000mm. The water table is found 9m below the original ground level. Sand-silt soils and coralline limestones form the geological features of the proposed project area.

Stakeholder Engagement and Public Consultations

Stakeholders' identification and engagement process was conducted based on Part IX of Zanzibar Environmental Management Act No. 3 of 2015, World Bank Environmental and Social Standards (ESS10) and Stakeholders Engagement Plan (SEP).

The SEP covered both national and regional stakeholders; however, a greater focus was placed on regional stakeholders. The SEP provides details on the engagement needed

associated with project activities. The stakeholder consultation involved face-to-face interviews with representatives of relevant government institutions, agencies and local government authorities. These include:

- Zanzibar Environmental Management Authority (ZEMA);
- Lands Commission of Zanzibar;
- Department of Occupational Safety and Health (DOSHS) - Zanzibar;
- Department of Environment (DoE) - Zanzibar;
- Zanzibar Water Authority (ZAWA);
- Zanzibar Investment Promotion Authority (ZIPA);
- Department of Forest – Zanzibar;
- Magharibi (West) “B” District Commissioner;
- IMS-Buyu Academic Staff;
- IMS-Buyu Students; and
- Community Members of Shakani Shehia.

The following issues were raised by consulted project stakeholders: -

- There is no objection to the proposed project;
- The project proponent shall adhere to all rules and regulations governing environmental management, building construction as well as health and safety in Zanzibar;
- The project proponent shall install adequate and appropriate firefighting equipment for the proposed new buildings;
- There shall be an instituting of emergency preparedness and response plan for the project;
- IMS management shall handle properly all kinds of waste to be generated as a result of project implementation;
- The Contractor shall be caused to implement mitigation measures for noise and dust pollution;
- Enforce the use of appropriate safety signs to guide the construction workforce and surrounding community;
- The Contractor shall be caused to conduct training for all workers regarding occupational health and safety, including firefighting;
- Engaging the local community in labour at various stages of project implementation;
- Supporting surrounding communities through undertaking Corporate and Social Responsibility (CSR);
- The Project Proponent shall intensify the security of the IMS-Buyu Campus by constructing a boundary fence and
- Provision of dedicated building infrastructure for disabled persons.

Project Alternatives

Several project alternatives were considered for this project based on the techno-economic, environmental and social criteria.

- “No Project Alternative”; VS “Project Alternative”-The project Alternative was selected in favour of the: No Project Alternative” due to its long-term social and economic benefits
- Labour Intensive VS Machine Intensive Construction Methods, Both “Labour Intensive Method” and “Machine Intensive Method” were considered to be useful but with more emphasis on Labour Intensive due to their ability to create temporary employment with less environmental, health, and safety risks than “Machine Intensive Method.
- Diesel Engine Alternative VS Solar Power Alternative -The Sola Power Alternative was selected in favour of the Diesel Engine due to its less environmental impact than the Diesel Engine Alternative.
- Lagoon System VS Septic Tanks. The septic tank alternative was selected for handling domestic wastewater due to the limited space available for the lagoon system.

Potential Environmental and Social Impacts

The following are the identified beneficial (positive) and adverse (negative) environmental and social impacts that are likely to occur during the pre-construction, construction, and operation phases. Chapter 7 of this ESIA Report provides details on enhancement measures for the identified positive impacts and mitigation measures for the identified negative impacts.

Positive Environmental Impacts

- Increased economic value of land
- Improved land planning, use and management
- Improved aesthetic value of the surrounding environment

Negative Environmental Impacts

- Vegetation clearance at the site proposed for construction of student hostel buildings.
- Increased waste generation
- Creation of air pollution due to dust emission from construction activities.
- Creation of noise nuisance to the adjacent receptors due to construction activities.
- Degradation of the landscape and loss of aesthetic value of the surrounding environment due to accumulation of construction/demolition solid wastes.
- Risk of water sources and marine and coastal pollution.
- Increase in water demand.
- Risk of damaging existing access roads due to frequent turning and overloading of materials hauling trucks to the project site.
- Increased runoff and subsequent soil erosion due to the effects of climate change.

Positive Social Impacts

- Creation of employment opportunities for local people due to recruitment of construction workers.
- Creation of income generation opportunities for local people due to increased demand for food from construction workers.
- Increased student enrolment and revenue for the UDSM due to the availability of space after the construction of the administration building and student hostels at the IMS-Buyu Campus.
- Increased revenue for infrastructure/ utility service providers due to increased demand for power and water supply.

Negative Social Impact

- Risk of damaging underground archaeological artefacts during the undertaking of excavation works for building foundation.
- Increased prevalence of HIV/AIDS and STIs transmission due to interaction between construction workers and students.
- Risk of construction-related accidents due to trespassing by unauthorized persons into the construction site.
- Creation of occupational health and safety risks due to handling /operation of hazardous construction materials /equipment.
- The emergence of GBV/SEA and SH.
- Loss of temporary employment opportunities.

Environmental and Social Management Plan

ESMP aims to minimize or prevent the identified adverse social and environmental impacts. The Environmental and Social Monitoring Plan (ESMP) has also been developed in this report. The ESMP has identified environmental and social management and mitigation actions required to be implemented by the Contractor and Project Proponent per the requirements of the World Bank Safeguard Policies and applicable Zanzibar policies and legislation. The ESMP outlines the performance standards based on Zanzibar Policies/Legislations, World

Bank Safeguard Policies/Guidelines, and International Conventions/Treaties/Agreements. The total cost for implementation of mitigation measures amounts to Tanzania Shillings (TZS 154,800,000.00). The ESPM also defines the roles and responsibilities of different actors in the plan.

The contractor shall implement components relevant to the actual construction and operation phases. The proponent mentioned above shall be responsible for the overall implementation of the ESMP in collaboration with their contractor. The ESMP is an estimated cost of the measures so that the project proponent can budget the necessary funds. Appropriate bills of quantities should give the actual figures. In any case, the consultant used informed judgment to come up with these figures.

The project shall ensure that the activities that are causing impacts on the environment are managed in a comprehensive, systematic, planned, and documented manner. The Proponent shall communicate the environmental and social management plan and environmental and social monitoring plan to its employees and contractors to ensure that implementation is done accordingly.

Furthermore, the project proponent shall ensure the availability of resources which are required for the implementation of its environmental management plan. The plan shall also be monitored to ensure that environmental objectives are well met. The project proponent shall carry out routine auditing to ensure the continued sustainability of the environmental management system.

Demobilization Plan

The demobilization activities will involve the removal of all mobilized items and the cleaning up of the construction site. It will include the removal of all temporary safety signs, temporary fencing, and construction debris, including crushed stone aggregates, pieces of wood, construction stakes, and other construction-related refuse, as well as temporary facilities or works. The restoration of surfaces to an equal or better than the existing condition shall be considered to be part of demobilization. Site reclamation includes reclamation of areas disturbed during construction, other than access and staging areas, to pre-project conditions or better.

Decommissioning Plan

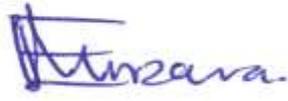
The Project Proponent might consider renovating or demolishing his buildings as the case may depend on the condition of the building at that time, let us say after about 99 years of the projected life of the structure. In case the demolition is considered, specific conditions for mitigation are generally inherently uncertain. The conditions include demolition methods, material handling, proposed sequences, protective measures, traffic management, occupational health and safety and environmental management, and the estimated cost of decommissioning.

Conclusion

The project is expected to have both beneficial (positive) and adverse (negative) impacts. However, most of the beneficial (positive) impacts will be long-term and will occur during the operation phase. Most of the negative impacts will be short-term and will occur during the construction phase. Therefore, it can be concluded that the project benefits (positive) will outweigh its adverse (negative) impacts because most of the negative impacts will be short-term, and their mitigation measure can be easily implemented through design and good engineering practices. Moreover, the environmental management plan has been formulated to ensure the implementation of outlined mitigation measures. The project benefits will be maximized through the enhancement of the beneficial (positive) impacts. UDSM holds the responsibility for ensuring the overall implementation of the Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMP) outlined in this report.

This Environmental and Social Impact Assessment (ESIA) report recommends that the proposed project can proceed, provided that the proponent adheres to the ESMP as specified in the report, along with any additional conditions imposed by regulatory bodies such as the Zanzibar Environmental Management Authority (ZEMA), World Bank ESF and ESSs, and other relevant authorities.

THE ESIA TEAM

NAME ^a	SIGNATURES
Mr. Akonaay M.L. Ako (Environmental Expert / Team Leader)	
Eng. Samwel Maguya (Assistant Environmental Expert)	
Mr. Huruma Kisaka (Sociologist / Resettlement Expert)	
Mr. Haruna Maulid (Environmental Expert)	
Ms Elizabeth Temu (Gender Expert)	
Dr. Yasinta John (Ph.D) (Environmental Expert)	
Esther Mnzava (Sociologist / Resettlement Expert)	

^a All the listed Experts are Registered as EIA Expert by the National Environment Management Council (NEMC) of Tanzania

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ABBREVIATIONS AND ACRONYMS

AIDS : Acquired Immunodeficiency Syndrome	GRM : Grievances Redress Mechanism
AP : Aggrieved Person	GRP : Grievance Redress Plan
APIU : Agency-level Project Implementation Unit	HEET : Higher Education for Economic Transformation
BOQ : Bill of Quantity	HIV : Human Immunodeficiency Virus
CF : Chance Finding	HSE : Health, Safety and Environment
CoC : Code of Conduct	HSMP : Health and Safety Management Plan
CoET : College of Engineering and Technology	IFC : International Finance Corporation
CoL : Commission of Lands	IMS : Institute of Marine Sciences
COVID: Corona Virus Disease	LGAs : Local Government Authorities
DoE : Department of Environment	MCDO : Municipal Community Development Officer
C-ESMP : Contractor's specified ESMP	MoEST : Ministry of Education Science and Technology
DOE-VPO : Division of Environment in the Vice President's Office	NGOs : Non-Governmental Organisations
DoFD : Department of Fisheries Development	OSHA : Occupation Safety and Health Authority
DoFNRNR : Department of Forestry and Non-Renewable Natural Resources	PAPs : Project Affected Persons
DoSH : Directorate of Occupational Safety and Health.	PDA : Project Development Area
DSFA : Deep Sea Fisheries Authority	P-ESMP : Project ESMP
ESCP : Environmental and Social Commitment Plan	PIU : Project Implementation Unit
EHSO : Environmental, Health and Safety Officer	PM10 : Particulate Matter with diameters that are generally 10 micrometres and smaller.
EIA : Environmental Impact Assessment	PM2.5 : Particulate Matter with diameters that are generally 2.5 micrometres and smaller
EMA Cap : Environmental Management Act Cap	RAA : Regional Assessment Area
EMO : Environmental Management Officers	RAP : Resettlement Action Plan
ESHS : Environmental, Social, Health, and Safety	SEA : Sexual Exploitation and Assault
ESIA : Environmental and Social Impact Assessment	SEU : Safety and Environment Unit
ESMP : Environmental and Social Management Plan	SGO : Social and Gender Officer
ESU : Environmental and Social Unit	SH : Sexual Harassment
GBV : Gender-Based Violence	STIs : Sexually Transmitted Infections
GHGs : Greenhouse Gases	SUZA : State University of Zanzibar
GN : Government Notice	UDSM : University of Dar es Salaam
GOT : Government of the United Republic of Tanzania	UPIU : University Project Implementation Unit
ZEMA : Zanzibar Environmental Management Authority	VC : Vice Chancellor
	ZAFIRI: Zanzibar Fisheries and Marine Resources Institute
	ZAWA : Zanzibar Water Authority
	ZECO : Zanzibar Electricity Corporation
	ZIPA : Zanzibar investments Promotion Authority
	ZTC : Zanzibar Tourism Commission

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

University of Dar es Salaam (UDSM) is the oldest public University in Tanzania. The University was established in 1961 as an affiliate College of the University of London. After its independence in 1963, the University became an affiliate of the University of East Africa (UEA) and became independent in 1970 after the split of the UEA. UDSM is currently located in Ubungo Municipal Council, Ubungo District, Dar es Salaam region. Institute of Marine Sciences (IMS) - Buyu is one of the campuses under UDSM and is found in Zanzibar.

Among others, the UDSM is also responsible for infrastructure development, including learning equipment, upgrading curriculum, and introducing innovative pedagogical methodology; promoting applied research and innovation capacity; building function linkage with the industry; strengthening the use of digital technology; promoting self-generated income; and building the capacity of both academic staff and the university leadership.

Through the continuation of developing and delivering higher education services to the locations where the services are not available, the UDSM has received financial support from the World Bank (WB) through the Ministry of Education, Science and Technology (MoEST) under the project named Higher Education for Economic Transformation (HEET-P166415). The Project Development Objective (PDO) of the HEET Project is to strengthen the learning environment and labour market alignment of priority programmes at beneficiary higher education institutions and improve the management of the higher education system.

From the financial support received, sufficient resources have been allocated, including a dedicated Project Implementation Unit, Office, and Conducive Environment for Managing and Administering the HEET project. Under HEET project, the project activity implementation covers Lot 1: Dar Es Salaam Campus (Mwalimu Julius K. Nyerere Mlimani - MJKNM Campus Sites; CoICT-Kijitonyama, SoAF-Kunduchi), and Lot 2: Out of Dar es Salaam Campuses (Ngongo Area - Lindi Campus and Research Centre; IMS-Buyu, Zanzibar Site; and Likunja Site - Ruangwa).

The project will involve excavation activities and vegetation clearance on the site as a requirement for the construction of new buildings. Building construction and associated activities will certainly have adverse environmental, social, and economic impacts, which need to be identified and mitigation measures put in place to ensure the sustainability of the project. The Zanzibar Environmental Management Act No.3 of 2015 requires project developers to carry out an Environmental and Social Impact Assessment (ESIA) before project implementation.

Similarly, the World Bank provides an Environmental and Social Framework (ESF), Environmental and Social Safeguarding Policies and relevant Environmental and Social Standards (ESSs), which aim to offset the anticipated social and environmental risks and impacts. The ESS1, for example, sets out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and the development of mitigation measures. Therefore, Zanzibar Environmental Management Act No.3 of 2015, World Bank Environment and Social Framework (ESF), Environmental and Social Standards as well as the HEET project's Environmental and Social Management Framework (ESMF) were observed during this ESIA study.

1.2 Project Rationale

In the past 10 years, Tanzania has witnessed a remarkable change in basic education. For instance, enrolment at the primary level has increased to 24.5% from 8,116,488 in 2015 to

10,111,671 pupils in 2018 and 10,601,616 in 2019. In the year 2013/14 the enrolment trend in secondary education showed a positive increase in the number of students transitioning to post-primary education. According to PAD of 2021, student demand for higher education is expected to increase by 2030; therefore, the tertiary education system (public and private) must expand and be of better quality to accommodate these additional students.

Despite the fact the country has successfully recorded an increase in basic education, there is prevalent acknowledgement among policy makers that the overall outcome of the successful performance in basic education is the demand for subsequent levels of education particularly higher education. In this regard, the main challenge is the inability of the system to absorb the expanding number of graduates in basic education who are inspired and capable of joining the higher education subsector. Of immediate need is the expansion of investment in infrastructure, facilities and quality assurance systems in Engineering (agro-processing, mechanized agriculture, railway, hydropower, aeronautic, etc.), Medical Science and Technology, Agriculture and Allied Sciences, Energy and Minerals, Forestry and Natural Resource Management

According to the HEET Project Appraisal Document (PAD, 2021) the challenges in the current higher education system include:

- Gender inequality in lower levels of education (especially upper secondary) persists up to the university level, although the gender parity index in higher education has improved from 56.5 % in 2013 to 67.4% in 2018;
- University graduates struggle to find jobs, at least in part due to skills mismatches;
- Demand-side considerations underscore the need for greater numbers of students in disciplines and programs sought after by employers, such as engineering, agribusiness, tourism, and climate change. The overall quality of post-secondary academic programs is low and does not prepare university graduates adequately for current and future formal jobs or self-employment;
- Shortage of well-trained lecturers and the majority of academic staff use traditional teaching methodologies;
- Most higher education institutions are not currently able to access or use modern technologies to deliver training; and
- The global pandemic has reinforced the need for higher education institutions to develop thoughtful resiliency plans.
- Technology, skills and education combined will help Tanzania to develop its productive sectors and create jobs for youths entering the labour market every year (PAD, 2021).

To address these issues, the World Bank has launched the Higher Education for Economic Transformation (HEET) project. The main objective of the project is to improve the quality, relevance, and equity of higher education in Tanzania. It supports the development of academic programs, research centres, and partnerships in priority areas. It also provides scholarships, grants, and loans to students and institutions. The project is expected to benefit over 100,000 students and 3,000 faculty members by 2028.

The HEET project will invest in infrastructure, facilities, and quality assurance systems in fields such as engineering, medical sciences, agriculture, energy, and natural resources to improve the operational capacities of public universities and be in line with the economic needs of the country and continue to fuel sustainable economic growth through their missions, objectives, and core values.

1.3 Objectives of the HEET Project

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 (PAD, 2021). The stipulated objective is in line

with UDSM Rolling Five Years Strategic Plan 2020/21 – 2024/25 and UDSM Vision 2061, which focuses on expanding infrastructures to match the increase in student enrolment. This calls for the need to expand facilities, including infrastructures, to create a supportive environment towards achieving its goal.

Prior to the construction of the proposed project, Environmental and Social Impact Assessment is required by World Bank and Tanzanian laws and governing to protect the environment and lives of people. The ESIA study shall be conducted per the World Bank Environmental and Social Framework as well as the Zanzibar Environmental Management Act No. 3 of 2015.

In complying with World Bank's ESF and Zanzibar legislations, the project beneficiary UDSM, through a consultancy service, has prepared this ESIA report to identify potential environmental and social risks/impacts and propose appropriate mitigation measures.

1.4 Proposed Activities for UDSM HEET Project at IMS Buyu, Zanzibar site

This project activity at the Institute of Marine Science in Zanzibar involves Construction of the hostel buildings with a carrying capacity of 200 students occupying an area of 750m² whose estimated construction cost is TZS 1,223,250,000.00. Completing construction of Phase II building for lecture rooms, conference hall and staff offices occupying an area of 6,350m² whose construction cost is estimated at TZS 10,356,850,000.00.

1.5 Objectives and Scope of the Assignment

The environmental and social impact assessment aims to establish a framework of potential negative environmental and social impacts that would require attention before project implementation at the project site. Proposed mitigation and enhancement measures will follow the prediction of these negative impacts and specifies how these mitigations should be enforced. Key objectives will include: -

- To describe components of the proposed project for the construction of the proposed structures.
- To review existing environmental and social baseline in the project site, zone and around Buyu village.
- To review the environmental policies and procedures of the Revolutionary Government of Zanzibar in the implementation of the proposed project.
- To forecast potential environmental and social impacts of project activities and analyse project alternatives.
- To develop an environmental and social management plan with recommended mitigation measures for addressing negative externalities in the course of project implementation.
- To carry out institutional and community consultations for environmental planning and monitoring of the project.

Initial appraisal has indicated implications on some negative impacts, including the coastal and marine impacts and over the boundary walls of the project site. Other potential environmental impacts would include clearance of trees, sanitation challenges, excreta-contaminated dust emissions, an increase in the discharge of surface runoff and an increase in solid and liquid wastes.

As per Zanzibar Environmental Management Act No. 3 of 2015, the project was registered with ZEMA by the Director of Institute of Marine Sciences in November 2022 and detailed project Environmental Assessment Report was submitted to Zanzibar Environmental Management Authority in June 2023. The project has been issued with Environmental Clearance Certificate by ZEMA on 8th August 2023 (ANNEXURE – 1).

1.6 Methodology of the ESIA Study

The focus of the assignment was to undertake an initial scoping of the potential environmental impacts of the activities and prepare an ESIA Report to guide further environmental considerations in project implementation. The assignment adopted various methods (such as interviews of selected stakeholders, consultations, field visits, literature review, etc.) to achieve these targets.

1.6.1 Desk work

This step involved a review of some existing literature and documents within the formation and data related to the project. Documents reviewed included: Project Appraisal Document (PAD), Project Engineering Design Documents, and Architectural Drawings for Proposed Construction Works at IMS-Buyu, Project Operation Manual Prepared by MoEST, Publications by the World Bank and RGoZ, Peer-Reviewed Articles, Zanzibar Environmental and Social-related Policies and Legislations.

Data and information from such sources include climate, soil, geology, climate, flora and fauna, population statistics, socio-economic issues, etc. All these documents and sources have been duly acknowledged as a footnote and on the reference page of this Report.

Other HEET project documents involved were the Environmental and Social Management Framework (ESMF), Environmental and Social Commitment Plan (ESCP), Resettlement Policy Framework (RPF) and Stakeholder Engagement Plan (SEP).

1.6.2 Fieldwork

This step involved a field survey in and immediately around the project site at Buyu, Magharibi B District in Zanzibar. The objectives of the field survey were to observe the extent of the existing plot of land, its geographical characteristics, environmental profile, and socio-economic activities and to characterize the scale/extent of potential impacts and effects from construction works. During the ESIA study, ambient air quality, noise level, and water quality were assessed onsite. Further laboratory examination for water quality was carried out at ZAWA and UDSM College of Engineering and Technology in Dar es Salaam. Results of laboratory water quality examination are presented in ANNEXURE – 3. Furthermore, information on the socio-economic condition of the local people was collected and used to determine the poverty levels, hence their vulnerability due to labour influx into the project area.

The information on Gender-Based Violence (GBV), Sexual Exploitation and Sexual Harassment was collected through face-to-face interviews with representatives of government agencies, local government authorities and local NGOs/CBOs. The collected baseline information was used to assess the risk of GBV/SEA and SH due to the prevalence of different forms of violence.

1.6.3 Measurement of baseline

1.6.3.1 Selection of measured air quality, noise and vibration stations

The two (2) stations that were measured were established/selected based on the norms prescribed by local standards (Environmental Management (Air Quality Standard) Regulations, 2007) and international guidelines. The norms include predominant wind direction (leeward and windward) at the area during the study, direction to the nearest local communities as possible receptors, size of the area to be covered, the areas where generated air pollutants, noise, and vibrations were expected, as well as areas that pollutants from the proposed project are likely to disperse to.

1.6.3.2 Measured ambient air quality, noise and vibrations

The measured parameters include (i) Dust as particulate matter in terms of TSP, PM10 and PM2.5; (ii) Ambient pollutant gases, i.e., Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), Carbon monoxide (CO), Hydrogen Sulphide (H₂S) and Volatile Organic Compounds (VOCs); (iii) ambient noise, and (iv) ground vibrations.

(a) Dust as particulate matter in terms of TSP, PM10 and PM2.5

Dust levels were measured by using an Aeroqual series 500 monitor (S-500). Particulate matter (TSP, PM10 and PM2.5) were measured in accordance with the manufactured procedure that meets ISO 9835:1993 and ISO 9835:1993 Protocols for TSP, PM10 and PM2.5. During measurements, the device was fixed at a breathing height of about 1.5 meters from the ground, which is assumed to be the breathing zone of people at their respective locality or working environment. Dust levels were measured at each station during the daytime and night-time hours. The recorded data at each station were then averaged and compared with National Environmental (TBS) and WHO/IFC guidelines to check for their compliance.

(b) Ambient pollutant gases

Ambient gases concentrations (i.e. CO, NO₂, SO₂, H₂S, and VOC) were measured using "Aeroqual series 500 monitors (S-500)" at two stations. The ambient gases were measured in accordance with the manufacturer's procedure, which meets the ISO 9001:2008 protocol. The device was elevated at a height of 1.5 meters above the ground; once the device was switched ON, it performed an automatic calibration for two minutes by pumping in fresh air into the sensors so as to set the toxic sensors to zero. Ambient pollutant gases were measured at each station during the day and night hours. The measured gases levels were then compared with their respective TBS-NES limits and World Health Organization (WHO) guidelines to check their compliance.

(c) Noise levels

Baseline noise data were recorded at each established station during the daytime (L_{day}) and night-time (L_{night}) in accordance to ISO 1996 -1:2003 using a digital sound level meter. On taking measurements, the meter was set to the "A" weighed measurement scale, which enables the meter to respond in the same manner as the human ear. The meter was held approximately 1.5 m above the ground and at least 0.5 m away from hard reflecting surfaces such as walls. Periodic measurements were taken to grasp the mean noise values for each station during the daytime and nighttime hours. The averaged L_{day} and L_{night} values were calculated and compared with their respective local standards and international guidelines.

(d) Ground vibrations

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

1.6.4 Collection of Socio-Economic Data

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 investigate the socio-economic considerations within the project area. These were undertaken to ascertain information to satisfy the following factors as outlined in the terms of reference provided:

- Population and settlement characteristics
- Land uses and livelihoods
- Community structure, employment and income
- Developments underway
- Infrastructure in place
- Water supply and other utilities
- Waste management practices
- Recreational activities
- Energy supply
- Public health and safety
- Access to and delivery of health, education and social services

1.6.5 Stakeholder Communication and Public Participation

This step involved soliciting views from identified project stakeholders, including the Zanzibar Environmental Management Authority (ZEMA); Department of Environment, Zanzibar Water Authority (ZAWA), Department of Forestry, Non-Renewable and Natural Resources (DoFNRNR); Department of Fisheries Development (DoFD); Directorate of Occupational Safety & Health; Zanzibar Fire and Rescue Force; West B District Authorities; and Shehia Leaderships. The discussions were centred on the aim and objectives of the project, its scope, the design and modalities of implementation, environmental and social concerns, and recommended measures.

1.6.6 Identification and Assessment of Impacts

The identified potential environmental impacts are based on the interaction between the project-related activities and selected valued environmental components (VECs). VECs were selected based on the existing project environment (environmental baseline conditions), opinions/views obtained from stakeholder consultations, and the consultant's professional judgement. For this project, the selected VECs include Atmospheric Environment, Acoustic Environment, Terrestrial Environment, Public Health and Safety, Labour and Economy, and Community / Public Services Infrastructure / Utilities.

The identified impacts were assessed using the Environmental Impact Assessment Matrix. The EIA Matrix helped to determine the significance of impacts based on the following criteria:

- **Importance** – whether important to national, regional, or international interest or site-specific.
- **Magnitude** of Change – whether Positive or Negative
- **Permanence** – whether the condition is permanent or temporary.
- **Reversibility**- reversible or irreversible.
- Whether **Cumulative / Synergistic** for positive and negative impacts, respectively.

The significance of impacts also took into consideration existing by-laws, national and international environmental standards, legislation, treaties, and conventions that may affect the significance of identified impacts.

These techniques have been used to provide a logical and systematic way of identifying, assessing, and analysing environmental impacts. The techniques also allowed subjective judgments to be quantitatively recorded and therefore, make the assessment of impacts more objective.

1.7 Report Structure

The preparation of this ESIA report has been carried out in accordance with the requirements of Part IX of the Zanzibar Environmental Management Act (2015) This report is structured in the following style:

- (I) Executive Summary
- (II) Table of Contents
- (III) Acknowledgement
- (IV) List of Acronyms
- 1. Introduction
- 2. Project Description
- 3. Policy, Legal and Institutional Frameworks
- 4. Environmental and Social Baseline Conditions
- 5. Stakeholders Engagement and Public Consultation
- 6. Assessment of Impacts and Identification of Alternatives
- 7. Enhancement and Mitigation Measures
- 8. Environmental and Social Management Plan
- 9. Health and Safety Management Plan
- 10. Environmental and Social Monitoring Plan
- 11. Resource Evaluation / Cost Benefit Analysis
- 12. Decommissioning and Closure
- 13. Conclusion and Recommendations
- 14. References
- 15. Appendices

CHAPTER TWO

2.0 PROJECT DESCRIPTION

2.1 Location

The project will be executed at IMS-Buyu Campus on the land owned by UDSM located at Buyu Village in Magharibi B District of Unguja Island. The approximate GPS coordinates are 6o25'20" S and 39o23'47" E. Implementation of the project is compatible with the current land use master plan for the Institute of Marine Sciences – Buyu Campus (Figure 2.1-1).

Buyu village is located approximately 14 Km from Zanzibar Stone Town, a bit further from Karume International Airport. The project site lies in an area characterized by flat land of shrubs intersperse with rocky headlands and rocky intertidal flats. The general area is mostly pristine, although there is a rapidly growing new settlement at the bordering area of the western and northern sides.

There is moderate socio-economic development near the project site, where a number of human activities are taking place. The Google Earth map location of the site is shown in Figure 2-1.

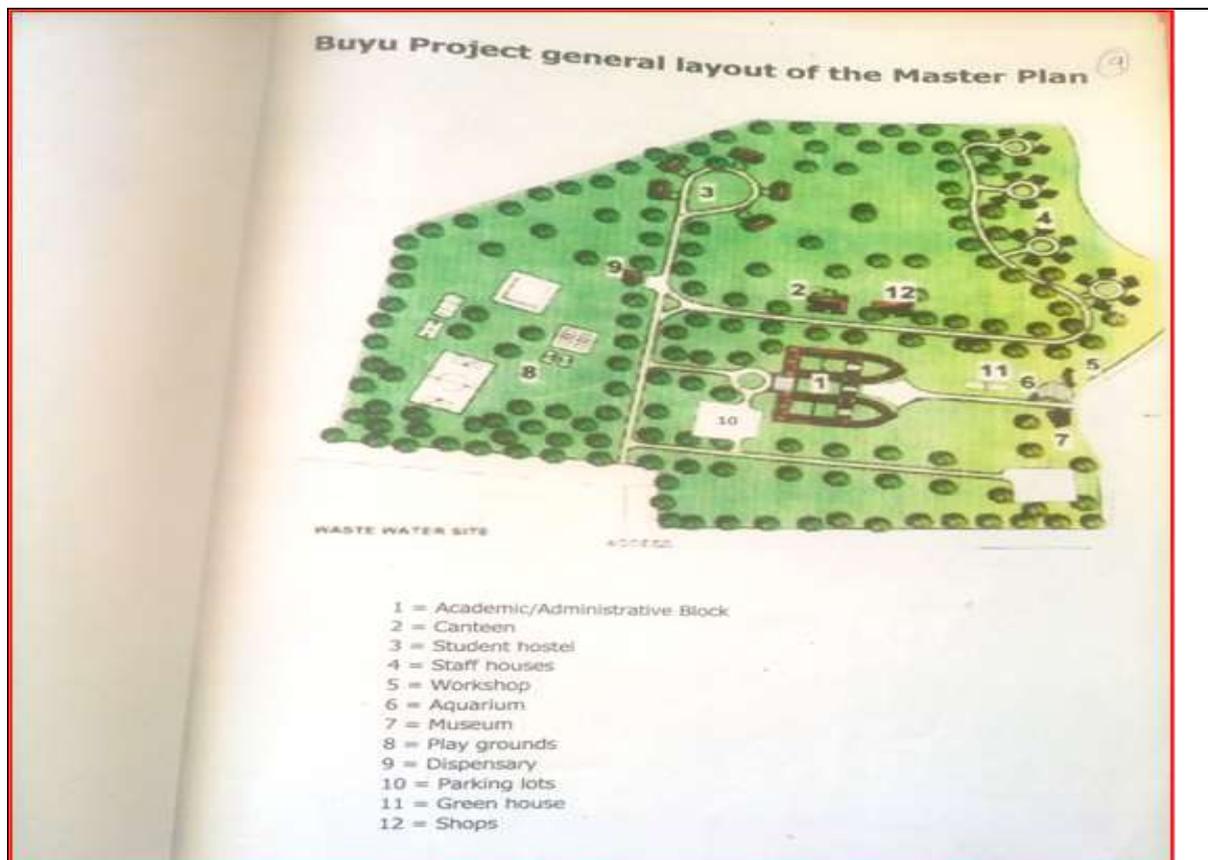


Figure 2.1-1: Current Land Use Master Plan of IMS-Buyu Campus.

Source: (IMS, April 2023)

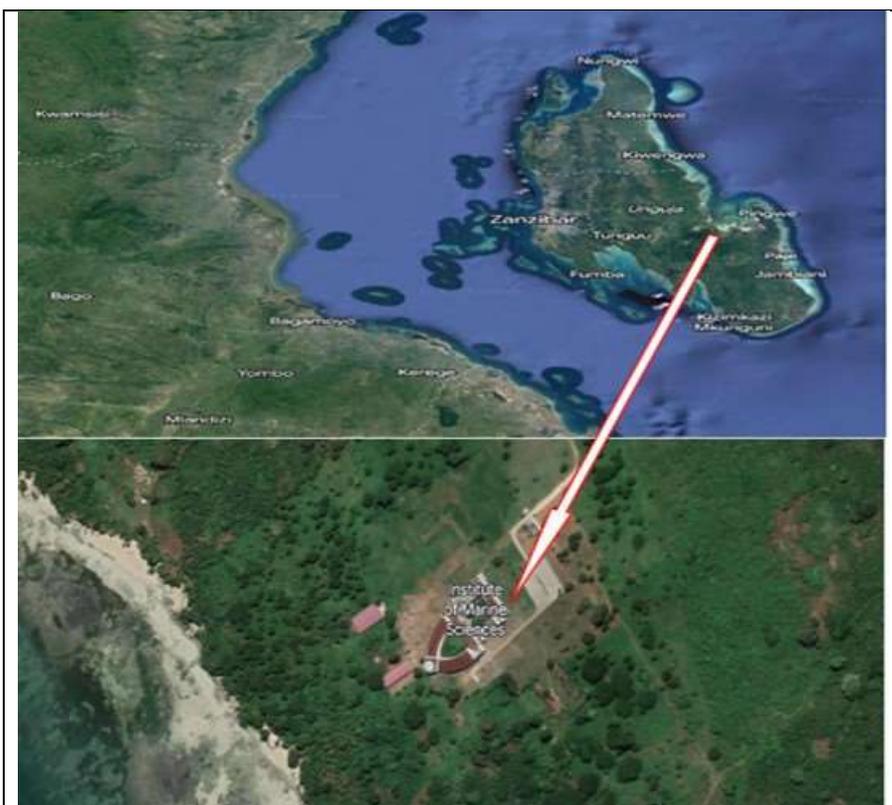


Figure 2.1-2: Location of IMS-Buyu Campus.

Source: (Google Earth Image Retrieved of 20th April 2023)

2.2 Land Ownership and Requirements

The proponent owns the land with a permanent right of occupancy registration No. 10/1904/0803, as shown in **APPENDIX 1**. The land is on Plot No. 530, with a total area of about 502474.3 Square metres (SQM). The total land area to be occupied by the proposed building facilities is estimated to be about 7,100 SQM, which is about 1.4% of the total land area of the IMS Buyu Campus.

2.3 Description of the project sites

2.3.1 Current Land Use and Important Features

The infrastructure development of the area began over ten years ago with the construction of Phase I academic and administration blocks (**Plate No. 2.3-1**). The University of Dar es Salaam (UDSM) is intending to construct hostel buildings (**Plate No. 2.3-2**) with a total area of about 750 Square meters (SQM) and complete the construction of Phase II building for lecture rooms, conference hall and staff offices with a total area of about 6,350 SQM, at the Institute of Marine Sciences (IMS), Buyu, Magharibi B District in Zanzibar (**Plate No. 2.3-3**). Currently, there is a building foundation at the proposed construction site (**Plate No. 2.3-4**).

The premises will be constructed in stages and designed for expansion. The construction of the buildings will be contracted to a competent company in a tender. After the construction is completed, an evaluation of the construction will be conducted to ensure a functional facility.

The World Bank's standard procedures for the construction of the buildings will be complied with. The building will be guarded day and night and fenced to control access by unauthorised persons. The operations at the buildings will be led by the Institute of Marine Sciences management as a part of the University of Dar es Salaam. The architectural drawings of the proposed buildings,



Plate No. 2.3-1: Completed Phase I Academic and Administration Block.

Source: Field Survey, April 2023



Plate No. 2.3-2: View of the Proposed Site for Construction of Student's Hostels.

Source: Field Survey, April 2023)



Plate No. 2.3-3: View of Site Proposed for Construction of Phase II Academic and Administration Building

Source: (Field Survey, April 2023)



Plate No. 2.3-4: Foundation Part for the Construction of Phase II Building.

Source: (Field Survey, April 2023)

2.4 Project Design

2.4.1 Project Design, Climate Change Risks Mitigation Adaptation

Low energy use, rainwater harvesting, stormwater management systems, adequate natural ventilation and lighting, and green space infrastructures shall be accommodated in the design of the UDSM IMS-Buyu Campus in order to mitigate and adapt the climate change risks (e.g., heat, drought, water scarcity, etc.) as described below;

- **Park and open space:** Trees will be planted in the park and public open spaces to maximize the tree canopy cover and shade provided by trees in the area for more provision of ecosystem services. In doing so, native trees will be given priority to maintain the natural ecosystem.
- **Greenery walkways:** The design maximizes pedestrian movement and minimizes motorized transport within the site in order to reduce air emissions (greenhouse gasses (GHGs)) and maximise Carbon sequestration. Walkways are provided to restrict free movement that causes vegetation destruction on the site, and reducing land cover important for carbon sequestration. Trees are proposed to be planted along the vehicular access road and footpaths to improve the landscape and reduce the effects of sun radiation during the day.
- **Green areas:** Green areas are distributed in every zone/ block to allow cross-fresh air into the buildings. Due to the topographical nature and natural vegetation cover, green

belts and conservation zones intend to preserve the ecosystem and control land degradation. Trees and grasses will reduce soil erosion in sloping plains and all areas prone to soil erosion.

- The building with low energy use; Provisions for adequate openings for cross ventilation, that will ensure easy flow of clean air and reduce energy use (thus reducing emissions); provisions for motion sensors in public areas, to enable auto switch ON/OFF of lights; installation of presence sensors in offices, class rooms, laboratories and workshop areas; proper orientation to reduce indoor discomfort and capture natural air as much as possible and minimization of the sun effects (installation of fans; and provisions for solar lights along the pathways for sun shading); maximizing the potential of utilization of renewable energy options such as solar and wind; Utilization of biogas from the wastewater treatment plant for cooking; buildings to be oriented and constructed to take advantage of natural lighting and cross ventilation as a means of minimizing energy consumption during operation;
- Buildings with a low footprint. This increases green spaces, accommodates rainwater harvesting, stormwater and waste management systems, and embraces water-efficient processes.

2.4.2 Disaster Risk Management

The proposed project shall have provisions for fire prevention and firefighting facilities. Also, the buildings shall have provisions for solid waste and liquid waste management for disease prevention. In addition, possible access roads shall be used to ensure easy walkability and vehicular access to and from the building to avoid car accidents. The roads shall be safely connected to the parking area, which is huge enough to accommodate cars. UDSM IMS-Buyu Campus shall have an emergency management plan that assigns the responsibilities for various emergency tasks, specifically to WHO does, WHAT, WHEN AND HOW.

2.4.3 Gender Inclusivity

The University structures shall be designed to be intelligent and inclusive to all genders, with special attention to accommodating individuals with special needs (e.g. physical, learning impairment, emotional and behavioural). These include provisions for ramps, toilets, etc.

2.4.4 Occupational Health and Safety (OHS)

Pre-construction phase

The structural elements of a project will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. Where the project includes new buildings and structures that members of the public will access, the UDSM will consider the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events. Where technically and financially feasible, UDSM will also apply the concept of universal access to the design and construction of such new buildings and structures.

Construction phase

UDSM with support from the supervision consultant will ensure regular training to permanent and temporary workers (including community workers) on occupational health and safety to workers and information relevant to health risks including cholera, HIV/AIDS, COVID-19, and impacts of dust on workers health will be provided to workers. During the construction period, the contractor shall provide, equip and maintain adequate personal protective equipment, first-aid stations and sign boards directing where these services are situated and transported in case of emergency. Appropriate protective gear including, but not limited to helmets, heavy-duty gloves, safety vests and boots, shall be provided to site workers and visitors. Training related to hazards and hazard management will be provided to workers and particularly as

stipulated in the general IFC general EHS guidelines during construction the contractor will be required to put emphasize on training related to specific hazards such as working at height, ergonomic, slips and falls, dust and moving machinery and any other relevant hazard that will be identified during construction.

Operation phase

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

Decommissioning phase

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

2.4.5 Building Design Criteria

The building rules and regulations will be in accordance with Tanzania government specifications and the planning regulations of Magharibi B District, Unguja Island, and specific conditions as provided by a certificate of occupancy from the Ministry of Lands, Housing and Human Settlements Development.

The following are the design criteria that have been followed during the design of the building;

- Easy vehicular access to and from the building,
- Short internal walking distances
- Ensure easy flow of clean air
- Aesthetic values added
- Proper orientation to reduce indoor discomfort and minimize the effect of the sun
- Ensure coherence, diversity compatible uses and scale in the context
- Wastewater disposal facilities are part of the design whereby stormwater is directed into the highway storm drains.

The expansion of the UDSM IMS Campus at Buyu was characterized by two main factors, one of which was to fulfil the objectives and requirements of the HEET project. HEET is coordinated by the Ministry of Education, Science and Technology (MoEST) and will be implemented in almost all regional public higher learning institutions. The second factor was the stipulated objectives that are in line with UDSM Rolling Five Years Strategic Plan 2020/21

– 2024/25 and UDSM Vision 2061, which focuses on expanding buildings, research facilities and other infrastructures to match the increase in the student's enrolment.

2.5 Utility Requirements

2.5.1 Energy supply

IMS Buyu campus is served by Zanzibar Electric Supply Company (ZECO) power lines that are rated at 33kV. It has been planned that during the implementation of this project, the Contractor will extend existing power lines to the construction sites. However, in case of a power blackout, there will be a backup diesel-powered generator with a capacity of 200kVA. Electricity cost is estimated to be 100 USD per month. The generator to be installed will be designed to comply with the EC directive for machinery safety and noise emissions, fully enclosed in an acoustic canopy. The technical specifications of the proposed Generator Set are provided in **Table 2.5-1**.

Table 2.5-1: Specification of the Proposed Generator Set.

S/n	Proposed Specifications		
1.	Rated Frequency	50Hz	
2.	Prime Power	200Kva	
3.	Rated Voltage	380-415V	
4.	Size	Length	3.98m
		Width	1.2m
		Height	2.47m
5.	Weight	4,644kg	
6.	Fuel consumption at 100% prime power	45.41/hr.	
7.	Air Emissions at 100% load	NOx (Oxide of Nitrogen)	6.4g/kWh
		PM (Particulate Matter)	0.2 (g/kwh)
		CO (Carbon Monoxide)	3.5g/kWh
8.	Noise Emissions at 100% load	1m away from Genset	78dBA
		7M away from Genset	70dBA

2.5.2 Water Supply

Buyu and Shakani areas have vast groundwater potential because of their geological nature. Water resources in some areas near the project site are managed and supplied by the Zanzibar Water Authority (ZAWA), while some individuals have their own boreholes.

Currently, the project proponent owns a private borehole located about 7km away from the site. Water from the drilled borehole is pumped through an elevated storage tank system and released by gravity via pipelines to the IMS campus at Buyu. Water from the storage tank is used mainly for domestic purposes. For the proposed project, water will be required for different uses, including construction processes, equipment maintenance, and sanitation. For reliable access to water resources, the proponent will have to request a ZAWA connection or drill another well for the project to supplement water requirements.

The amount of water requirements during the construction and operation phases are provided in **Table 2.5-2**. During the study, it was not possible to obtain the borehole yield, and therefore, it was not possible to establish water balance.

Table 2.5-2: Estimation of Water Requirements for the Proposed Project Activities

Item /component	Quantity
Construction Phase	
Construction crew (40Litres x 150persons)	6,000 litres per day
Construction works	25,000 litres per day

Item /component	Quantity
Housekeeping	5,000 litres per day
Total water consumption during Construction Phase	36,000 litres per day
Operation Phase	
Domestic (Drinking, Bathing, Laundry)	50,000 litres per day
Housekeeping and gardening	10,000 per day
Total water consumption during Operation Phase	60,000 litres per day

2.6 Project activities

The University of Dar es Salaam (UDSM) is intending to construct hostel buildings (750m²) and complete the construction of Phase II building for lecture rooms, conference hall and staff offices (6,350m²) at the Institute of Marine Sciences (IMS), Buyu, Magharibi B District in Zanzibar. The undertaking involves various phases from the planning phase to the construction and operation phase. Each specific phase has its activities and as a result different waste fraction. As elaborated in these sections, waste types and generation vary depending on implementation phases. The sections identify expected waste generation, storage, options for pollution prevention, necessary treatment, and disposal infrastructure. It involved the following:

Gathering information about project activities and processes, description of waste streams by type, quantities, and potential environmentally friendly methods for handling the wastes;
 Establishment of priorities based on potential Environmental Health and Safety risks risk anticipated by the waste streams and the available infrastructure to manage the waste in an environmentally sound manner;
 Identification of options for waste reduction at the generation point but equally important, the possibility for reuse and recycling;
 Identification and proposal of procedures and operational controls for onsite storage, treatment, and final disposal of wastes.

2.6.1 Mobilization Phase

The mobilization phase is the initial stage of the project cycle, during which the Contractor will start to mobilize equipment and workforce for the project. For this project the following are some of the major activities to be carried out by the Contractor:

- Topographical survey and geotechnical investigations.
- Establishment of Contractor's Site Office / Camp Site and Materials Storage Yard.
- Recruitment of construction workers and administrative staff.
- Mobilization and transportation of construction equipment/machinery to the site.
- Transportation of construction materials (e.g., stone aggregates, sand, cement, gravel, etc) to the site.
- Installation of safety/security fence around the camp site and construction site.
- Removal of existing vegetation from the proposed project area.
- Identification and relocation of public services infrastructure and utilities such as water supply pipelines, sewer pipelines, electricity power poles, and telephone cables if any.
- Installation of temporary safety sign boards.
- Demolition of existing building structures at the proposed site if any.
- Excavation and transportation of construction-related solid wastes / spoil materials and demolition wastes to the dumping sites.

2.6.2 Construction Phase

The second stage is the construction phase, which overlaps with the mobilization phase, whereby some of the activities from the mobilization phase will continue during the construction phase. During construction, the following activities will be performed;

- Earthworks include vegetation clearance, removal of top soils, and excavation of the foundation for the proposed facilities and stormwater drainage system.
- Filling of parking facility bed with gravel/base course materials, compaction and laying of concrete pavements.
- Transportation of construction materials, machinery, and equipment to new construction sites
- Collection and transportation of soil/spoilt materials and demolition wastes to the dumping site.
- Transportation of construction materials such as gravel, sand, aggregates, cement bags, and reinforcement bars to the materials storage yards.
- Fabrication of concrete slabs, curb stones, and concrete lining of storm water drainages,
- Installation of permanent road and safety signs, security lights, and traffic lights.
- Installation of CCTV cameras for security purposes
- Construction of the proposed facilities for IMS Buyu.
- Painting of the IMS Buyu
- Establishment of Access Road
- Construction wastewater collection and disposal facilities
- Construction of solid waste collection facilities

2.6.3 Demobilization Phase

This is the third stage of the project cycle, which involves restoration of the project site at least to its original conditions. The following are some of the major activities to be carried out by the Contractor during demobilisation phase:

- Removal of temporary infrastructure and equipment from the campsite;
- Disposal of contaminated materials, including used oil, sewage, and solid wastes (plastics, wood, metal, papers, etc.) to the authorized dumping place;
- Disassembling and transportation of construction equipment/machinery from the construction sites.
- Landscaping of the open areas

2.6.4 Operation Phase

The operation phase is the fourth stage in the project cycle, which involves the operation of the constructed infrastructure. The following are some of the major activities to be carried out during the operation phase:

- Operation of campus hostel
- Periodic maintenance of the Campus infrastructures,
- Operations of the academic and research facilities
- Operation Min-cafeteria

2.7 Building Materials Requirements

The estimated quantities of required building materials like timber, cement, sand, murram and rock is provided in Table 2.7-1. There are contractual services for the onward supply of raw materials from different bulk suppliers for the entire period of the construction phase. These are only estimated figures as the actual volume is subject to BOQ approval.

Table 2.7-1: Required Construction Materials During Construction Phase

S/n	Type	Estimated Quantity
1.	Murram	2500 Tons
2.	Sand	100 Tons
3.	Rocks/Aggregates	500Tons
4.	Cement	400 Tons
5.	Timber	1600m2

S/n	Type	Estimated Quantity
6.	Reinforcement	250 Tons

2.8 Manpower Requirements

Construction and installation of the project structures may require up to 150 personnel involving both skilled and unskilled labour. It is highly recommended that at least 40% of the construction crew shall be women. The majority of the casual labourers will be recruited from within Buyu village and neighbouring villages within Shakani Shehia. The construction workers will be hired on short-time basis contracts (up to 12 months) subject to renewal until construction and installation activities are complete. During this phase, working hours will be 8 to 9 hours per day (7:30 am to 4:30 pm).

2.9 Waste Management

The most common types of solid waste generated during the mobilization phase will be soil materials and debris from site excavations. The amount and type of solid waste will depend on the depth of the area to be excavated and the number of buildings to be demolished from the site.

The Contractor's office is expected to generate sanitary wastes, mainly wastewater from the kitchen, bathrooms, and toilets. Types of solid wastes to be generated include food residues, waste papers, plastic bottles, food cans, etc. The amount of wastewater and solid wastes will depend on the number of people occupying the Contractor's Office. Other types of waste will be generated from construction activities and the operation of construction machinery/equipment. These include cement bags, pieces of bricks/blocks, wood, metals, oils, grease and paint containers.

Some of the solid wastes like cement bags, paint containers, waste oils, pieces of bricks and wood can be re-used during construction or handed over to local people. Non-reusable wastes will be disposed of at the approved site by the resident engineer.

2.9.1 Construction Phase

During the construction phase, the operation of the Contractor's Office is expected to generate wastewater from the kitchen, bathrooms and toilets. The type of solid waste to be generated from campsite will be comprised of food residues, plastic bottles, plastic papers, food cans, broken glass and waste papers, etc. The construction activities will result in the generation of soil materials from excavations, cement bags, metals, waste oils, paint containers, pieces of bricks and wood.

However, the amount of solid waste and wastewater generated during the construction phase is not expected to be significant compared to similar types of waste generated in the municipality. Authorized dealers will collect the waste oils and other hazardous wastes. The Resident Engineer will dispose of the non-reusable solid wastes as prescribed. The estimated quantities of various types of waste likely to be generated during the construction phase are provided in **Table 2.9-1**.

Vehicle and construction equipment emissions include carbon dioxide (CO₂) and a small number of noxious gases, such as sulphur dioxide (SO_x), nitrogen oxides (NO_x), hydrocarbons, and particulate matter (PM) associated with transport, excavation, and construction, as well as exhaust fumes from construction plants, machinery, and vehicles. These greenhouse gases (GHGs) are known to interfere with temperature regimes and cause climate change effects. Regular maintenance of vehicles and construction equipment and deploying qualified drivers and operators will help combat the impacts.

The construction works are also expected to generate hazardous wastes such as Asbestos, Chemicals, Acidic Batteries, Fluorescent Tubes, Solvents, Pesticides, Oils and grease. The following methods will help to reduce the magnitude of the anticipated impact: Prevention, if possible, Reuse, Recycling, Recovery, and Disposal.

Vehicle and construction equipment emissions and hazardous waste are significant in the construction phase but short term, while throughout the mobilization and demolition phases, the impact is insignificant and short-term.

Table 2.9-1: Quantity of Wastes to be Generated during Construction Phase.

Category of waste	types	Quantity	Treatment Disposal
Solid Waste (Degradable)	General garbage (food remains, cardboard papers etc.)	37.5 kg/day (based on a generation rate of 0.25kg/day/person and 150workers)	to be collected in a skip bucket and then disposed of at the dumpsite
	Vegetation	Approximately 65-70% of the area where the building will be sited vegetation clearance will be done	Tree logs will be given to local people for firewood
	Pieces of timber	Variable	Will be collected and stored ready to be sold to recyclers
Solid Waste (Non-Degradable)	Plastics	Variable	Will be collected and stored ready to be sold to recyclers
	Tins, glasses	Variable	To be collected and stored ready to be sold to recyclers
Hazardous Wastes	Scrap metals, materials packaging, paint buckets, corrugated iron sheets, oil filters, etc.)	Variable	To be collected and sold by the authorized recyclers or to be disposed of by the registered firm by the ZEMA and VPO-DoE
Liquid waste	Sewage	4,800 litres per day (Based on 150 people, water consumption rate of 40 LPCD and 80% wastewater) discharge factor.	To be collected in onsite sanitation
	Oils and greases	Variable	To be collected and sold by the authorized recyclers or to be disposed of by the registered firm by the ZEMA and VPO-DoE

2.9.2 Demobilization Phase

The waste to be generated includes pieces of bricks, concrete rubbles, pieces of wood, and scrap metals. All these wastes will be disposed of at the dump site. (The authorized area for dumping solid wastes within the Magharibi B District). However, the reusable materials can be handed over to the local people.

2.9.3 Operation Phase

The waste to be generated during operation is food waste from cafeterias, wastewater from toilets and baths (black and grey wastewater), paper waste, plastic waste, and solid waste will be collected and transported to the dumpsite. Food waste will be sold or handed over to livestock keepers around the project site. Plastic solid wastes will be collected and sold or handed over to recyclers. The generated wastewater will be treated by a septic tank system.

2.10 Wastewater Management

A flush toilet system for emptying waste and discharge into the septic tank will be constructed as per developed design drawings. For the case of the construction workforce, the general rule of a minimum water requirement of 40 litres per capita per day ideally provides a minimum amount of generated wastewater/sewage to 4,800 litres per day, assuming up to 150 construction workers will be on site. The anticipated amount of liquid waste will be handled on-site in a septic tank system.

2.11 Solid Waste Management

It is estimated that the daily solid waste generation (excluding construction debris) will not exceed 30 kg per day. The quantity of dumped and abandoned wastes will depend on the pace of the construction works, and the number of workers involved. Local environmental guidelines indicate solid wastes and garbage must be collected in properly set receptacles inside the project site and transferred for disposal. Currently, at Buyu Village, there is a domestic solid waste collecting company that also serves IMS.

2.12 Hazardous Waste Management

The construction chemicals that are likely to be generated include oil and grease, paint, thinners, bleaching powder, solvents, acids, etc. These may not be generated at a significantly voluminous level, but their control and sustainability require great attention, especially in storage, handling and disposal. Once generated, hazardous waste will be stored temporarily in a bounded area before being sent to an authorized recycling company. Currently, the Director of IMS has contracted a third-party company to manage hazardous waste generated from academic laboratories. It is planned that the same arrangement will be adopted during the construction phase of the proposed project.

2.13 Project Boundaries

Project boundaries help to determine and evaluate the extent of the identified environmental and social impacts of any given or proposed development. The boundaries include spatial, temporal and institutional boundaries, as described below.

2.13.1 Spatial Boundary

The Project Area of Influence (AoI) is defined based on the IFC Performance Standard 1. The AoI comprises the Direct Impact Area (DIA), the Indirect Influence Area (IIA) or Secondary Impact Area (SIA), and the Wider Influence Area (WIA). The DIA is the area where direct impacts from planned and unplanned project activities could occur. The DIA also considers areas, where impacts from unplanned but predictable developments caused by the project may occur later or at a different location or indirect project impacts on biodiversity or on ecosystem services upon which affected communities' livelihoods, are dependent.

The DIA embraces the area that is likely to be affected by the project activities and facilities that are directly owned, operated or managed (including by contractors, suppliers, etc.), such as at the project's site, immediate air shed, watershed, transport corridors, access roads/pathways, borrow and disposal areas. The primary boundaries (DIA) in the project site include:

Activities associated with the development of in situ operations and related infrastructure within 50,2474.3 m² of IMS land;
Existing subsistence seasonal crop farms on the project site and
Waste disposal areas.

The Indirect Influence Area (IIA): where associate facilities are located that are neither funded, constructed or expanded by the project; however, are required for the project to function These are areas where indirect impacts from the proposed project activities could take place but outside DIA embracing the impact areas beyond the immediate stretches adjoining the zones of project works. The IIA in this project includes:

Transportation routes (construction materials, imported equipment, project material supply, etc.)

- Licensed borrow pits, quarries and sand extraction sites for construction materials;
- Waste disposal site that the proponent will potentially use;
- Source markets, service areas associated with supporting utilities and distant beneficiary communities;

The Wider Influence Area (WIA) covers the whole Magharibi B District and areas resulting from cumulative/incremental impact on resources used or land directly impacted by this project and other existing or planned developments that overlap in temporary or physical boundaries.

2.13.2 Temporal Boundary

The time horizons of the project consist of what are referred to as temporal boundaries. As presented in Section 6.3 of this report, the temporal boundaries of each of the identified positive and negative impacts from the proposed project have been characterized in terms of their nature of occurrence as either direct or indirect; duration, i.e. long-term or short-term; reversible or irreversible; localized impact or regionalized impact; and time of their time of occurrence, i.e. mobilization phase; construction phase; operation phase; and/or decommissioning phase.

2.13.3 Institutional Boundary

Institutional boundaries refer to those institutions and sectorial boundaries in which the project is located or mandated. Primarily, this entails all the key stakeholders, from national to local level, who can legally, technically, and socially influence the project. These include but are not limited to the Vice President's Office-Department of Environment (VPO-DoE), ZEMA, Ministry Responsible for Land, Magharibi B District Authority and Shehia Authorities. The role and involvement of each institution are described in Section 3.4 of this report.

CHAPTER THREE

3.0 Policy, Legal AND INSTITUTIONAL FRAMEWORKS

This Chapter describes relevant National and World Bank Safeguard Policies and Institutional Framework for environmental management in the country as well as relevant regulations, strategies, standards, international conventions and/or treaties/agreements. It also considers compliance with relevant National Policies and World Bank Safeguard Policies, legal requirements, and international conventions/agreements/treaties to which the country is a signatory.

3.1 Relevant National Policies

Over the years, Zanzibar has made considerable strides in integrating the environment into socio-economic policies, plans, and strategies to promote and consolidate sustainable socio-economic development in the country.

The following are relevant sectoral and cross-sectoral policies that provide directives on how projects should be implemented in relation to concerned environmental and socio-economic settings. The proponent shall consult these policies in the course of designing and implementing the proposed project activities.

3.1.1 Zanzibar Vision 2020

The Zanzibar Vision 2020 encourages environmental protection; promotes resource use efficiency, and adoption of safe and environment-friendly technologies. The vision promotes conservation, protection, and rational and efficient utilization of environment and natural resources. It is envisioned that sustainable economic development should be accompanied by proper environmental management so that Zanzibar's natural resources and natural heritage are passed on to future generations.

The objectives of the vision are to promote life quality, promote an integrated approach to sustainable utilization of resources, increase resource efficiency and environmental management, ensure control of industrial pollution, and maintain environmental health and safety.

3.1.2 Zanzibar Poverty Reduction and Strategic Growth

The goals of MKUZA-II are related to environmental protection and sustainable development. There should be a sustainable land use program to protect, conserve and manage ecological resources, including flora and fauna, and to maintain soil and water conservation. The coastal ecosystems need protection.

Furthermore, mangroves provide a valuable ecosystem function that extends to coral reefs and overall fisheries environment. If coastal erosion and coral reef damages remain unchecked, it will eventually affect the environment, tourism, fisheries and Zanzibar's biodiversity. Communities have been empowered to set up their natural resources management committees and take part in the decision-making process in environmental and land use planning.

3.1.3 Zanzibar Environment Policy (2013)

The Policy focuses on ensuring the maintenance of basic ecological processes upon which all productivity and regeneration, on land and in the sea, depends. It promotes sustainable and rational use of renewable and non-renewable natural resources while advocating for the preservation of terrestrial and marine biological diversity, cultural richness and natural beauty of Zanzibar's lands.

Moreover, the Policy ensures that the quality of life of the people of Zanzibar, present and future, is not harmed by destruction, degradation or pollution of their environment and natural resources. It strengthens both institutional mechanisms for protecting the environment and the capacity of relevant institutions involved in environmental enforcement and management.

3.1.4 Draft Zanzibar Land Policy (2012)

Critical environmental issues with respect to land use have come because of the rapid increase of population growth, uncontrolled encroachment of urban settlements into fertile lands for agriculture, and horizontal urban expansion, without considering integration of environmental regulations and guidelines.

The consequences of land mismanagement could result in land-use conflicts, unsustainable land-use practices, and degradation of natural resources. The draft land policy framework integrates the environment into the social and economic development policy framework while providing transparent and easy access to land for all.

The Draft Policy facilitates the registration of rights on land to secure investments in land and property development and the means to prevent land grabbing and the attached social and economic consequences. The Policy stresses the protection of the environment, cultural heritage and use of natural resources. Good governance and transparent, affordable and gender-responsive measures of land for the benefit of all, including the most vulnerable groups, are key to the implementation of the policy.

Nevertheless, the Draft Policy addresses the challenges of climate change and related consequences of natural disasters, and food shortage. It recognizes the trend of rapid urbanization as a major challenge to sustain future living and livelihoods.

3.1.5 Zanzibar Forest Conservation and Management Policy (1999)

The goal of the Zanzibar Forest Policy is to protect, conserve and develop forest and wildlife resources for the social, economic and environmental benefits of present and future generations of the people of Zanzibar.

The Specific Goals of the Zanzibar Forest Policy include strengthening the role of forestry in alleviating poverty and increasing equity in resource management and utilization; strengthening the role of forest resources in promoting economic development, meeting demands for forest products, and creating income generating activities for revenues and efficiency.

The Policy promotes protection and conservation of forest reserves including wildlife and flora, and enhances the role of forest resources in maintaining soil and water conservation and other environmental benefits.

3.1.6 Zanzibar Water Policy (2004)

The policy on water emphasizes the protection of catchment and watershed areas all over Zanzibar. The policy advocates for the adequate supply of quality and safe water and its rational use. The policy advocates that development planning must take proper account of the availability of water resources and encourages rainwater harvesting, recycling and artificial recharge practices.

3.1.7 Zanzibar Fisheries Sector Policy

This is part of the overall agriculture sector policy which stresses supporting artisanal fishermen, their fish landing site and resources and helping with micro-credit facilities for artisanal fishermen. The policy also lays a framework for conflict resolution over territorial disputes of artisanal fishers.

The policy also highlights issues related to the environmental conservation of marine ecosystems and calls for increased education and awareness programs on marine conservation and implementation of the goals of the Integrated Coastal Zone Management (ICZM).

3.1.8 Zanzibar Occupational Safety Policy (2012)

The main objective of the Policy is to promote the right of workers to a safe and healthy working environment, and to contribute to the improvement of workers' well-being and national productivity. The policy provides general direction for the occupational health and safety stakeholders to adopt a management system that is effective in reducing the incidence of work-related injury and disease.

3.1.9 Zanzibar HIV/AIDS Policy (2004)

The goal of the Zanzibar HIV/AIDS Policy is to prevent new HIV infections in the population; treat care for and support those who are infected; and mitigate the impact of HIV/AIDS on the social and economic status of individuals, families, communities of all those living in Zanzibar.

3.1.10 Zanzibar Local Government Policy (2012)

The objective of the policy is to ensure the establishment of an accountable local government that can provide better and efficient basic services to the people and safeguard their livelihoods. The Policy promotes grounds for local good governance framework, provisions of local socio-economic programs of the Government, security and protection, conflict resolution and ensuring the welfare of the local communities.

3.1.11 Zanzibar Investment Promotion Policy (1998)

The policy objectives are to promote domestic production of goods and services for export to enhance the development of a competitive export sector; to attract and optimize FDI's to complement local private sector efforts; to mobilize investments that are socially and economically beneficial as well as environmentally sound in order to protect Zanzibar's natural heritage; to encourage and facilitate the adoption of new technologies that have a direct bearing on productivity, quality and increased competitiveness; and to reform the public administration in order to establish an efficient bureaucracy.

The Policy also promotes the development of a transparent legal framework, which facilitates and gives a guarantee of protection to all investors, including deregulating and speeding up the investment approval process, improving linkages among the various economic sectors while empowering women by encouraging them to invest in areas where they have a comparative advantage. The Policy encourages investment in Research and Development (R&D), particularly in the productive sectors and promotes training and skills development for employment opportunities in all sectors of the economy.

3.2 Relevant Principal Legislations

3.2.1 Zanzibar Environmental Management Act No. 3 of 2015

The Act makes it mandatory for any person to comply with the environmental and social impact assessment requirement of the Project which includes environmental screening, scoping, preparation of the Environmental Impact Statement and its review before the decision on environmental clearance is made. As per the Act, there is EIA screening, scoping and review process, while the preparation of the EIS is carried out by the consultant forwarded by the project proponent and only after having been approved by the Authority.

Part IX of the Act outlines the steps to be followed in the preparation of Environmental and Social Impact Assessment of projects. This part comprises the Environmental and Social Impact Assessment, which contains nine Sections from 39 to 48. The Sections are on Environmental Impact Assessment Requirements; Criteria for determining activities which

require an EIA certificate; Recognition of Environmental Impact Assessment Experts or Firms; Public hearing; Monitoring; Information requirements; ESIA Report; Environmental Audit; and Cost Bearer.

Section 39 states that a person shall not carry out any activity which is likely to have a significant impact on the environment and society without Environmental Impact Assessment Certificate issued by the Authority under this Act. A person who contravenes the provision of this Section commits an offence and upon conviction shall be liable to a fine of not less than ten million shillings and not exceeding twenty million shillings or imprisonment for a term of not less than five years and not exceeding ten years or both such fine and imprisonment. In addition to the penalty, the court shall order the person convicted of the offence to pay compensation to the third party and any other cost for the restoration of the affected area to the Authority.

Section 40 of the Act outlines criteria for determining activities which require an Environmental Impact Assessment certificate while Section 41 of the Act sets out Recognition of Environmental Impact Assessment experts or firms. Section 42 makes provisions for Public Hearings while Section 43 focuses on Post-ESIA periodic monitoring to ensure that the conditions issued with Environmental Impact Assessment Certificate are fulfilled. Subsequent provisions highlight Environmental Audit criteria and the EIA process cost bearer.

3.2.2 Guidelines for Environmental Impact Assessment (EIA) in Zanzibar, 2009

The related ESIA Guidelines and Procedures were developed in 2009, and they contain tools that govern how development activities should be subjected to environmental impact assessment. The principal use of these Guidelines is to facilitate the procedures and steps (registration, screening scoping, review, conducting ESIA study, etc.) in mainstreaming environmental impact assessment and auditing development projects.

The guidelines are used by government agencies, project developers, donors and the public in their project processes. The aim of the guidelines is to integrate environmental concerns into national development.

Strategies for all types of projects in both the public and private sectors. The guidelines outline specific roles for the lead institution (ZEMA), project proponents, and other institutions in managing environmental impacts. This is necessary so that the proponent prepares a comprehensive ESIA study with an environmental management plan for mitigating potential risks during construction and operation activities.

3.2.3 Other Relevant Laws Applicable for the Project

3.2.3.1 Zanzibar Fire Brigade Rescue Act (1999)

The Act empowers the fire-fighting authorities to enter and inspect premises, facilities, or any other place to ensure fire safety measures in those premises and facilities, including all standard measures against fire hazards, availability of fire hydrants, and all other safety measures aimed at saving life and property in the event of a fire calamity.

3.2.3.2 Zanzibar Fisheries Act (2010)

Section 7 of the Fisheries Act gives the Minister responsible for fisheries powers to develop and control all forms and types of fishing. Sections 8 and 9 of the Act give the Director responsible for fisheries powers to prohibit, close, or limit fishing activities as required in the management plan. The Director has a mandate to prevent pollution in internal and territorial waters of Zanzibar and establish marine protected areas.

In addition, the Act protects the established fish-landing sites across the isles. It empowers the institution responsible for fisheries to maintain the preservation of those landing sites against encroachment or any attempt to forcefully resettle those sites.

Section 14 of the Act requires all operators of the fishing vessels to obtain a license from the Department of Fisheries, while Section 17 prohibits the use of beach seines, weirs, spear guns, and electrical and diving devices as means of fishing. Section 19 of the Zanzibar Fisheries Act, 2010 empowers the Department of Fisheries to declare Marine Protected Areas, and at the same time, Section 20 of the Act prohibits all forms of destructive fishing that is negative to the natural growth of marine organisms and coral reefs. Section 22 of the Fisheries Act prohibits any catch of fish that falls below certain prescribed measurements in the national efforts to conserve marine biodiversity.

3.2.3.3 Zanzibar Tourism Act (2009)

The Zanzibar Tourism Act No.6 of 2009 empowers the responsible authority to implement tourism policy and master plan; promote, assist and facilitate efficient development of sustainable tourism planning; promote and develop cultural eco-tourism; preserve heritage and coordinate public-private partnership in the Zanzibar Tourism Industry.

The project proponent is required to comply with the Act to alleviate any potential disruption that could affect marine tour operators, marine tourist vessels, scuba diving, snorkelling, and the overall marine environment.

3.2.3.4 Regional Administration Act (2014)

The Act specifies powers and functions of the Regional, District, and Shehia Government administrators. It covers all matters related to social, economic, and environmental governance in the lower administrative units such as in the Shehia. Section 22 (1) (d) of the Act states that regional development committees established under this Act have been given the responsibility to mobilize people to participate, contribute, and if possible, assist in the use and management of natural resources, protection of the environment for sustainable development and in all activities of national development.

The project proponent is required to collaborate with the regional, district and Shehia administrations to implement the proposed project's social and environmental safeguards, and coordinate with the community to implement corporate social responsibility in the areas affected by the operations, if necessary.

3.2.3.5 Local Government Authority Act (2014)

The Act specifies the establishment of the Local Government Authority structures with their jurisdictional areas, powers and functions. It covers all matters related to social, economic, and environmental governance within the defined boundaries of the local government authorities. In the context of the environment, the Act has emphasized the local powers to prevent and control public nuisance and ensure sustainable management of land and natural resources.

Section 26 (1) of the Act specifies the general functions of the local council, which include maintenance of environmental sanitation, promotion of tourism and other investment opportunities available in their areas, keeping records of land and marine transport vehicles and vessels within their jurisdictional areas, control environmental pollution and prevent private nuisance, supervise and ensure measures to combat epidemic diseases; control extraction of stone, sand, wood, and other forms of natural resources, undertake afforestation and urban forestry initiatives, implement the land use plan, and deal with cross-cutting issues of climate change, disaster management, and population issues.

Section 63 provides powers to enter any premise and check if the development has been approved with a permit. Sections 83 and 84 of the Act specify offences under Nuisance and unauthorized land use, respectively.

The project proponent needs to comply with all the requirements within the jurisdiction of the local government council in terms of land acquisition, necessary public works and permits, local environmental services clearance, prevention of public and private nuisance, and other activities that require certification and permits, etc.

3.2.3.6 Zanzibar Forest Resources Conservation Act (1996)

The purpose of the Act is to promote the protection, conservation, and development of forest and wildlife resources for the social, economic and environmental benefit of the present and future generations of the people of Zanzibar. The Act is composed of thirteen parts (13) and the most relevant parts in the Act concerning the Environmental Impact Assessment issues include National Forest Resources Planning, Forest Reserves and Nature Forest Reserves, Community Forest Management Areas, Special Forest Management Areas, Licenses, and Conservation of Wild Animals and Plants.

The Act contains names of species which are to be protected and which are to be accorded the highest conservation and work priority. These include 41 species of Birds, 13 species of mammals, one amphibian species, and 17 reptilian species including five sea turtles and 13 species of Insects.

3.2.3.7 Zanzibar Water Act (2006)

The act provides for an establishment of the water authority for Zanzibar which has jurisdiction over all matters pertaining to management of water. The Act includes provisions on regulating, controlling, managing, and protecting all catchment areas; promoting the conservation and proper use of water resources; managing production and distribution of water on a sustainable basis; specifying standards of water quality, effluent and water equipment; advising the Government of Zanzibar in the formulation of policies related to the development and conservation of water.

The Act could be the basis of regulating water distribution issues between the project proponent's needs and the community water supply rations. This is important in avoiding any conflict between the project and the users.

3.2.3.8 Land Tenure Act (1992) with Amendments

In the context of the land regulations, all-natural land within the islands of Zanzibar occupied or unoccupied is public land and is vested in and at the disposition of the President, to be held by him, for the use and common benefit, direct or indirect, of the people of Zanzibar. Riparian occupiers along non-navigable waterways are required to accord the right of passage over a strip ten (10) meters in width on each bank. Compensation is to be paid to the persons or communities concerned; compensation shall be equal to the fair market value of the land. All affected people should be compensated accordingly.

3.2.3.9 Zanzibar Investment Promotions Authority Act (2004)

Part III of the ZIPA Act, 2004, stipulates the principles of fair treatment of investors. Section 11 of the Act states that for establishing and carrying out any business activity or taxation of the income of any business activity, an approved enterprise shall be in no different position than an approved domestic enterprise. At the same time, the Minister is obliged in the Act to protect provision of services from stipulated small-scale business activities, particularly those related to exploitation of natural resources that are reserved for local citizens. Section 37 of the Investment Act for Zanzibar requires all investments made under the provisions of the Act to comply with the provisions of the Environmental Act.

3.2.3.10 Zanzibar Employment Act (2005)

The Act applies to all employment in the private and public sectors. The Act prohibits forced labour or child labour. No employer may discriminate, directly or indirectly, against an employee, in any employment policy or practice on any ground, including race, gender, colour, religion, social origin or status, age, place of origin, national extraction, political opinion, marital status, pregnancy, disability, and HIV/AIDS status real or perceived.

The Act prohibits mandatory checks on HIV/AIDS status or any form of sexual harassment in the workplace. On employment of standards and rights, in all establishments, the normal working hours shall not exceed eight hours per day or forty-two hours per week.

Every employer shall, at his or her own expense, provide for his or her employee's medical facilities if personal injury arises out of and during employment, the employer shall be responsible for all expenses of medical attendance on such employee until such employee recovers; and the employee shall in addition be entitled to such compensation as provided for by the Workers' Compensation Act.

3.2.3.11 Zanzibar Workers' Compensation Act (2005)

The Act provides procedures and conduct for compensating a worker who has been injured in the line of duty. The Act empowers a medical inspector to initiate required procedures to provide evidence and medical certification that gives ground for legal measures on the compensation of an injured worker.

3.2.3.12 Zanzibar Occupational Safety and Health Act (2005)

The Act empowers the OSHA Authority to enter, inspect and examine any workplace for the safety and health of workers related to any process in that workplace from physical environment, handling and storage, application of appliances and tools, use of explosive or highly inflammable materials, chemicals, or machinery, plant, or appliance and make sure that those facilities, equipment or materials are safety-compliant.

The Act establishes supervisory committees, legal mechanism of enforcement, and guides on how a workplace environment, protective gear requirements, infrastructure, services and transparency in terms of safe guards and safety performance checks should be implemented without hindrance to ensure the occupational safety and health of the workers.

3.2.3.13 Zanzibar Electricity Corporation Act (2006)

The Act provides for the regulation of services related to the generation, transmission, supply, connection, and management of all electricity infrastructures in the country.

3.3 Summary of Statutory Approvals/Licenses to be obtained for ESIA Study

Construction works will require several approvals from government agencies. Normally, these approvals are processed and issued by licensing agencies, and ZEMA may require proof of these licenses as part of the fulfilment of the ESIA clearance. The summary of relevant statutory and regulatory approval and licenses to be obtained for the project in line with sound and environmental management practices and compliance with other relevant pieces of legislation is provided in **Table 3.3-1**.

Table 3.3-1: List of Statutory Approvals/Permits that may be required for the Proposed Project for ESIA Clearance

Project phase	Permits, approvals, and charges required	Type of Permit	Relevant Legislation	Issuing Authority
Pre – Construction	Building Permit	Building Permit	Land Tenure Act No12 of 1992 (As amended various times)	Commission for Lands
Environmental and Social Assessment and Approval	Registered/Certified Expert (for undertaking ESIA& Audit)	EIA Expert Recognition	Environmental Management Act No.3 of 2015	Registered/Certified Expert (for undertaking ESIA& Audit)
	Environmental approval for new development projects	EIA Certificate	Environmental Management Act No.3 of 2015. This is backed up by the established ESIA Guidelines and Procedures of 2009	Zanzibar Environmental Management Authority (ZEMA)
Operations Outputs	Emissions into the air	Air Quality Standards	Environmental Management Act No.3 of 2015.	Zanzibar Environmental Management Authority (ZEMA)
	Effluent (wastewater) discharge	Water Quality Standards	Environmental Management Act No.3 of 2015.	Effluent (wastewater) discharge
	Construction debris and Solid waste disposal	Collection, transport and permits. Disposal	<ul style="list-style-type: none"> Zanzibar Regional Administration Act No.8. of 2014. Local Government Authority Act No.7 of 2014 	Zanzibar Municipal Council District, Local Councils.
	Disposal of hazardous substances	Hazardous Waste Disposal Permit.	Environmental Management Act No.3 of 2015	Zanzibar Environmental Management Authority (ZEMA)
	Noise emissions	Environmental Standards Emission on Noise	Environmental Management Act No.3 of 2015	Zanzibar Environmental Management Authority (ZEMA).
	Waste oil collection, transportation and disposal	Waste Oil Collection Permit	Environmental Management Act No.3 of 2015	Zanzibar Environmental Management Authority (ZEMA)
	Sludge collection, transportation and disposal	Sludge Collection Permit	Local Government Authority Act No.7 of 2014	<ul style="list-style-type: none"> Zanzibar Environmental Management Authority (ZEMA) Municipality

Project phase	Permits, approvals, and charges required	Type of Permit	Relevant Legislation	Issuing Authority
	Leakage of hazardous substances or chemicals spills on site	Approval of remediation measures and emergency plans.	<ul style="list-style-type: none"> Environmental Management Act No.3 of 2015 Disaster Risk Reduction and Management Act No.1 of 2015 Fire Brigade and Rescue Act No.7 of 1999 	i. ZEMA ii. Disaster Management Commission iii. Fire Brigade and Rescue Department
	Felling of higher tree son site.	Approval from Forestry Institution	The Forest Resources Management and Conservation Act. No.10/1996	Department of Forestry and Non-Renewable Natural Resources
	Quarry pit sand harvesting of Non-Renewable Natural Resources.	The permit from the Department of Forestry and Permit from the Local Council	<ul style="list-style-type: none"> The Forest Resources Management and Conservation Act, No.10/1996. Zanzibar Regional Administration Act No. 8. Of 2014. Local Government Authority Act No.7 of 2014 	<ul style="list-style-type: none"> ➤ Department of Forestry and Non-Renewable Natural Resources ➤ Halmashauri
	Labour Standards and Conditions	Work and Labour Permits	<ul style="list-style-type: none"> Zanzibar Employment Act No.11(2005) Workers' Compensation Act (2005) 	Labour Commission

3.4 International Conventions/ International Agreement

Tanzania has signed some treaties and conventions which guide the protected areas of the world; the project has been designed to meet all international conventions. Some of the relevant international conventions / treaties/agreements are provided in **Table 3.4-1**.

Table 3.4-2: International agreements and treaties relevant to the project

S/n	Relevant convention	Most relevant provisions
1.	Convention on Biological Diversity, Rio de Janeiro 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. Relevant to this project is Article 6 of the CBD, which provides general measures for conservation and sustainable use of biodiversity. The project site does have significant biological diversity. For that, Developer shall avoid/minimize disturbance to any areas that are not required to be mined at that particular time.
2.	United Nations Framework Convention on Climate Change (1992)	The objective of UNFCCC is to stabilize the concentration of greenhouse gases (GHG) in the atmosphere, at a level that allows ecosystems to adapt naturally and protects food production and economic development. Article 4 commits parties to develop, periodically update, publish and make available national inventories of anthropogenic emissions of all 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. Since mineral extraction and processing is recognised as an activity that emits GHG, Tanzania is obliged to include such activities in its published national statistics. Since Tanzania is a Party to the Convention will have to account for all sources of GHG in her second communication. Clean energy, such as ZECO power supply as well as solar-powered equipment for lighting, shall be promoted at the site. Maintenance of combustion engines shall be done regularly.
3.	ILO C138 Minimum Age Convention (1973)	Ratified by Tanzania (United Republic of) on 16:12:1998; that prohibits child labour; the Developer shall ensure no child is employed in its activities.
4.	ILO C148 Working Environment (Air Pollution, Noise & Vibration) Convention (1977)	Ratified by Tanzania (United Republic of) on 30:05:1983 that protects Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration; University of Dar es Salaam shall ensure that workers are protected against occupational hazards.
5.	ILO C182 Worst Forms of Child Labour Convention (1999)	Ratified by Tanzania (United Republic of) on 12:09:2001; the project developer shall ensure no child is employed in its activities.
6.	United Nations Convention to Combat Desertification, 1994	Tanzania ratified this convention in June 1994. The objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification. The Convention advocates implementation of integrated strategies that focus on improved productivity of land, and the reconstruction, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. This convention ensures the conservation and sustainable

S/n	Relevant convention	Most relevant provisions
		management of forests, land and water resources. The project activities will ensure that the conservation of trees, land and water resources is promoted. Continuous mine rehabilitation through backfilling and re-vegetation is highly recommended.

3.5 World Bank Policies, Guidelines and Frameworks

3.5.1 World Bank Group Environmental, Health, and Safety Guidelines

The World Bank Environmental, Health, and Safety (EHS) General Guidelines apply to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or stormwater to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Process wastewater may include contaminated wastewater from utility operations, stormwater, and sanitary sewage. It provides information on common techniques for wastewater management, water conservation, and reuse that can be applied to a wide range of industry sectors. The guidelines require projects with the potential to generate process wastewater, sanitary (domestic) sewage, or stormwater to incorporate the necessary precautions to avoid, minimize, and control adverse impacts on human health, safety, or the environment.

Relevance/Compliance

The EHS Guidelines are relevant to this project because the project is likely to trigger Environmental, Health and Safety Issues during the construction phase. These include emission of air pollutants; emission of noise nuisance; handling of hazardous wastes; and accumulation of construction and domestic solid wastes.

3.5.2 World Bank Environmental and Social Framework

There are ten (10) World Bank Environmental and Social Standards (ESS). The ESS set out the requirements for Borrowers relating to E&S risks and impacts associated with projects. The standards are intended to support Borrowers to reduce poverty and sustainably increase prosperity for the benefit of the environment and their citizens.

The review and screening of WB ESS has been carried out to find out which of those ten standards are applicable as summarized in Table 3.5-1. The results indicate the project is expected to trigger seven (7) ESSs, namely: ESS1 (the Assessment and Management of Environmental and Social Risks and Impacts Standard); ESS2 (Labour and Working Conditions Standard); ESS3 (Resource Efficiency and Pollution Prevention and Management Standard); ESS4 (Community Health and Safety); ESS 6: (Biodiversity Conservation and Sustainable Management of Living Natural Resources); ESS 8: (Cultural Heritage) and ESS10 (Stakeholder Engagement and Information Disclosure).

Table 3.5-1: Applicable WB Environmental and Social Standards

S/n	Safeguard Policy	Relevant? (Yes /No)	Remarks
1.	ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Yes	The project is likely to create some environmental and social risk/impacts.
2.	ESS 2: Labour and Working Conditions	Yes	The project will involve recruitment of construction workers, hence creation of temporary employment opportunities for local people. The presence of construction workers will result in increased demand for

S/n	Safeguard Policy	Relevant? (Yes /No)	Remarks
			food, creating income-generating opportunities for local people.
3.	ESS 3: Resource Efficiency and Pollution Prevention and Management	Yes	The Project is likely to create air pollution due to dust emissions from construction activities. The project will also result into the consumption of finite land-based resources like sand, gravel, and crushed stone aggregates.
4.	ESS 4: Community Health and Safety	Yes	The project is likely to create health and safety risks for the local community members. For example, it is likely to create construction-related risks of accidents due to unauthorized people trespassing into the construction site.
5.	ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	No	The project will not result in land acquisition or resettlement of people. The construction site is located within Campus The land is owned by the proponent
6.	ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	With regard to the biophysical survey conducted at the proposed hostel building construction area, the ESS6 will be applicable to the project as some natural trees need to be cut down during site clearance. To address the impact, landscaping and greening works shall be executed soon after completion of physical works
7.	OP/BP4.10 Indigenous Peoples	No	There are no Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities in the project area as defined in paragraphs 8 and 9 of ESS
8.	ESS 8: Cultural Heritage	YES	The construction site is located in an already built-up urban environment with no history of archaeological or paleontological findings. There are no important historical, cultural, sacred or religious features or natural landscape features within the construction site. However, chance finds are possible.
9.	ESS 9: Financial Intermediaries	No	There are Financial related activities involved in the project.
10.	ESS 10: Stakeholder Engagement and Information Disclosure	Yes	This ESS is applicable because the project is likely to affect various stakeholders directly or indirectly and positively or negatively. Therefore, stakeholder engagement and consultation will be necessary at all stages of the project implementation.

3.5.2.1 ESS1: Assessment and Management of Environmental and Social Risks and Impacts

The ESS1 sets out the Borrower's responsibilities for assessing, managing and monitoring E&S risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing in order to achieve E&S outcomes consistent with the ESS safeguards.

Objectives of ESS1: -

- To identify, evaluate and manage the E&S risks and impacts consistent with the ESSs.
- To adopt the mitigation hierarchy approach (avoid, minimize, rehabilitate/restore, compensate/offset);
- Ensure disadvantaged or vulnerable people are not disadvantaged in sharing benefits and opportunities from the project.
- To utilize national legislative frameworks in the assessment, development and implementation of projects whenever appropriate.
- To promote improved environmental and social performance.

The ESS1 will be applicable because the project is likely to create some environmental and social risk/impacts, and therefore, ESIA has to be conducted in accordance with the requirements of ESS1.

3.5.2.2 ESS2: Labour and Working Conditions

The ESS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

Objectives of ESS2: -

- To promote safety and health at work.
- To promote the fair treatment, non-discrimination and equal opportunity of project workers.
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate.
- To prevent the use of all forms of forced labour and child labour.
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law.
- To provide project workers with accessible means to raise workplace concerns.

This ESS2 is applicable because the project will involve recruitment of construction workers, hence creation of temporary employment opportunities for local people. The presence of construction workers will result into increased demand for food, hence creation of income generation opportunity for local people.

3.5.2.3 ESS3: Resource Efficiency and Pollution Prevention and Management

The ESS3 recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. The current and projected atmospheric concentration of greenhouse gases (GHG) threatens the welfare of current and future generations. At the same time, more efficient and effective resource use, pollution prevention and GHG emission avoidance, and mitigation technologies and practices have become more accessible and achievable.

Objectives of ESS3: -

- To promote the sustainable use of resources, i.e. energy, water and raw materials.
- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To avoid or minimize project-related emissions of short and long-lived climate pollutants.
- To avoid or minimize generation of hazardous and non-hazardous waste.
- To minimize and manage the risks and impacts associated with pesticide use.

This ESS will be applicable because the project is likely to create air pollution due to dust emission from construction activities. The project will also result into consumption of finite land-based resources like sand, gravel, and crushed stone aggregates.

3.5.2.4 ESS4: Community Health and Safety

The ESS4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to project activities.

Objectives of ESS4: -

- To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances.
- To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams.
- To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.
- To have in place effective measures to address emergency events.
- To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.

This ESS4 will be applicable because the project is likely to create health and safety risks for the local community members. For example, the project is likely to create construction-related risks of accidents due to unauthorized people likely trespassing into the construction site.

3.5.2.5 ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

ESS6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. Biodiversity is defined as the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems. Biodiversity often underpins ecosystem services valued by humans. Impacts on biodiversity can, therefore, often adversely affect the delivery of ecosystem services.

ESS6 recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. Habitat is defined as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment. All habitats support complexities of living organisms and vary in terms of species diversity, abundance and importance.

Objectives of ESS6: -

- To protect and conserve biodiversity and habitats.
- Apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could impact biodiversity.

- To promote the sustainable management of living natural resources.
- To support the livelihoods of local communities, including Indigenous Peoples, and inclusive economic development through the adoption of practices that integrate conservation needs and development priorities.

Based on the biophysical survey conducted at the proposed hostel building construction area, it is clear that some natural trees need to be cut down during site clearance, hence ESS6 will be applicable. To address the impact, landscaping and greening works shall be executed soon after the completion of physical works.

3.5.2.6 ESS 10: Stakeholder Engagement and Information Disclosure

The ESS10 recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the E&S sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Objectives of ESS10: -

- Establish a systematic approach to stakeholder engagements that will help Borrowers identify stakeholders and build and maintain constructive relationships with them, particularly project-affected parties.
- To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance.
- To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.
- To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.

This ESS10 will be applicable because the project is likely to affect various stakeholders directly or indirectly and positively or negatively. Therefore, stakeholder engagement and consultation will be necessary at all stages of the project implementation.

3.6 Institutional Framework for ESIA

3.6.1 At National and Local Authority Level

In Zanzibar, the Zanzibar Environmental Management Authority (ZEMA) provides an administrative and enforcement framework for environmental and social impact assessment for any prescribed project in accordance with Zanzibar Environmental Management Act No.3 of 2015. The Authority is based at Maruhubi, Zanzibar Town, and is led by the Director General who is assisted by several professional and administrative officers.

The responsibilities of the Authority include enforcement of the Zanzibar Environmental Management Act with respect to Environmental and Social Impact Assessment (ESIA), Pollution Prevention and Control (PPC), Environmental Monitoring and Compliance (EMC), conservation of Non-renewable Natural Resources (NRNR), enforcement of environmental standards, and mainstreaming of environmental management development programmes. ZEMA's duties in ESIA clearance are supported by a specialized ESIA Unit which receives screens and recommends various pathways of environmental clearance applications from project developers in accordance with the Act. If a project requires a full ESIA study for environmental clearance, ZEMA recommends for environmental scoping study prior to releasing Terms of Reference for the Study through a cognized ESIA consultant (a person or a firm).

On submission of that ESIA Study for administrative and institutional clearance, ZEMA convenes an ad-hoc multidisciplinary Technical Committee on ESIA Review (formed of members from various Government institutions) which provides expertise advice to ZEMA on a wide range of environmental and social matters for consideration and makes necessary recommendations to the Director General for appropriate action and necessary clearance conditions. The Department of Environment Zanzibar provides policy guidance and recommends policy, planning and implementation of a strategic framework for environmental conservation and management.

3.6.2 At Project Level

The institutional framework for environmental and social management at the project level is comprised of the World Bank (WB), Ministry of Education, Science and Technology (MoEST), National Project Implementation Unit (NPIU), Agency-level Project Implementation Unit (APIU), Institution-level Project Implementation Unit (PIU), University-level Project Implementation Unit (UPIU), Consultant and Contractor. The institutional responsibilities for the implementation of environmental and social management issues at the project level are provided in Table 3.6-1.

The WB is responsible for financing the project and ensuring that the project is carried out in accordance with the ESMF and that environmental and social impacts are managed in accordance with the WB Environmental and Social Framework (ESF) and Environmental and Social Standards (ESS1-10).

The MoEST is responsible for environmental and social monitoring and surveillance of all project component investments that will be undertaken by the project and reporting the results to the WB.

The Implementing Institution PIU is responsible for the coordination of the consultant's activities (preparation of ESIA and ESMPs), providing support to the procurement department within the implementing institution and ensuring that the Contractor complies with environmental social, health and safety requirements, including the appointment of qualified environmental and social experts.

The Consultant, through its Environmental and Social Team, is responsible for liaising with NPIU, APIU, and UPIU to ensure the project meets the environmental and social requirements. These include conducting ESIA studies, preparing ESIA reports and corresponding ESMPs, and assisting APIU and UPIU in obtaining relevant permits and certificates for project implementation.

The Contractor, through its Environmental and Social Team, is responsible for complying with environmental and social requirements, including the allocation of an adequate budget for the preparation and implementation of site-specific HSMP and ESMP based on project ESMP provided in the Bidding Documents. The Contractor is also responsible for liaising with APIU, UPIU and Supervision Consultant and reporting of any accidents or incidents

Table 3.6-1: Institutional Responsibilities at Project Level.

Institution	Roles and responsibility
World Bank	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.

Institution	Roles and responsibility
PS-MoEST	E&S monitoring and surveillance of all project components investments that will be undertaken by the project. The ministry will report the 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 in regard to Environment and Social Framework
Implementing institution (UDSM PIU) Environmental and Social Team	<p>PIU is established by Article 3 (2) (ii) of the Grant Agreement between The Ministry of Education Science and Technology (MoEST) and the University Dar es Salaam, which states that: Maintaining the PIU chaired by the Deputy Vice Chancellor (Planning, Finance and Administration) and assisted a senior university staff at the level of at least Deputy Vice Chancellor, assisted by qualified and experienced staff in adequate numbers and under terms of reference as outlined in the Project Operational Manual (POM).</p> <p>The PIU is vested with the responsibility of the day-to-day implementation of the respective USIP activities including financial management, procurement, environmental and social risk management, governance and anti-corruption, monitoring and evaluation, and reporting.</p> <p>Coordinate specialists/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.</p> <p>Support the procurement officer at UDSM in making sure that the bidding documents cover the health, safety and environmental components with appropriate provisions of the same for the contractors to bid.</p> <p>Coordinate preparation of ESIA and environmental and social management plans (ESMPs) undertaken by consultants and site-specific ESMPs (SSESMPs).</p> <p>Ensure that contractors have an Environmental, Social and Health and Safety Officers, who are familiar with the compliance to Environmental, Social, Health and Safety risk management requirements, including WB ESHS guidelines.</p> <p>Regular reporting on the implementation of the ESMP and compliance of all the ESF environmental, social, health and safety requirement of the project.</p>
Consultant (Environmental, Social, Health and Safety Team)	<p>Work with the NPIU/APIU/UPIU to understand the requirements of the environmental, social, health and safety risk assessments;</p> <p>Conduct initial site visits with the NPIU/APIU/UPIU to understand the sub-project setting and site-specific requirements;</p> <p>Prepare the ESIA 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; review and approve Contractor's Site Specific ESMPs (C-ESMP).</p> <p>Cost all the mitigation and management measures proposed in the ESMPs.</p> <p>Propose a capacity-building plan for the implementation of the sub-projects for all actors involved with cost estimates and schedule;</p> <p>Carry out public consultations;</p> <p>Conduct training as needed;</p> <p>Assist the APIU/UPIU in preparing documentation to obtain certification from ZEMA for the ESIA and ESMPs.</p>
Contractors (Environmental and Social Team)	Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including

Institution	Roles and responsibility
	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 Environmental, Social, Health and Safety officers of the contractor will participate in the joint site inspections with the APIU/UIPU and Environmental Supervision Engineer/consultant; Immediate notification of the NPIU and supervision engineer of any significant social or environmental health and safety incident linked with the project, and indication about the measures taken or that are planned to be taken to address the incident as well as propose any measures to prevent its recurrence. Carry out any corrective actions instructed by the Supervision Engineer/consultant; In case of non-compliance/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

3.6.3 UDSM Project Implementation Unit (PIU)

UDSM Project Implementation Unit (PIU) is comprised of 12 members. These include 1- Environmental Expert, 1-Social Expert, and 1-Gender Expert, locally known as Environmental and Social Safeguard (ESS) Team. The Health and Safety Officer will also be co-opted during the construction phase. Other PIU members include the Coordinator, Deputy Coordinator, Infrastructural Development Officer, Capacity Building Officer, Curriculum Development Officer, Finance Officer, ICT Expert, Procurement Officer, Monitoring and Evaluation Officer, Industrial Linkage Officer, and Communication Officer. Most of the PIU members have been appointed based on their expertise, and thus, their contribution to this project is based on their expertise.

The ESS Team is involved in providing inputs in the preparation of TORs and Contracts Documents for procurement of Contractors and Consultants. In addition, the ESS Team has an ESS Office and has developed an operational Grievances Redress Mechanism (GRM). Also, there is a suggestion box at the ESS Office.

CHAPTER FOUR

4.0 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

4.1 Physical Environment

4.1.1 Land Use

The land use and land cover of the study area have been interpreted from the satellite data, route survey maps of the area, and subsequently by ground checking during field surveys. The land use in the study area is characterized by human settlement, shrub and tree cover, agricultural land, and Beach. The IMS-Buyu Campus forms boundaries with the Indian Ocean to the north and east, individual plots to the south, and the Airport–Shakani Road to the west.

4.1.2 Topography

The topography of the area is relatively sloped with slanted drainage toward the beach. The area has an altitude of about 1.5 meters above the mean sea level.

4.1.3 Geology and Soils

The surface of the project zone can be found only in Quaternary and Tertiary (Miocene) sediments. The soils in the project area are categorized as Sand-silt (Kichanga) and Coraline Limestones (Maweni) soils. Kichanga and Maweni soil is in the coralline limestone that forms the extensive eastern and southern parts of the island (Figure 4-1). This soil covers more than 40% of arable land and supports traditional shifting cultivation.

4.1.4 Climate

The area lies mainly in the equatorial Monsoon system. The rainfall pattern is bimodal with the long Rains (Masika) from March to May coming before the onset of the South-West Monsoons (Kusi) which blow from April to November while the short Rains (Vuli) which begin from September to 33 November come before the onset of Northeast Monsoon winds (Kaskazi) which blow from November to April.

A mean annual rainfall of 1000mm as per record at the Zanzibar Airport Meteorological Station. The hot season is between December to February while the cool and dry season is between June to September. The monthly maximum temperature ranges from 27 °C during the coolest month (July) to 32°C during the hottest month of February.

The mean monthly minimum temperature ranges from 19°C during September to 23.4°C during April. The relative humidity is high, especially early morning with an average of 91% and an average of 62% during afternoon.

In the project area, deforestation is one of the contributing factors to climate change due to destruction of natural vegetation, which is important for Carbon dioxide reduction from the atmosphere due to sequestration (absorption) effects.

Implication for the project

The project is not likely to contribute to climate change effects, because the project site is located on cultivated land, with few isolated trees. However, the project will utilize climate change information in the design of building structures. The project will also contribute to the reduction of GHG emissions by prohibiting the use of ozone depleting substances.

4.1.5 Ambient Air Quality

4.1.5.1 Dust Level Measurements

The daily average concentrations of TSP, PM10 and PM2.5 were measured at two established air quality stations (**Appendix 3a**). The findings indicate the measured concentration at the two stations were below the TBS limits and/or WHO guideline criteria.

4.1.5.2 Ambient Pollutant Gases

The measured Sulphur dioxide (SO₂), Volatile Organic Compounds (VOCs), and Nitrogen dioxide (NO₂) concentrations were found to be lower than the prescribed TBS and WHO/IFC limits at all stations (**Appendix 3b**). Similarly, the recorded CO concentrations were found to be lower than prescribed TBS limit of 15 mg/m³ and WHO/IFC guideline value of 30 mg/m³. The Hydrogen sulphide (H₂S) concentrations ranged from 0.13 mg/m³ to 0.19 mg/m³, with highest concentrations (0.19 mg/m³) being recorded at AQMS2 (Main Office wing B site) and lowest values (0.13 mg/m³) at AQNS1 (Proposed hostel site). The higher values of H₂S at AQMS2 can be attributed to presence of H₂S emitting sources around the measured station. However, there is no any prescribed Tanzania or International Standards for ambient H₂S concentrations. Nevertheless, according to literature², the World Health Organization (WHO) has an air quality guideline of 150 µg/m³ (10.6 ppb) hydrogen sulphide, averaged over a 24-hour period, which is equal to 0.15 mg/m³.

4.1.6 Noise Levels

The day time average noise levels recorded at the two stations are acoustically safe for people residing nearby the project site as the measured noise levels were found to be lower, than the prescribed TBS Limits and WHO/IFC Guidelines (**Appendix 3c**).

4.1.7 Ground Vibrations

The recorded vibration levels at measured two stations (**Appendix 3d**) are considered insignificant as the measured levels were found to be lower than 0.15 mm/sec PPV criteria established to evaluate the extent that can easily be detected by human beings, The measured values were also lower than TBS and British Standard limits. Therefore, the ground vibration levels around the project site are not likely to create significant impacts on adjacent sensitive receptors.

4.1.8 Water Quality

Two 2 water samples were collected from a drilled well at Shakani³ and a water tap at the IMS administration block (**Plate No. 4.1-1** and **Plate No. 4.1-2**). Each water sample was analysed to determine its biological, physical and chemical properties in comparison with Tanzania and WHO standards for drinking water. The samples were then examined in two laboratories: at Zanzibar Water Authority (ZAWA) and College of Engineering and Technology (CoET) of the University of Dar es Salaam.

² EARTHWORKS™ General Information – [Hydrogen Sulfide](https://earthworks.org/issues/hydrogen-sulfide/) <https://earthworks.org/issues/hydrogen-sulfide/>

³ Shakani drilled well is the primary source of water supply to IMS Buyu Campus



Plate No. 4.1-1: In-situ Water Quality Examination for Shakanii Drilled Well.

Source: (Field Survey, June 2023)



Plate No. 4.1-2: Water Sampling for Laboratory Analysis for a Water tap found at the Garden IMS Administration Building.

Source: (Field Survey, June 2023).

Determination of water quality parameters for Total Coliforms, E. coli, pH, Temperature and Dissolved Oxygen was done in situ via ZAWA laboratory, whereas other physical and chemical parameters were examined at CoET laboratory in Dar es Salaam. Certified results for water quality examination are attached as **APPENDIX 2**. The results show that existing groundwater source at Shakani is not polluted and still suitable for domestic consumption for IMS- Buyu Campus. It is recommended that the drilled borehole shall be protected from contamination.

4.2 Biological Environment

4.2.1 Flora

The project site is within the surveyed area with few buildings existing already. Much of the vegetation surrounding the project area are Coconut trees, Mango trees, Baobab trees etc. Table 4.2-1 .6 shows

The list of identified plant species at the proposed project site is provided in **Table 4.2-1**. The existing baobab tree will have to be retained because according to IUCN the tree species is endangered and therefore needs to be protected during construction.

Table 4.2-1: List of identified plant species at the proposed site.

S/n	Common Name	Scientific Name
1.	Acacia Trees	Acacia auriculiformis
2.	Coconut Trees	Cocos nucifera
3.	Mango Trees	Mangifera indica
4.	Copper Pods	Peltophoru mafricanum
5.	Manila Tamarind	Pithecell obiumdulce
6.	Rain Trees	Samani asaman
7.	Indian Almond	Terminalia catappa
8.	Cascabela Trees	Thevetia peruviana

9	Baobab Tree	Adansonia digitata
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4.2.2 Fauna

The existing vegetation cover provides a natural habitat for birds such as Zanzibar somber bulbul, house sparrow, Yellow vented bulbul and White browed cloacal. List of Fauna Found at the Proposed Site are shown in **Table 4.2-2**.

Table 4.2-2: List of identified birds' species at the proposed site.

S/n	Common Name	Scientific Name
1.	Sitting cisticola	Cisticola juncidis
2.	House sparrow	Passer domesticus
3.	Indian house crow	Corvus splendens
4.	Zanzibar somber bulbul	Andropadus importunes
5.	Yellow vented bulbul	Pycnonotus barbatus
6.	White browed cloacal	Centropus superciliosus
7.	Lilac breasted roller	Coracis caudat

However, all vegetation and bird species found in that area can also be seen in other parts of Zanzibar. They are not confined on one area but are well scattered in many areas of the Island. All bird species that were identified during the survey were not in danger of being threatened and none of them fall in IUCN category of being threatened.

4.3 The Marine Environment

Rocky shores are found where the sea meets the land. They support a diverse mix of plants and animals that have adapted to survive this habitat's unique conditions. In addition to supporting many unusual plants and animals, rocky shores are important fish nurseries and roosting and feeding grounds for birds. Along with their commonly associated algal beds, they also help stabilize inshore sediments.

4.4 Socio-Economic Environment

4.4.1 Population

The Magharibi B District has an estimated population of 206,905 (Male 102,342 and Female 104,563) as per 2012 census (NBS, 2012). The annual population growth rate in the district was 7. The average number of persons per house hold is 4.2 and the sex ratio is 98 males per 100 females. For Shehia level, Shakani has population of 8850 with 1,970 houses.

4.4.2 Status of land acquisition and suitability of the location

Unlike other projects which are implemented on individual lands, this particular project is implemented on the land already acquired by the University of Dar Es Salaam. In this case, there is no compensation required. The building will be constructed in the midst of other buildings used for academic purposes so it will add value in academics and research as a whole.

4.4.3 Education

There is no Schools founds near the project area. However, the students in Buyu Village attain Education from the nearby ward. In Magharibi 'B' District, there are 23 primary schools and 13 secondary schools. Also, within the Magharibi 'B' has 5 Collages and 1 Vocational training Centre.

4.4.4 Economic Activities

The project area is dominated with fishing activities with among oldest fish landing site located about 800 m from the project site. Coral rag agriculture is being replaced by human resettlement as the village is a forthcoming sub urban residential neighbourhood.

4.4.5 Transportation Network

Access to the Buyu village and towards the project site is via the Chukwani Buyu Road or Kisauni Shakani Road. Both roads are under major repair to upgrade to bitumen standards.

4.4.6 Infrastructures

The infrastructure development of the area began over ten years ago with the construction of Phase I academic and administration block. The Institute's activities were in full swing for over four years where teaching classes of both undergraduate and postgraduate students are moving on.

The temporary laboratories to support academic programs were constructed after untimely fire accident happened at old premises of the Institute at Mizingani. Other infrastructures on the area include experimental shade and security post.

4.4.7 Waste Disposal

The problem of waste management in this project zone is of higher concern. The neighbourhood of the project area relies on open dumping. However, for the case of the Institute the solid waste management is governed by private company which is responsible to collect and dispose at the authorized site. On the other hand, the toilets are pour-flush connected with septic tanks and soak away pits. The laboratory waste must have its own wastewater management system.

4.4.8 Water Sources and Supply

Buyu and Shakani have vast ground water potential because of its geological nature. Water resources in some areas near by project site are managed and supplied by ZAWA while some individuals have their own borehole.

Currently, the proponent owns the private borehole located about 7km away from the site. Water is pumped through a storage tank system and released by gravity to the pipelines from the tank. Water from the storage tank is used mainly for domestic purposes. For the proposed project, water is required for different uses including construction processes, equipment maintenance and sanitation purposes. For reliable access to water resource, the proponent will have to request ZAWA connection or drill another well for the project to supplement water requirement and uses.

4.4.9 Gender Based Violence (GBV)

Gender Based Violence (GBV) are still issues of concern in Zanzibar as a total of 168 incidents were reported in July 2023 compared to 127 cases recorded in June in the same year. The victims included 22 women (13.1 percent), 136 children (81.0 percent) and 10 men equivalent to 5.9 reported, among the children, 109 (80.1 percent) were girls and 27 (19.9 percent) were boys. The most type of GBV reported in Zanzibar are Sexual Violence and physical assault and that 124 out of 168 reported cases were still under police investigation (equivalent to 73.8 percent), 39 incidences sent to Department of Public Prosecution (DPP) and five in Court⁴.

⁴ <https://dailynews.co.tz/cruelty-gvb-still-high-in-zanzibar-report/>

4.4.10 HIV/AIDS Prevalence

The implementation of the project may positively or negatively impact the community. Positive impacts include the provision of education, community HIV/AIDS training, safety and environmental conservation trainings, improved health services at the dispensaries and health centres in the vicinity of the project. Negatively the host community is likely to be affected directly or indirectly with the dust from the proponent operations, noise and vibrations. The project construction contractors may come into contact with the nearby villages where by social sexual relations may arise. It should also be borne in mind that individual characteristics differ from one person to another and may be affected by the existing environmental conditions and community around.

In general Zanzibar has the lowest HIV prevalence of less than 1%. The factors attributed to the spread of HIV/AIDS infection were stated during the consultation meetings: use of drugs, unfaithfulness among partners, income/poverty, ignorance, excessive alcohol taking, careless negligence and unsafe sexes.

CHAPTER FIVE

5.0 STAKEHOLDERS ENGAGEMENT AND PUBLIC CONSULTATION

5.1 Stakeholder Groups



Plate No. 5.1-1: Consultative Meeting Held by UDSM Management with Farmers in February 2023.

The study team's task to collect stakeholder's consultations feedback covered two key major areas: institutional consultations and community consultations. For institutional consultations, the primary focus was on the institutions responsible for environment, land, fisheries and occupational safety. For communities, the study team met with the local squatters, farmers and the Shehia leadership (**Figure 5.1-1**). Source: IMS (February 2023).

5.2 Objectives of Stakeholder Consultation and Public Participation

The overall objective of the consultation process was to solicit concerns, opinions, views, and attitudes of the stakeholders; disseminate project information and incorporate the views of stakeholders in the project design and operation including environmental and social mitigation measures, management and monitoring plans. The specific objectives (aligned with WB ESS10 and national legislative requirements) of the consultation process were to:

- Ensure the community and other key stakeholders are aware of the project establishment and operations;
- Consult stakeholders to gather the information needed to complete the assessment;
- Improve project design and, thereby, minimize conflicts and delays in implementation;
- Obtain stakeholders' inputs into the scope of the ESIA, impact identification, potential sources of cumulative impact and impact mitigation;
- Solicit stakeholders' questions and concerns from stakeholders and ensure these are addressed in the ESIA;
- Enhance long-term project sustainability;
- Reduce problems of institutional coordination; and
- Incorporate the stakeholders' concerns in the project development and life cycle

5.3 Stakeholders Identification and Engagement Process

Stakeholders' identification and engagement process was conducted based on World Bank's ESS10, Zanzibar Environmental Management Act No. 3 of 2015, and IFC PS1 (paragraphs

25-33). Public consultation for the proposed project entailed an inclusive and culturally appropriate on-going process which involved sharing information and knowledge, seeking to understand the concerns of key stakeholders, and building relationships based on collaboration. It allowed stakeholders to understand the risks, impacts and opportunities of the Project to achieve desired positive outcomes.

The public participation process was designed to provide information to and receive feedback from stakeholders for use throughout the ESIA process and overall project phases at the project site, thus providing organizations and individuals with an opportunity to raise concerns and make comments and suggestions regarding the project.

Identification of key stakeholders was based on the role relevance and influence of an organization, group or individual to the proposed project. A tentative Stakeholders Engagement Plan (SEP) – for ESIA purposes - was prepared by the UDSM to identify and map all the key stakeholders including engagement strategies before the actual commencement of the fieldwork. The SEP was prepared for ESIA purposes and to inform upcoming phases of the project including gender-related matters.

Stakeholders that can influence and/or affect the project and those who can be influenced and/or affected by the project were predetermined based on their roles and pertinence to the project, nature of the proposed project activities, discussions with the Client and Consultant's experience on similar projects. Since stakeholder engagement is a continuous process since the University of Dar Es Salaam is committed to continuing with planned engagements during the operation phase of the project as it will be guided by its corporate directive/guidelines on stakeholders 'engagement /community relations.

The main stakeholders were identified and drawn from categorical groups of project proponents, relevant administrative and regulatory authorities, agencies, local communities, and other interested parties in Zanzibar. Stakeholders are found at both national and local levels and range from government authorities to local community members. Relevant stakeholders were identified based on their roles and pertinence to the Project. Some of the stakeholders were predetermined based on the nature of the proposed project activities, as presented in Table 5-1. Classification by levels allowed the establishment of adequate planning and strategies for the development of the consultation meetings.

5.4 Issues/Concerns raised by consulted stakeholders

In general, the public supports the implementation of the proposed project as it is going to strengthen the capacity of IMS-Zanzibar to enrol a great number of students. The record of issues/concerns raised by the consulted stakeholders is provided in **Table 5.1-1**.

There is also an expectation from the community for the project to create employment opportunities for local people. The community calls for the priority of employment for unskilled labour to be given to the Shakani people.

Table 5.1-1: Stakeholder Consultation Feedback

S/n	Name of stakeholder	Issues/Concerns
1.	Fire and Rescue Department	They have no objection to the proposed project. The Fire Rescue Force department insisted to the proponent that the assembling point in the project area is a must. The contractor should ensure that they have an emergency plan. They should ensure that all staff should undergo medical checking.

S/n	Name of stakeholder	Issues/Concerns
		<p>Project proponent should conduct training to all staffs on using various machines and equipment at the project site when needed.</p> <p>The project proponent should ensure that the Installation of Firefighting equipment are in place in their project</p> <p>The project management should ensure that all staff are wearing safety gears during the construction for their safety</p> <p>All precautionary measures should be taken by the contractor to make sure that there are no effects during the construction</p>
2.	Department of Occupational Safety and Health (DOSH)	<p>The Department of Occupational Safety and Health has no objection to the proposed project</p> <p>All types of waste must be managed properly by the project management</p> <p>During the construction phase, project activities may cause various negative impacts such as noise and dust and the like and therefore the project proponent should ensure that all effective measures against those effects are taken timely</p> <p>The project contractor should ensure that all staff working on this project wear safety gear and uniforms during working time.</p> <p>Emergency preparedness plans should be available at the project site.</p> <p>The project proponent should ensure that all safety signs, like exit signs and the like, are available at the project site.</p> <p>Moreover, enough firefighting equipment should be available in the project areas.</p>
3.	Land Commission	<p>The Project proponent should ensure that they have all permits relating to their project.</p> <p>The project management should fully consider all rules and regulations related to the proposed project during the construction and operation phase</p> <p>The surrounding community should be consulted so as to get their concerns on the proposed project</p> <p>The project management should follow all rules and conditions provided by the Land Commission.</p>
4.	Zanzibar Environmental Management Authority (ZEMA)	<p>The project management should ensure that all wastes that will be generated during the construction and implementation phases are disposed of properly.</p> <p>The Authority insisted the project management have proper waste management in their project and this is because their business and the country need to enlarge</p> <p>The institution (IMS) should have a good relationship with the surrounding community.</p> <p>The management of the project should ensure that the project has followed all procedures during the construction phase</p> <p>Rules and regulations related to this project should be observed by the owner of this project</p>

S/n	Name of stakeholder	Issues/Concerns
5.	Department of Environment (DoE)	<p>Project management should ensure that all related rules and regulations concerning this project are followed.</p> <p>The department also insisted that proper waste management for this project is very important to be considered.</p> <p>During the construction phase, the machines and other equipment may cause noise pollution, dust, and the like that can affect the surrounding community and therefore, mitigation measures should be taken immediately.</p> <p>The proposed project should ensure that wastes are disposed of properly.</p> <p>The solid waste collection work should not be given to companies which are not registered by the proper authorities as they might end up dumping them in unspecified areas</p>
6.	Zanzibar Investment Promotion (ZIPA)	<p>The Zanzibar Investment Promotion Authority has no objection to this project and advised the management and contracture of this project to ensure that all related environmental and social rules and regulations are complied with the said project</p> <p>The project management should ensure that they do not cause problems to others.</p> <p>The project should consider environmental preservation.</p> <p>ZIPA requested management of this project, during the recruitment of the staff for those unskilled posts to consider the surrounding community</p>
7.	Zanzibar Water Authority (ZAWA)	<p>ZAWA has no objection to this project</p> <p>The authority directed that if they need to connect water, they should only contact ZAWA offices and not any other person.</p> <p>All procedures and regulations must be followed by the management of this project.</p> <p>Project management should support the surrounding community by providing social services as a corporate social responsibility of this project.</p>
8.	Department of Forest	<p>Project management should consider environmentally friend technologies for the proposed project construction</p> <p>The contractor should ensure that their proposed construction activities are not affecting environment</p> <p>All tries, especially big trees should be maintained by the project contractor of this project</p> <p>The department also insisted that waste should disposed of properly</p> <p>proper waste management for this project is very important to be considered</p>
9.	Magharibi (West) 'B' District Commissioner's Office	<p>They have no objection to the project.</p> <p>They insisted on project management to have a good relationship with the surrounding community</p>

S/n	Name of stakeholder	Issues/Concerns
		<p>The institution should consider to have proper waste management in their project areas</p> <p>The proposed project is very important to our people and the national enlarge</p> <p>Security for the institute properties is very important to be considered due to the area where this institution exists</p>
10.	Institute of Marine Sciences (IMS)	<p>The proposed project construction should consider the infrastructure for the disabled</p> <p>The proposed project construction should consider the prayer area</p> <p>One of the components of the proposed construction is a hostel therefore, the project should include a playground that will be used by the students who will stay in the hostel</p> <p>The project consultant should ensure that the proposed construction meets the standards/quality of the construction</p> <p>The proposed construction should be surrounded by a brick fence, which is safer for the institution</p> <p>The staff preferred terrazzo floor to tiles in the proposed buildings</p> <p>The proposed project construction should have a modern, quality standard cafeteria that will be used by the students and staff of IMS</p> <p>All services like toilets and the like from the proposed project should consider disabled persons</p> <p>Within the project compound, there should be security posts, especially at the hostel buildings</p> <p>The proposed project should include a new and modern marine laboratory with standard tools and facilities</p> <p>Important social services like shops, dispensaries, and the like should be included in the proposed project</p> <p>The security area that security officers will use should be safe to allow the security officers to work properly and effectively</p> <p>The laboratory technicians should have their offices and not use laboratory rooms as their offices</p> <p>The number of security officers should be increased compared with the area of the institution</p> <p>The drawings/master plan of the proposed project construction should be given to IMS staff to provide their suggestions as per their requirements</p> <p>The water system, as well as the electricity system, is very old and not working properly so they should repair it accordingly</p> <p>The construction should involve the construction of big stores that will relate to such institution</p> <p>The health requirements per such institutions like incinerators, dispensaries and the like should be considered</p>

S/n	Name of stakeholder	Issues/Concerns
		The construction should consider a good system of cleaning We should consider the rainwater harvesting system
11.	Shakani Community Members	The community members have no objection to the proposed construction and they acknowledged the proposed construction. The construction of this institution helped our area to get social services like roads, health services and the like This construction will beautify our village and will increase community interaction The management of the IMS should consider the surrounding community members on the all-unskilled posts to be sent to them The construction should involve business areas like shops and the like that can be used by the community members

5.5 Stakeholders Engagement During Implementation

During Project implementation, engagement activities will be undertaken in relation to project activities. At this stage, the study will conduct a number of structured and formal meetings, focus group discussions, community meetings, one-to-one interviews and site visits that will involve a number of stakeholders. The timing for the conduct of the above meetings will be determined by the progress of the project implementation and when seem necessary to invite stakeholders for their comments and observations. However, the sharing of information and progress with stakeholders will be subject to scrutiny with regard to the kind of information to be shared and how the same will be communicated to stakeholders. Furthermore, at this stage, the UDSM will ensure equal and effective participation from project preparation to implementation stages. To ensure stakeholders' views and concerns are well captured, the SEP will have different methods of collecting and sharing information based on their needs, i.e. disadvantaged or vulnerable groups. The summary of stakeholder engagement and means of communication during project implementation is provided in **Table 5.1.2**.

Table 5.1-2: Stakeholder Engagement during Project Implementation.

S/n	Project Phase	Objective	Messages	Means of Communication
1.	Project Preparation Phase	To present the draft SEP (for comment) and final versions of the instruments.	Presentation of the Project and its implementation schedule	Organized public meetings /Consultations based on Stakeholders' needs and circumstances (FGD, one-on-one meetings, etc.)
			Present potential environmental and social impact reports and their enhancement and mitigation plans. Describe Grievance Redress Mechanism	Disclosure on UDSM, IMS Website Emailing to respective stakeholders. Email copies of the instruments to Non-State Actors and other institutions.

S/n	Project Phase	Objective	Messages	Means of Communication
			Present a list of identified stakeholders and describe an approach to their engagement.	Sharing of executive summaries in hard copy during meetings.
				For stakeholders who are illiterate, information will be presented verbally during meetings in local language. Disclosure of Project documentation in appropriate and accessible manner. The instruments will be disclosed in Swahili language in project offices and hard copies will be accessible to stakeholders.
2.	Project Preparation Phase	ESIA / ESMP Preparation and Disclosure	To inform the preparation of the Environmental Statement/ ESMP, etc. and present findings when drafted to all the identified stakeholders	Face to Face Meetings Community Meetings Site Visits based on stakeholders needs and circumstances. Disclosure on UDSM, IMS Website. FGD Disclosure of Project documentation in an appropriate and accessible manner. The instruments will be disclosed in Swahili language at the University, Magharibi B District and in the offices of the identified stakeholders or public meetings
3.	Construction Phase	To conduct a meeting to alert or	Public Meetings	Meeting to Alert stakeholders to the

S/n	Project Phase	Objective	Messages	Means of Communication
		inform the stakeholders on the commencement of the project.	Face to Face Meetings Groups Discussions based on stakeholders needs and circumstances.	
4.	Construction Phase	Alert stakeholders of any new activities and Provide updates on project progress (every month)	Inform the public about any emerging issues; provide information on risks and impacts. GRM, workers code of conduct, etc.	Public Announcements Focus Group Discussions Community Meetings Meetings with Buyu Village
5.	Construction Phase	Contact with the Project Coordination Team	Provide phone number/WhatsApp account and email for stakeholders to submit questions and give out comments.	Meetings with Buyu Village
6.	Throughout the Project Implementation Period.	Information dissemination	General information on IMS, Buyu, project implementation	Posting on bulletin boards, Information leaflets, banners. Outreach activities with Buyu communities where presentations, workshops and public meetings will be conducted. Sharing on UDSM social media and website Information is accessible at, Magharibi B District in Unguja.
7.	Throughout the Project Implementation Period.	Contact with the Project Coordination team	Maintain website with contact box, email, and social media accounts	UDSM's Websites UDSM's phone number for HEET activities and

S/n	Project Phase	Objective	Messages	Means of Communication
			and phone number for people to submit questions, comments and concerns.	concerns will be shared with project sites and all stakeholders. UDSM's phone number for HEET activities and concerns will also be found at Magharibi B Town Council.

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

5.6 Stakeholder's Communication Strategies During Implementation

Information disclosure strategies attempt to increase the availability of information on the proposed construction of the UDSM Main Campus and the entire HEET project. The public disclosure of the information will be very useful in motivating and improving the performance of the project. During implementation, when new activities are being developed engagement will be undertaken to inform the development of the specific sub-project and plans. Further engagement on the frameworks will also be undertaken. Depending on the issue at hand, UDSM will be developing an agenda so as to ensure that key strategic and risk items can be discussed with all relevant stakeholders in order to foster decision making address risk factors and develop enhancement measures during project implementation. The summary of stakeholders communication strategy is provided in **Table 5.6-1**.

Thus, depending on the needs of each stakeholder, UDSM will use the following methods;
Focus Group Meetings/ Discussions – UDSM will employ FGD when aiming to bring together stakeholders with the same interests or common characteristics into a meeting to discuss specific topics or project components in a focused manner. FGD will be employed to explore issues that are relevant to specific groups or sub-groups of a community – such as youth, the elderly, women, students and people with disabilities. The intention of using this approach is centred upon establishing similarities and differences among people of the same or different groups.

Formal meetings - These meetings will be focused on identifying and discussing specific stakeholder concerns and disclosing project information. Participation in these meetings will be influenced by the issues under consideration and will include adequate representation of women as well as other marginalized and vulnerable people where possible.

One-on-one interviews – The interviews will aim to give chance to individuals to air concerns on project and will involve government officials depending on the issues to be addressed.
Distribution of pamphlets – This is a way of sharing information with a wide range of individuals.
Site visits – These visits are focused on identifying and discussing stakeholder concerns and to disclose project information within communities.

Table 5.6-1: Summary of Stakeholders Communication Strategy.

S/n	Stakeholder Group	Specific Needs	Language	Communication Means
1.	Government Entities and Implementing	Inclusion in the decision-making processes and	Kiswahili	Correspondence by phone/email meetings Roundtable discussions

S/n	Stakeholder Group	Specific Needs	Language	Communication Means
	Institutions and Agencies (ZECO, ZAWA, FIRE, OSHA)	implementation role of the project		
2.	Communities and local government authorities of Buyu village	Sensitization as to the project, its benefits and its role. Information on the Project and approach to managing environmental and social issues.	Kiswahili	Community meetings Outreach activities Flyers Banners
3	Students, Students Government and people with disabilities IMS Buyu, Zanzibar.	Sensitization as to the project, its benefits and its role. Information on the Project and approach to managing environmental and social issues. Consideration of their decision-making processes	Kiswahili	Meetings Roundtable discussions Community meetings Group discussions Outreach activities Flyers Banners
4	Vulnerable Groups (women, youth, elders and the disabled) in project site surrounding areas	Sensitization as to the project, its benefits and their role. Information on the Project and approach to managing	Kiswahili	Disclosure of Project documentation in a culturally appropriate and accessible manner. Community meetings. Group Discussions
5.	Government Entities and Implementing Institutions and Agencies (ZECO, ZAWA, FIRE, OSHA)	Inclusion in the decision-making processes and implementation role of the project	Kiswahili	Correspondence by phone/email meetings Roundtable discussions
6	Communities and local government authorities of Buyu village	Sensitization as to the project, its benefits and their role. Information on the Project and approach to managing environmental and social issues.	Kiswahili	Community meetings Outreach activities Flyers Banners

5.7 Stakeholders' Engagement Plan (SEP)

The engagement plan will be reviewed and updated throughout the project implementation. During this process, the focus and scope of the SEP may change to reflect the varying stages of project implementation and to encompass any changes in project design and lessons learnt from previous phases of the Project. However, it is important to develop a guiding framework that may act as a roadmap for stakeholders' engagement as shown in **Table 5.7-1**.

Table 5-4: Stakeholders' Engagement Plan.

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/Frequency	Responsible person/ group
Project Preparation and Pre-Construction Phase					
Representatives of implementing institutions and agencies (ZECO, ZAWA, OSHA); Local NSAs; Community groups representatives from Buyu area, Students and Student organisations, UDSM and IMS staff, service providers and private sector surrounding project site	To disclose finalized ESMF, SEP, LMP ESCP and ESIA	Email message to advise Stakeholders of disclosure and where to access the disclosed documents. Disclosure of Project documentation in an accessible manner	Organized public Meetings/ Consultations Disclosure of Project documentation Email copies to key individuals and organizations.	At least once per each stage of the project or once when there are changes or revision	
Representatives of implementing institutions and agencies (ZECO, ZAWA, OSHA); Local NSAs; Community groups representatives from Buyu Area, Students and Student organisations, UDSM and IMS Buyu staff, service providers and private sector surrounding project site	To inform stakeholders of any new activities, unexpected impacts, etc., during construction. To Provide updates on project progress	Inform on the new changes and progress	Public Meetings Focus Groups Discussions. Face to Face Meetings	At least once per each stage of the project or once when there are changes or revision	UDSM Monitoring and evaluation team, E&S coordinator
Representatives of implementing institutions and agencies (ZECO, ZAWA, OSHA); Local NSAs; Community group representatives from Buyu area,	Inform stakeholders of any new activities, unexpected impacts etc. during construction. Provide updates on project progress	Inform public about any emerging issues Information and education on the risks and impacts, GRM, workers code of conduct etc. Updates on project progress etc.	Public Meetings Focus Groups Discussions. Face to Face Meetings	At least once per each stage of the project or once when there are changes or revision	UDSM Monitoring and evaluation team, E&S Coordinators

<p>Representatives of implementing institutions and agencies (ZECO, ZAWA, OSHA); Local NSAs; Community groups representatives from Buyu area, Students and Student organisation, UDSM and IMS Buyu staff, service providers and private sector surrounding project site</p>	<p>Inform stakeholders of any new activities, unexpected impacts etc. during construction. Provide updates on project progress</p>	<p>Inform public about any emerging issues Information and education on the risks and impacts, GRM, workers code of conduct etc. Updates on project progress etc.</p>	<p>Public Meetings Focus Groups Discussions. Face to Face Meetings</p>	<p>At least once per each stage of the project or once when there are changes or revision</p>	<p>UDSM Monitoring and evaluation team, E&S Coordinators</p>
<p>Community groups representatives from Buyu area, Students and Student organizations, UDSM staff, IMS, service providers and private sector surrounding project site</p>	<p>Resolve grievances received</p>	<p>To address grievances related to construction activities Refer persons affected by project related GBV/SEA to services To promote accountability for violations of GBV by project staff.</p>	<p>Face-to-face meetings Confidential and safe face-to-face referral for GBV survivors Meetings and aggrieved persons</p>	<p>Every time a grievance is received</p>	<p>E&S coordinators, UDSM Monitoring and evaluation team, UDSM Gender Unit and Gender Desk at Magharibi B District, and police station</p>
<p>Representatives of implementing institutions and agencies (ZECO, ZAWA, FIRE, OSHA); Community groups representatives from Buyu area, Students and Student organizations, UDSM and IMS staff, service providers and private sector surrounding project site</p>	<p>Contact with the Environmental and Social Project Experts</p>	<p>Sharing of phone number and WhatsApp number to submit questions and other comments.</p>	<p>Phone number WhatsApp number</p>	<p>At least once per each stage of the project or once when there are changes or revision</p>	<p>E&S coordinators</p>

Throughout the Project Implementation Period (All Components)

<p>Representatives of implementing institutions and agencies (ZECO, ZAWA, OSHA); Community group representatives from Buyu area, Students and Student organisations, UDSM staff, service providers and private sector surrounding project</p>	<p>Information dissemination</p>	<p>To share general information on project, activities</p>	<p>Posting on bulletin boards; Information leaflets Community meetings Outreach activities – Focus groups. One to one meeting</p>	<p>At least once per each stage of the project or once when there are changes or revision</p>	<p>E&S Coordinators and PO-RALG Office.</p>
<p>Representatives of implementing institutions and agencies (ZECO, ZAWA, OSHA); Local NSAs; Community groups representatives from Buyu area, Students and Student organisations, UDSM staff, service providers and private sector surrounding project site</p>	<p>Contact with the Environmental and Social Project Experts</p>	<p>Sharing of phone number and WhatsApp number to submit questions and other comments.</p>	<p>Phone number WhatsApp number</p>	<p>At least once per each stage of the project or once when there are changes or revision</p>	<p>E&S coordinators</p>

5.8 Disclosure

When the ESIA statement for this project will be approved and the certificate provided, UDSM will disclose the approved project components information (ESIA, ESMP) to the public. The document will be made available in the institutional library, District, and ward to inform the stakeholders of the response to their concerns and views. A non-technical ESMP will be presented in both Kiswahili and English to make it understandable to the public.

CHAPTER SIX

6.0 ASSESSMENT OF IMPACTS AND ALTERNATIVES

6.1 Identification of Environmental and Social Impacts

The identification of impacts considers both positive and negative impacts which result from the interaction between the Project related activities and Valued Environmental Components (VECs)⁵. For this project, the selected VECs include the Atmospheric Environment, Acoustic Environment, Wetland Environment, Terrestrial Environment, Public Health and Safety, Labour and Economy, and Public Services Infrastructure / Utilities. The identified potential environmental and social impacts are based on the interaction between the project-related activities and selected valued environmental components (VECs).

The selection of VECs was based on the existing project environment (environmental and social baseline conditions), opinions/views obtained from stakeholder consultations, and consultant's professional judgement. The potential interactions between the Project Related Activities and the Selected VECs for each phase of the project implementation are illustrated in **Table 6.1-1**.

Table 6.1-1: Potential Interactions of the Project with VECs

Valued Environmental Components	Project Phase			
	Pre-Construction	Construction	Demobilization	Operation
Atmospheric Environment	-	✓	-	-
Acoustic Environment	-	✓	-	-
Water Resources	-	-	-	-
Aquatic Environment	-	✓	-	-
Wetland Environment	-	-	-	-
Terrestrial Environment	✓	✓	-	-
Public Health and Safety	-	✓	-	✓
Labour and Economy	✓	✓	✓	-
Community/Public Services Infrastructure / Utilities	-	-	-	✓
Transportation	-	✓	-	✓
Current Land and Resources Use	✓	✓	-	-
Current Use of Land and Resources by Indigenous Peoples ⁶	-	-	-	-
Cultural and Historical Heritage Resources	✓	✓	-	-
Legend: Possible Interaction No Substantial Interaction				

⁵ Valued Environmental Components can be physical, biological, social, economic, or cultural

⁶ Defined as members of those cultures which have historic, ancestral, spiritual, and functional connection to the land on which and from which they live. Distinguished from members of those cultures whose connection to the land on which they live is limited to the historical period.

6.2 Assessment of Impacts

The identified impacts have been assessed by using the Environmental and Social Impact Assessment Matrix⁷ provided in **APPENDIX 3**. The ESIA Matrix helped to determine the significance of impacts based on the following criteria:

- **Importance** – whether important to national, regional, or international interest or site specific.
- **Magnitude** of Change – whether Positive or Negative
- **Permanence** – whether condition is permanent or temporary.
- **Reversibility**- reversible or irreversible.
- Whether **Cumulative / Synergistic** for positive and negative impacts, respectively.

The significance of impacts also took into consideration existing by-laws, national and international environmental standards, legislation, treaties, and conventions that may affect the significance of identified impacts.

These techniques have been used to logically and systematically identify, assess, and analyse environmental impacts. The techniques also allowed subjective judgments to be quantitatively recorded, making the assessment of impacts more objective. The following subsections provide a detailed description of the interaction between the project and VECs at various phases of the project implementation. In addition, the identified impacts are categorized into Environmental and Social Impacts.

6.3 Identified Environmental Impacts

6.3.1 Pre-Construction Phase

6.3.1.1 Loss of ecological functions and landscape quality

The project will interact with Terrestrial Environment during construction phase through clearing of existing vegetation within construction sites for student hostel buildings. The project will involve site preparation before the commencement of construction works. This requires removal of vegetation cover/trees from the construction site.

The existing vegetation cover /trees provide some ecological functions and improve the landscape quality of the surrounding environment. The important ecological functions include providing a natural habitat for a variety of organisms, including insects, birds, reptiles, lizards, snakes, etc. The presence of vegetation cover helps to protect the land against soil erosion by surface run-off during rainfalls and wind actions. Therefore, the removal of vegetation cover/trees is likely to result into the loss of ecological functions and landscape quality of the surrounding environment.

The impact has been assessed to be **direct** and **negative** with **Medium Significance**; and is expected to be **short-term** and **temporary** as it will occur only during pre-construction and construction phases. However, its effects on vegetation clearance will be **Reversible** if it occurs due to the possibility of developing greening zones after completion of construction works. The impact is considered to be **Cumulative** due to interaction with outgoing pre-construction activities.

6.3.1.2 Landscape degradation and loss of aesthetic value of the surrounding environment

The project will involve vegetation clearing and soil excavation. This will result in the accumulation of excavated soil materials and vegetation residues, which will reduce the aesthetic value of the surrounding environment.

⁷Environmental Impact Assessment Using the Rapid Impact Assessment Matrix (RIAM). Ed. Kurt Jensen. Published by Olsen & Olsen, 1998.

The impact has been assessed to be **indirect** and **negative** with **Very Low Significance**; and is expected to be **short-term** and **temporary** as it occurs only during the construction phase. Its effects on the surrounding environment are **Reversible** because the surrounding environment can be restored to its original condition after removal of the impact or completion of the project. The impact is considered to be **non-cumulative** as will occur only within the boundaries of the construction site.

6.3.2 Construction Phase

6.3.2.1 Creation of air pollution due to dust and exhaust emissions

The project will interact with the Atmospheric Environment during the construction phase through excavation and stockpiling of excavated soil materials during preparation of the construction site. This is likely to result in increased air pollution due to dust emissions, especially during dry seasons, which will affect the construction workers and nearby people. Air pollution will also occur due to exhaust emissions from construction equipment/machinery operations. The impact has been assessed to be **direct** and **negative** with **Low Significance** and is expected to be short-term and temporary, as it will occur only during the construction phase. Its effects on human health will be **reversible** if it occurs.

6.3.2.2 Creation of noise nuisance and vibration effects

The project will interact with the Acoustic Environment during the construction phase through the operation of mobile equipment/machinery. This is likely to result in noise nuisance and vibration effects. Due to high noise emissions from construction equipment/machinery, the most affected people will be the construction workers, students, academic staff, and other people close to the construction site. The impact has been assessed to be **direct** and **negative** with **Low Significance**, and is expected to be short-term and temporary as it occurs only during the construction phase. However, its effects on human health will be **reversible** if it occurs.

6.3.2.3 Landscape degradation and loss of aesthetic value of the surrounding Environment

The project will interact with the Terrestrial Environment during the construction phase through excavation and stockpiling of excavated soil materials and accumulation of other construction solid wastes. The accumulation of excavated soil materials and other construction solid wastes is likely to result into landscape degradation and loss of aesthetic value of the surrounding environment.

The impact has been assessed to be **indirect** and **negative** with **Very Low Significance** and is expected to be **short-term** and **temporary** as it occurs only during the construction phase. Its effects on the surrounding environment are **Reversible** because the surrounding environment can be restored to its original condition after removal of the impact or completion of the project. The impact is considered to be **non-cumulative** as will occur only within the boundaries of the construction site.

6.3.2.4 Creation of land and soil pollution

The project will interact with Terrestrial Environment during construction phase through generation of both hazardous and non-hazardous waste. The non-hazardous waste will comprise papers, garbage, plastics, timber, broken blocks and sewage. The hazardous waste will comprise of sharp objects such as nails, broken glasses, scrap metals, used oils, unwanted chemicals (paints and thinners), used tyres, used batteries and contaminated soil due to oil spillage.

The impact has been assessed to be **Direct** and **negative** with **High Significance**; and is expected to be **short-term** and **temporary** as it occurs only during the construction phase. Its effects on the surrounding environment are **Reversible** because the surrounding environment

can be restored to its original condition by removal of generated waste streams. The impact is considered to be **non-cumulative** as will occur only within the boundaries of the construction site.

6.3.2.5 Risk of marine and coastal pollution

The project will interact with the Aquatic Environment during the construction phase through the action of stormwater runoff that would flow from the IMS-Buyu Campus (upstream) to the Indian Ocean (downstream). If generated hazardous and non-hazardous waste materials are not properly handled, will result in littering. Natural stormwater drains will carry out unmanaged waste and ultimately discharge into nearby Indian Ocean. This will cause pollution of nearby surface and groundwater sources, marine environment and subsequent contamination of coast belt.

The impact has been assessed to be **Direct** and **Negative** with **High Significance**. It is expected to be short-term and temporary as it occurs only during the construction phase. Its effects on the surrounding environment are reversible because the surrounding environment can be restored to its original condition. The impact is considered to be non-cumulative because it will not extend beyond the boundaries of the construction site.

6.3.2.6 Risk of causing damage on local access roads to the construction Site

The project will interact with the Transportation Environment during the construction phase through the hauling of construction materials from sources to project sites. These construction materials include cement, timber, reinforcements, iron sheets, glasses, paints, tiles, furniture, plumbing fixtures, sand, aggregates and rocks. Frequent turnaround and overloading of heavy construction trucks will result in damage to the existing Airport – Shakani road. The effect will cause severe damage to the public that currently enjoys the smooth flow of traffic on the existing road.

The impact has been assessed to be **Direct** and **Negative** with **High Significance**; and is expected to be **short-term** and **temporary** as it occurs only during the construction phase. Its effects on the transport environment are **Reversible** because the existing road can be repaired or rehabilitated to its original condition. The impact is considered to be **Cumulative** as likely to extend beyond the boundaries of the construction site.

6.4 Identified Social Impacts

6.4.1 Construction Phase

Public Health is a condition of the environment that relates to the physical health and well-being of the public /local community surrounding the Project. The potential for public health concerns includes those associated with chemical emissions, human health factors, potable water supplies, and several types of accidents, malfunctions, and unplanned events.

The project will interact with Public Health and Safety to create the following impacts during construction phase:

- Increased prevalence of HIV/AIDS and STIs due to interaction between the construction workers and local community members.
- Creation of occupational health and safety risks to the construction workers due to handling /operation of hazardous construction materials/equipment.
- Creation of risk of construction-related accidents due to trespass by unauthorized people into the construction sites.
- Increased risk of traffic accidents at the junction of access roads due to frequent movement of construction vehicles to and from the construction site.
- Increased risk of COVID-19 transmission due to the influx of people into the project area.

6.4.1.1 Increased prevalence of HIV/AIDS and STIs

The project is likely to result in an increased prevalence of HIV/AIDS and STIs in the project areas due to social interaction between construction workers and local community is likely to result into increased prevalence of HIV/AIDS and STIs among the local community in the project area.

The impact has been assessed to be **indirect** and **negative** with **High Significance**. It is expected to be **long-term** and **permanent** as it continues to occur even after the construction phase. Its effects on human health are **Irreversible** because there is not yet any known treatment for HIV, apart from Anti-retrovirus (ARV) drugs, which help to increase resistance against HIV. The impact is considered to be **Cumulative** because it will be additional to the current situation of HIV/AIDS prevalence in the project area.

6.4.1.2 Creation of occupational health and safety risks

The project will involve construction workers handling and operating hazardous construction materials and equipment, which is likely to result in occupational health and safety risks for them. These include physical injury from construction equipment like jackhammers, exposure to dusty construction materials like dry cement, sand, and aggregate, and hand injury due to exposure to wet cement.

The impact has been assessed to be **direct** and **negative** with **Low Significance**. It is expected to be short-term and temporary, occurring only during the construction phase. The impact is considered to be **non-cumulative** because it will occur only within the boundaries of the construction site.

6.4.1.3 Creation of construction-related risk of accidents

The project involves the movement of mobile construction equipment, like bulldozers, graders, and heavy-dumper trucks, around the construction site. Therefore, unauthorized people trespassing into the construction site is likely to result in the risk of construction-related accidents. For example, a person may be overrun by backwards-moving mobile construction equipment/machinery, especially if it is not fitted with a sounding alarm device.

The impact has been assessed to be **indirect** and **negative** with **Low Significance** and is expected to be short-term and temporary as it occurs only during the construction phase. However, its effects on human health may be Irreversible because the impact may result in fatal injury (death) or non-fatal injury, which results in loss of an organ (e.g., legs, arms, etc.). The impact is considered to be **non-cumulative** because it will occur only within the boundaries of the construction site.

6.4.1.4 Increased risk of road traffic accidents

The project will involve movement of heavy trucks to and from the construction site during transportation of construction materials to the construction site or spoil/soil materials from the construction site to the dumping site. The frequent movement of heavy trucks to and from the construction site is likely to result into risk of traffic accidents at the junction between the access roads to the construction site and local main road.

The impact has been assessed to be **indirect** and **negative** with **Low Significance**, and is expected to be short-term and temporary as it occurs only during the construction phase. However, its effects on human health may be **Irreversible** because it may result into fatal injury (death) or non-fatal body injury and irreversible property damage. The impact is considered to be **Cumulative** because it will be additional to the current situation of traffic accidents along the local roads in the project area.

6.4.1.5 Increased risk of COVID-19 transmission

The project is likely to induce an influx of people into the project site, in terms of job seekers, small business operators, etc. This will result into an increased number of people around the project site, hence resulting into an increased risk of transmission of Covid-19, if precautions are not taken.

The impact has been assessed to be *indirect* and *negative* with **High Significance**, and is expected to be long-term and permanent as it continues to occur even after the construction phase. Its effects on human health are *Irreversible* because there is not yet any known treatment for Covid-19., apart from Vaccine, which helps to increase resistance against COVID-19 Virus.

6.4.1.6 Creation of temporary employment for local people

The project will involve recruiting local residents during construction, hence creating temporary employment for the local people during construction. The project is expected to employ at least 150 people during construction. The employment of local people in the project will also benefit their dependent families. For example, if the project employs 150 people and each individual has an average of 5 dependents, then the project is likely to benefit about 750 people.

The impact has been assessed to be *direct* and *positive* with **Medium Significance**, and is expected to be short-term and temporary as it occurs only during the construction phase. However, it can have *Long-term* effects on the socio-economic conditions of the local people. The impact is considered to be *Synergistic* because it is a positive impact, which will be additional to the current situation on employment creation in the project area

6.4.1.7 Increased income generation opportunity for local people

The presence of a large number of construction workers will result into increased demand for food and other items, hence resulting into increased income generation opportunities for local people.

The impact has been assessed to be *indirectly positive* with **Medium Significance**; and is expected to be *short-term* and *temporary* as it occurs only during construction phase. However, it can have long-term effects on the socio-economic conditions of the local people. The impact is considered to be *Synergistic* because it is a positive impact, which will be additional to the current situation on income generation in the project area.

6.4.1.8 Emergence of GBV/SEA and SH Cases among the project employees

Differences in gender and socio-economic status among the project employees are likely to result into emergence of Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH). For example, some corrupt senior project staff may demand sexual favours from female job seekers or demand sex from female employees. The impact has been assessed to be *indirectly negative* with Low **Significance**, and is expected to be short-term and temporary as it occurs only during the construction phase.

6.4.1.9 Risk of casing damage on archaeological artefacts/chance finds

The project will interact with the Cultural Heritage environment as during construction phase there will be excavation works for various project components including building foundations, septic tanks and soak-away pits. Upon because Zanzibar is one of the East African coastal areas rich in historical artefacts. In this regard, there is likely a high possibility of encountering artefacts and cultural heritage materials during the undertaking of excavation works at the IMS-Buyu Campus. The artefacts likely to be encountered shall not be damaged but rather salvaged by the Contractor under the Chance Find Procedure.

The impact has been assessed to be **direct** and **negative** with **High Significance**; and is expected to be **short-term** and **temporary** as it will occur only during construction phase. However, its effects on the damaged artefacts will be **Irreversible** if it occurs to the level impossibility of renewal. The impact is considered to be **Non-Cumulative** due to confining at construction sites only.

6.4.2 Demobilization Phase

6.4.2.1 Loss of temporary employment by local people

During demobilization or closure of the project, the construction workers will be retrenched, hence the loss of employment. The effect is not likely to be significant due to the fact that the retrenched people will be from within the project area and likely to revert back to their initial economic activities. Nevertheless, if their terminal benefits are not paid, the effect is likely to be significant. The impact has been assessed to be **direct negative** with **Low Significance**, and is expected to be short-term and temporary as it will continue to occur after the closure or completion of the project.

6.4.3 Operation Phase

6.4.3.1 Increased revenue for Infrastructure/Utility Service Providers

The project will interact with Community Public Infrastructure/Utilities during the operation phase through increased water and electricity supply demand. This is considered to be a beneficial or positive impact because the increased demand for infrastructure/utility services will result into increased revenue for infrastructure/utility service providers such as ZECO, ZAWA and Mobile Phone Companies.

The impact has been assessed to be **indirect positive** with **High Significance**; and is expected to be **long-term** and **permanent** as it will continue to occur throughout the project life. The water and power utility will continue to be used so long as the project continues to operate. The impact is considered to be **Synergistic** because it will positively contribute to the current situation on revenue collection by infrastructure/utility service providers.

6.4.3.2 Increased enrolment of students and revenue collection

The project will involve construction of new lecture theatres, laboratory building and associated facilities. This will result into increased revenue due to enrolment of students at IMS-Buyu Campus.

The impacts have been assessed to be **indirect** and **positive** with **High Significance**; and are expected to be **long-term** and **permanent** as it will continue to occur throughout the operation phase. The impact can be considered to be **Synergistic** because it will add positively to the current situation of revenue collection by the UDSM.

6.5 Summary of Identified Significant Impacts

The summary of identified significant impacts in **Table 6.5-1** indicates most of the negative impacts will occur during construction phase and their significance ranges from Low, Medium to High and most of the positive impacts will occur during operation phase and their significance ranges from Medium to High.

Table 6.5-1: Identified Significant Impacts

Impacts	Significance	MP	CP	DP	OP
Vegetation clearance.	Medium	✓	✓	-	-
Generation of hazardous and non-hazardous waste	High	-	✓	-	-

Impacts	Significance	MP	CP	DP	OP
Creation of air pollution due to dust emission and exhaust from construction activities.	Low	-	✓	-	-
Creation of noise nuisance and vibration effects due to construction activities.	Medium	-	✓	-	-
Creation of landscape degradation and loss of aesthetic value of the surrounding environment.	Low	-	✓	-	-
Risk of marine and coastal pollution	High	-	✓	-	-
Risk of causing damage on local roads to construction site	High	-	✓	-	-
Increased HIV/AIDS and STIs prevalence	High	-	✓	-	-
Creation of occupational health and safety risks	Low	-	✓	-	-
Increased risk of COVID-19 transmission.	High	-	✓	-	-
Creation of construction related risk of accidents.	Low	-	✓	-	-
Increased risk of road traffic accidents.	Low	-	✓	-	-
Creation of employment opportunities for local people.	Medium	-	✓	-	-
Risk of Emergence of GBV,SEA and SH among project employees and local community members.	High	-	✓	-	-
Risk of causing damage on archaeological artefacts .chance finds.	High	-	✓	-	-
Increased income generation opportunities for local people.	Medium	-	✓	-	-
Loss of temporary employment opportunities for local people.	Low	-	-	✓	-
Increased enrolment of students nd revenue collection.	High	-	-	-	✓
Increased revenue for infrastructure and utility service providers.	High	-	-	-	✓
KEY:					
	Ver High Positive Impact		Very High Negative Impact		
	High Positive Impact		High Negative Impact		
	Medium Positive Impact		Medium Negative Impact		
	Low Positive Impact		Low Negative Impacts		
	Very Low Positive Impact		Very Low Negative Impact		

6.6 Impacts of the Environment on the Project

The effects/impacts of the environment on the Project are associated with risks of natural hazards and influences of nature on the Project. Typically, these are a function of project or infrastructure design in the context of its receiving environment, and, ultimately, how the project is affected by nature. These effects/impacts may arise from physical conditions, land forms, and site characteristics or other attributes of the environment that may affect the project, such that the project components, schedule, and/or costs could be substantively and adversely changed.

In this report the assessment of the effects of the environment focuses on the environmental attributes that are considered to have a potential effects/impact on the Project. These are based on the regulatory consultation, public and stakeholder input, a review of the known past and existing conditions, and knowledge gained through projections of potential future conditions. For example, potential effects of climate change, severe weather, including: wind; precipitation; floods; electrical storms; seismic activity; and external fires resulting from causes other than the Project. This section provides the summary of the identified environmental effects on the Project. In general, the effects of the environment on the Project during the construction phase have been rated not significant.

6.6.1 Impacts of Climate Change on the Project

The Project area may experience extreme weather conditions during construction and operational life of the Project due to increasing climate change events. To assess the environmental effects of climate on the Project, current climate and climate change must both be considered. Current climate conditions are established by compiling relevant historical data and establishing a climatological background for the project area. The historical and projected extremes in temperature, intense precipitation, or other storm events, are important considerations that must be accounted for in the design of the Project and in all other aspects of construction.

The study on climate projections indicates in present century (2011–2040) Dar es Salaam and Zanzibar is projected to feature decreased minimum temperature in the range of -0.1°C to 0°C ; and increased rainfall in the range of 0.25 to 0.5 mm/day⁸.

Forecasted changes in climate may affect construction and operation in both positive and negative ways and may vary from nominal to extreme effects. Climate changes that could potentially have residual effects on the project include:

- Increased incidence of soil erosion and flooding.
- Increased frequency and magnitude of heavy precipitation events;
- Increased frequency of extreme storms accompanied by heavy precipitation, thunderstorms, and strong winds; and
- Extreme atmospheric temperatures and weather conditions.

Each of these effects must be considered in terms of how they may adversely affect the Project if they are not planned, engineered, and designed to account for such effects. Such effects could cause:

- Reduced visibility and inability to manoeuvre operation equipment;
- Delays in shipment of materials, supplies and/or products;
- Changes to the ability of workers to access the site (e.g., if a road were to be wash out);
- Damage to infrastructure;
- Increased structural loading; and/or
- Loss of electrical power resulting in potential loss of production.

Mitigation measures

The potential effects of climate on construction will be considered in the planning and design of the building structures, and in the scheduling of construction activities to limit delays, prevent damage to infrastructure and the environment, and to maximize the safety of construction staff. Compliance with design and building codes and standards are expected to account for weather extremes through built-in factors of safety to prevent undue damage to infrastructure from such events. **Table 6.6-1** provides the general mitigation measures against

⁸ Climate Change Projections for Tanzania Based on High-Resolution Regional Climate Models from the Coordinated Regional Climate Downscaling Experiment (CORDEX)-Africa. Philbert Modest Luhunga, Agnes L. Kijazi, Ladislaus Chang'a, Afredy Kondowe, Hashim Ng'ongolo and Habiba Mtongori. <https://www.frontiersin.org/articles/10.3389/fenvs.2018.00122/full>

climate change effects. **Table 6.6-2** outlines the specific mitigation measures against the potential effects/impacts of climate change on the construction of new academic buildings at IMS-Buyu Campus.

The predicted effects of climate change on the project will be carefully taken into account in the planning, design, and construction activities. These include the location of construction site, the selection of materials to be used; and the operating plans for the project to ensure the long-term viability and sustainability of the project. The likely adverse effects on the project during construction and operation will be taken into consideration in the planning and design of the project (or managed adaptively as appropriate as information regarding climate change evolves. As a result, substantive damage to the project or interruption to the project schedules are not anticipated.

Table 6.6-1: General Climate Change Effects and Mitigation Measures

Event	Effects	Mitigation measures
(a) Extreme temperature variations	Reduced ductility of construction materials and increased susceptibility to brittle fractures.	The specification of construction materials must be in compliance with the applicable standards and codes and must maintain structural integrity at the anticipated minimum and maximum ambient temperatures
(b) Rising or increasing sea water levels.	Soil erosion along the shorelines due to rising sea water level that results into shifting of sea shorelines towards the inland and creating damage on the building structure.	Design should consider appropriate distance between the construction site and the shorelines and provision of structure that will protect the building from rising sea water level. The effect is not anticipated because the proposed construction site is about 250 m from the shoreline.
(b) Extreme wind storm and severe precipitation resulting to soil erosion and flooding.	Reduced visibility and inability to manoeuvre construction equipment/machinery.	Make prediction of short delays and make allowance for them to be included in the construction schedule.
	Disruption of construction activities and delays to the construction schedule. Delays in the transportation of construction materials to the site.	Scheduling of tasks that require precise movement of equipment (e.g., positioning steel I-beams in place with cranes) to periods when the weather conditions are favourable.

Table 6.6-2: Potential Climate Effects on the Building and Mitigation Measures

Climate event	Risks to the Building	Mitigation Measures
(a) Heavy rain for longer periods	The elevation of the project site range between 3-5 m (m.a.s.l.) and that of adjacent marshland range between 1-2 m (m.a.s.l.). The movement of water is therefore towards the marshland area, hence resulting into soil erosion and sedimentation of the marshland area. In the long run sedimentation will result into reduced water retention capacity of	The area that is not going to be covered with the building should be provided with grasses and trees to control soil erosion and sedimentation of the marshland area. The foot paths and car parking areas should be paved by using porous interlocking concrete blocks to minimize surface run-off and overloading of the marshland area.

Climate event	Risks to the Building	Mitigation Measures
	the marshland, hence increased flood risk around the building structures	
(b) Storm events (Typhoons, Cyclones) and extreme winds	Possible removal of the roof and other building structures.	Compliance with specifications during depot roof construction and other structural members. Planting of trees around the building to act as wind barriers.

6.6.2 Impacts of Seismic Activity on the Project

The construction site is not located within an area with high seismic hazard⁹ and therefore, the likelihood of a major seismic event in the immediate vicinity of the construction site that could cause damage to the building structure or interrupt operations during any project phase is low.

6.6.3 Impacts of External Fires on the Project

In the event that an external fire did occur in close proximity of the Project, there is a potential risk of contact with fuel storage tanks, thereby potentially creating a risk of fire with petroleum products which are by their nature highly flammable.

Mitigation measures

The presence of fence wall established around the materials storage yard will help to reduce the likelihood of an external fire causing substantive damage to the Project. In addition, fire fighting capabilities (including appropriate equipment) on-site will be at a high level of readiness. The safety and security personnel will be in place in collaboration with Fire and Rescue Force to provide for rapid detection and response to any fire threat.

The materials to be used for construction will be inherently fire resistant. For example, the facility structures can be constructed primarily of concrete and steel, which are not typically affected by fire.

6.7 Analysis of Alternatives in Project Implementation

The project will involve construction of Hostel Buildings and Completing Construction of Phase II Building for Lecture Rooms, Conference Hall and Staff Offices for The Institute of Marine Sciences at Buyu in Zanzibar. Once completed, these infrastructures will be able to support the implementation of the University Strategic plans, vision, and improve the education services (teaching, research and consultancy).

The three alternatives have been considered in this study based on technical, economic, environmental and social point of view. That means selected alternative must be technically feasible, economically viable, environmentally friendly and socially acceptable. The analysis of alternatives considered whether the project should be implemented or not ("No project" alternative versus "Project" alternative), and if it will be implemented what type of construction method should be used (Labour-intensive method versus Machine-intensive method). For comparison of these alternatives the Multi-Criteria Analysis Method has been used, based on Technical, Economic (Techno-economic), Environmental and Social Criteria.

⁹ Map updated by U.S. Geological Survey National Earthquake Information Centre. 13 September 2016. <https://reliefweb.int/sites/reliefweb.int/files/resources/20160910.pdf>

6.7.1 No Project Alternative VS Project Alternative

The Institute of Marine Sciences in Buyu aiming in improving provision of higher education and continue to conduct quality researches in Zanzibar. Specifically, the proposed project implementation will encompass Hostel Buildings and Administration Building for Lecture Rooms, Conference Hall and staff offices which all together will enhance capacity of Institute of Marine Sciences in student enrolment.

The “No project” Alternative” means the Hostel Buildings and Completing Construction of Phase II Building for Lecture Rooms, Conference Hall and Staff Offices for the Institute of Marine Sciences at Buyu should not be implemented at all to the proposed project location. The no project alternative also means that all the foreseeable advantages should be abandoned.

The “Project Alternative” means that the project should be executed as planned. Implementation of the project will have the following advantages: -

- There is no land acquisition, hence no additional cost since the proponent will implement her project on owned land
- The project will provide various employment opportunities to the local community around the project area in both phases.
- The project will add value to the land in the flanking environment
- The Project operation is anticipated to attract more financial institutions such as Banks close to the community
- The expected increase in population will provide opportunity to farmers to produce more product and sell it to the Institute.
- The education from the Institute will help the locals to increase agricultural produce and fish production.
- Implementation of university campus buildings will add scenic beauty of the project area and will also motivate local people to construct buildings to the surveyed plots

On the other hand, the disadvantages of implementing the proposed project are as follows:

- The project is expected to generate both solid and liquid waste during the construction and operation phases.
- Construction works are expected to create health and safety risks to the workforce and the community around the project area.
- Dust is expected to be the major issue to the workforces during construction works especially during the transportation of the building materials
- The construction works are expected to generate noise during construction works

Summary of analysis for the “No Project Alternative” against “Project Alternative” is presented in **Table 6.7-1**.

Table 6.7-1: No Project Alternative VS Project Alternative.

Evaluation Criteria	No Project Alternative		Project Alternative	
	High	Low	High	Low
Techno-economic				
Investment Costs	-	-	-1	-
Knowledge transfer	-2	-	-	+2
Provision of social services within the campus	-2	-	-	+2
Productivity (increase in agricultural and fisheries production)	-	-2	+2	
Environmental and Social				
Construction related exhaust emission	-	-	-1	-
Construction related risk of traffic accidents	-	-	-1	-
Construction related dust emission.	-	-	-1	-

Evaluation Criteria	No Project Alternative		Project Alternative	
	High	Low	High	Low
Construction related exhaust emission.	-	-	-1	-
Operation related dust emission	-	-	-	-
Operation related exhaust emission	-2	-	-	+2
Total Score:	-6	-2	-3	+6
Overall Net Score:	-8		+3	
KEY: +1 = Short-term Positive Impact -1 = Short-term Negative Impact +2 = Long-term Positive Impact -2 = Long-term Negative Impact				
Conclusion: The "No Project Alternative" has been found to have an overall score of -8 and the Project Alternative an overall score of +3. Therefore, the "Project Alternative" should be selected and "No Project Alternative" should be rejected and should not be further considered for this project.				

6.7.2 Labour Intensive Alternative VS Machine Intensive Alternatives

The use of labour-intensive construction method is compared against machine-intensive construction method. The comparison of alternatives based on techno-economic, environmental and social criteria is summarized in Table 6-6.

From techno-economic point of view the labour-intensive construction method makes use of manual labour and therefore likely to create employment opportunity to a large number of adjacent local residents than machine-intensive method, hence improving the local economy. The employment creation will have multiplier effect as it will also benefit their families, hence socially acceptable. However, the use of mobile equipment / machine is costlier than labour-intensive method, but it is more efficient than labour-intensive method.

From environmental and social point of view the labour-intensive method will have minimum risk of construction related risk of accidents to construction workers and the local community, unlike the use of mobile equipment / machinery during excavation works, Labour-intensive method has less environmental impacts compared to machine-intensive method. For example, the use of mobile equipment / machine is likely to create more dust emission than labour-intensive method.

The use of mobile equipment / machine will also create air pollution and noise nuisance than labour-intensive method. The use of mobile equipment will create more landscape degradation than labour-intensive method.

From the analysis it can be seen that the labour-intensive method should be selected and machine-intensive method should be rejected. However, due to the nature of the project and limitations of labour-intensive method, the combination of the two methods should be more favourable. In this case, the contractor should give priority to labour-intensive method for those activities that could be done manually. For, example, excavation of roadside drainages to access roads could be done manually instead of using an excavator.

Table 6.7-2: Labour-Intensive VS Machine-Intensive Methods.

Evaluation Criteria	Labour-intensive method		Machine-intensive method	
	High	Low	High	Low
Techno-economic				
Cost of hiring equipment / machinery	-	+1	-1	-
Employment creation	+1	-	-	-1
Efficiency and time saving	-	-1	+1	
Work productivity	-	-1	+1	-
Environmental and Social	-	-	-	-
Dust emission		+1	-1	-
Exhaust emission	-	-	-1	-
Landscape degradation		+1	-1	
Risk of construction related accidents	-	+1	-1	-
Social acceptability	+1	-	-	-1
Total Score:	+2	(-2) +(+4) = +2	(-5) +(+2) = - 3	-2
Overall Net Score:	+4		-5	
KEY: +1 = Positive Impact -1 = Negative Impact				
Conclusion: The “labour-intensive method” has been found to have an overall score of +4 and machine-intensive method an overall score of -5. The “Labour-Intensive Construction Method” seems to be favourable than “Machine-Intensive Construction Method”. However, due to the nature of the project the labour-intensive method has been found to have some limitations, and therefore the combination of the two methods should be considered. However, during construction more emphasis will be given on the labour-intensive method in order to promote employment of the local people. For example, excavation of storm water drainages, relocation of utilities, etc.				

6.7.3 Alternative Site

Some consultations have suggested that there should be a consideration of a location alternative. The second building for academic and administration could move to another location. The decision of implementing the project at the proposed location was suitable since it has the required land size for implementation and some foundation works began.

Hence this option of shifting to another location was not considered as the current location is according to the approved current land use Master Plan of the IMS-Buyu Campus.

6.7.4 Waste Water Treatment and Disposal Alternatives

Alternative 1: Use of Lagoon System

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. The project site has limited land for establishment of WSP. However, the due to IMS-Buyu Campus being found at lower elevation and close to sea, any extreme flood event due to unpredicted climate change will result into overflow of sewage in ponds and subsequently pose risk to marine pollution.

Alternative 2: Use of Septic Tank System

The design has considered construction of septic tank system with soak pits for collection, treatment of generated wastewater from proposed administration and hostel buildings. This

wastewater treatment technology requires comparative smaller land size as oppose to lagoon system. The septic tanks are normally covered and rarely affected by flood even.

On the other hand, the geotechnical investigation report shows that ground water table is found between 9m and 10m below original ground level while the designed depths of septic tanks and soak away pits are 3.35m and 3.0m respectively. This demonstrates that there will be no anticipated groundwater pollution as a resulting of constructing septic tank system for handling and treatment of generated domestic wastewater for the project site. It is therefore concluded that the use of Septic Tank System with Soak Away Pits should be opted due its higher preference than the use of Lagoon System at IMS-Buyu Site. Septic tank system at IMS-Buyu Campus is economical due to limited available land area and poses no potential threat to groundwater contamination.

CHAPTER SEVEN

7.0 ENHANCEMENT AND MITIGATION MEASURES

Preamble

In general, the project has been found to have both beneficial (positive) and adverse (negative) effect/impacts. The positive impacts have been found to outweigh the negative impacts. Most of the identified negative impacts are short-term, as they occur only during construction phase, but most of the identified positive impacts are long-term as they continue during the operation phase. The positive impacts will be enhanced in order to maximize the project benefits.

The identified positive impacts include creation of temporary employment and income generation opportunity for local people during construction; increased revenue for infrastructure/utility service providers; and increased enrolment of local and foreign students due to improved learning facilities at IMS-Buyu Campus. The employment opportunities can be augmented by emphasising on labour-intensive construction methods. The labour-intensive construction methods apart from increasing employment opportunities for local people, it helps them build some skills for future employment and creates some sense of project ownership by the local community.

The identified negative impacts include likely air pollution due to dust emission from construction activities; clearance of existing vegetation; creation of noise nuisance due to operation of construction equipment/machinery; generation of hazardous and non-hazardous waste; landscape degradation and loss of aesthetic value of the surrounding environment due to accumulation of excavated soil materials; risk of marine and coastal pollution; increased HIV/AIDS prevalence due to social interaction between construction workers and students/local community members.

Other negative impacts associated with the proposed project are increased risk of exposure to COVID-19 due to influx of people into the construction site; increased risk of exposure to construction related accidents due to trespassing of unauthorized persons into the construction site; increased exposure to occupational health and safety risks due to handling/operation of hazardous construction materials/equipment; increased risk of traffic accidents due to movement of heavy trucks to and from the construction site; risk of damaging underground archaeological materials and artefacts; loss of temporary employment by local people due to closure or completion of the project. The purpose of this Chapter is to outline enhancement and mitigation measures for the identified positive and negative impacts respectively.

7.1 Enhancement Measures for the Positive Impacts

7.1.1 Creation of Temporary Employment Opportunities for Local People

The following enhancement measures will be taken by the Contractor to maximize the project benefits:

- Giving employment priority to the local people of Shakani Shehia during the recruitment of construction workers, especially unskilled persons.
- Giving equal employment opportunities to males and females and avoiding any kind of discrimination based on gender, race, religion, etc.
- Ensure all workers are given Employment Contracts which stipulates all workers' rights under the labour laws such as working hours, wage, maternity leave, sick leave, etc.
- Ensure workers are paid not less than minimum wage as stipulated by the Revolutionary Government of Zanzibar.
- Ensure payment of monthly contributions to the Zanzibar Social Security Fund (ZSSF) and Workers Compensation Fund (WCF) as required by the national laws.
- Ensure all workers are made aware, understand and follow the Code of Ethical Conduct.

7.1.2 Increased Income Generation Opportunities for Local People

Provide enabling environment for food vendors to sell their food in a clean and hygienic environment by providing shelter and water supply.

7.1.3 Increased Enrolment of Students and Revenue for the Institute

The UDSM Vice Chancellor, in collaboration with the Director of IMS-Buyu Campus, shall promote the marketing of the institute at regional, national and international levels. The project proponent shall use various social media outlets such as television, radio and web-based platforms to market courses offered by IMS-Buyu Campus.

7.1.4 Increased Revenue for Infrastructure/ Utility Service Providers

UDSM will maintain regular cooperation and consultation with infrastructure/utility service providers for efficient utilization of services from the infrastructure and utility companies.

7.2 Mitigation Measures for the Negative Impacts

7.2.1 Vegetation Clearance

The following mitigation measures will be taken by the Contractor during construction to minimize the impact of vegetation clearance:

- Avoiding unnecessary vegetation clearance beyond materials haulage access road to construction sites.
- Confining vegetation clearance only with construction points for the building structures.
- Matured and endangered species such as baobab trees shall not be cleared.

7.2.2 Creation of land and soil pollution

The following mitigation measures shall be taken by the Contractor and UDSM during all phases of the proposed project to ensure proper handling of hazardous and non-hazardous waste:

- The hazardous waste shall be separated from non-hazardous waste.
- There shall be a bounded impervious surface for storage of each type of hazardous waste, including waste oils, used batteries, sharp objects, broken glasses, scrap metals, unwanted chemicals and contaminated soil.
- UDSM shall engage registered hazardous waste company for removal and transportation of generated hazardous waste to the authorized recycling plants or disposal facilities.
- Non-hazardous liquid waste shall be directed to the septic tank system for treatment and ultimate disposal.
- Non-hazardous solid waste shall be handled onsite temporarily in separate waste bins for papers, plastics and garbage, whereas plastics and papers shall be sent to registered recycling companies.
- Timber, waste soils and broken blocks shall be as much as possible reused at this time. The unwanted timber and tree cuts may be given to community for reuse as firewood.
- All unwanted non-hazardous waste that found not suitable for reuse and recycling shall be collected and transported by a waste dealer to authorised municipal dumpsite for final disposal.

7.2.3 Creation of Air Pollution due to Dust and Exhaust Emission from Construction Activities

The following mitigation measures will be taken by the Contractor during construction to minimize air pollution from dust and exhaust emissions:

- Sprinkling of water on dusty areas and dusty construction materials.
- Minimize stockpiling of excavated soils within the construction site by immediate removal and transportation to dumping site.

- Trucks hauling excavated soil materials and dusty construction materials must be covered with tarpaulins.
- Carry out regular maintenance of vehicles and avoid the use of old vehicles and mobile construction equipment which emit black smoke.

7.2.4 Creation of noise nuisance and vibration effects

The following mitigation measures will be taken by the Contractor during construction to minimize noise nuisance:

- Limiting noisy construction activities only to day time hours.
- Fencing of the construction site with corrugated iron sheets to minimize transmission of noise to the sensitive receptors.

7.2.5 Landscape degradation and loss of aesthetic value of the surrounding environment

The following mitigation measures will be taken by the Contractor to minimize land degradation:

- All stockpiled soil materials and demolition solid wastes must be immediately removed and transported to the permitted dumping site.
- Useful soil materials can be retained for landscaping purpose, but must be properly stockpiled.

7.2.6 Risk of marine and coastal pollution

The following mitigation measures will be taken by the Contractor to avoid the risk of marine and coastal pollution: -

- Non-hazardous solid waste shall continue to be managed through the use of waste bins in collection and the engagement of a third-party company in removal from the site to a municipal disposal site.
- Liquid waste shall be handled on-site through a septic tank system
- All hazardous substances (solid and liquid) must be stored on a bounded impervious surface
- Carry out regular emptying of soak pits and maintenance of sewage chambers to prevent overflow of raw sewage into the environment.
- All discharged wastewater from the sewage treatment plant must not exceed Tanzania Effluent Discharge Standards.

7.2.7 Risk of causing damage on local access roads to the construction site

The following mitigation measures will be taken by the Contractor to avoid damaging of existing Airport – Shakani road during transportation of construction materials: -

- The Traffic Management Plan shall be developed and enforced to restrict overloading by materials hauling trucks.
- Ensure that any damaged local roads are immediately repaired/rehabilitated to make them passable throughout the construction period.

7.2.8 Increased prevalence of HIV/AIDS and STIs

The following mitigation measures will be taken by the Contractor to minimize transmission of HIV and STIs among the construction workers and local community members:

- Formulation and implementation of HIV/AIDS prevention and control programme.
- Giving employment priority to local people to minimize the number of newcomers, hence minimizing the likelihood of new HIV transmission.
- Collaboration with local NGOs/CBOs dealing with HIV/AIDS to promote awareness and education campaigns.

7.2.9 Increased risk of COVID-19 transmission

The Contractor will take necessary precautions as stipulated in the ESF/Safeguards Interim Note: COVID-19 Consideration in Construction/Civil Works Projects. These include:

- Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site.
- Providing daily briefings to workers prior to commencing work, focusing on COVID-19 specific considerations including cough etiquette, hand hygiene and distancing measures, using demonstrations and participatory methods.
- Preventing a worker from an affected area or who has been in contact with an infected person from returning to the site for 14 days or (if that is not possible) isolating such worker for 14 days.
- Preventing sick workers from entering the site, referring them to local health facilities if necessary, or requiring them to isolate at home for 14 days.
- Provision of hand sanitizers, hand washing basins and soap at the entry gate.
- Provision of respiratory masks (N95) and enforce mandatory use to all workers on daily basis.

7.2.10 Creation of construction related risk of accidents

The following mitigation measures will be taken by the contractor during construction:

- Fitting all mobile construction equipment / machinery and trucks with sounding alarm and signal device to warn people, especially during backward movement.
- Putting a written warning sign boards in Kiswahili and English languages at strategic locations to prohibit or prevent entrance of unauthorized persons into the construction site.
- Restrict operation of mobile construction machinery/equipment to trained personnel only.
- Fencing the construction site to prevent people from entering the construction site. This will include putting a written warning in both English and Kiswahili at a strategic location to prevent unauthorized people from entering the construction site.

7.2.11 Creation of occupational health and safety risks

The following mitigation measures will be taken by the Contractor to minimize exposure of construction workers to health and safety risks:

- Provision of Personal Protective Equipment (PPE) such as reflective vests, hand gloves, welding goggles, safety boots, etc.
- Avoid prolonged use of hand-held equipment by workers beyond the prescribed 8 hours in accordance with Tanzania Standards¹⁰.

7.2.12 Increased risk of road traffic accidents

The Contractor will develop and implement a Traffic Management Plan (TMP). This includes deploying flag persons to guide traffic movement at the junction of the main road and access road to the construction site. The involvement of traffic police will be useful whenever possible.

7.2.13 Risk of emergence of GBV/SEA and SH

The following mitigation measures will be taken by the Contractor to minimize the occurrence of GBV/SEA and SH cases:

- Ensuring there are codes of conduct in place that forbid and place penalties for GBV/SEA and SH.
- Disseminating information that raises awareness on the prohibition of GBV/SEA and SH among the construction workers, students/local community members.
- The contractor will develop a Code of Conduct on ESHS, GBV/SEA and SH that will be attached to the Employment Contractors.
- A Grievances Redress Mechanism will be in place for construction workers, students, and local community members to address GBV/SEA and SH.

¹⁰The United Republic of Tanzania. The Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations (2010). THIRD SCHEDULE (Made Under Regulation 15-(1)).

7.2.14 Loss of temporary employment opportunities

The following mitigation measures will be taken by the Contractor to minimize the effect of retrenchment after project completion or closure:

- Prioritizing employment for local people because, after the project closure, they will easily revert to their normal economic activities.
- Ensure that all construction workers are registered with social security funds and are paid their terminal benefits immediately before retrenchment from jobs.
- Remittance of monthly NSSF contributions for all workers and submission of payslips to the Resident Engineer on a monthly basis.

7.2.15 Risk of causing damage on archaeological artefacts/ chance finds

The following mitigation measures will be taken by the Contractor to minimize the effect of damaging underground archaeological materials:

- Formulation and implementation of chance find procedures for any archaeological findings.
- There should be Chance Finding (CF) procedure in place to allow any identified archaeological artefact to be salvaged from the construction site.
- The workforce shall be trained on CF.
- The encounter of archaeological material shall be reported to the Antiquities Department of Zanzibar.

7.2.16 Risk of increased flood events due to climate change factors

The following mitigation measures will be taken by the Contractor to minimize the effect of climate change to the project:

- Provision of adequate stormwater surface drainage with screened ducts, especially during the monsoon rains, will be developed in advance and in accordance with the contractor's obligations for the stormwater management plan.
- Maintaining existing green belt to increase surface infiltration rate and subsequence base flow.

7.2.17 Increased water demand

The following mitigation measures will be taken by UDSM and the Contractor to minimize the effect of increased water demand:

- Development of an alternative borehole that will be used as the source of water for construction works.
- Harvesting rainwater through roof catchment to suffice increased water demand.
- After completion of construction works, the developed alternative borehole shall be connected to the existing IMS-Buyu water supply system to augment production yield.

7.3 Evaluation of residual risks/impacts after mitigation measures

The evaluation and rating of residual impacts/ after implementation of the enhancement and mitigation measures are provided in **Table 7.3-1**. The results indicate the residual negative impacts ranged from moderate to minor after the application of mitigation measures. However, the residual positive impacts had a major significance after the application of enhancement measures, hence indicating the maximization of project benefits. It also indicates the effectiveness of the proposed mitigation of measures in reducing the adverse impacts to an acceptable level, and that most of the adverse impacts are easily manageable and could be minimized through a good engineering design and good construction practice.

Table 7-1: Significance Rating of Identified Impacts in the Presence of Mitigation and Enhancement Measures

Risks/Impact		Impact evaluation criteria					Significance rating after mitigation
Phase	Description	Direct/ Indirect	Probability	Extent	Magnitude	Duration	
Pre-construction	Employment and income generation opportunities	Direct	Definite	Local	Medium	Short term	+ve Moderate
	Air Pollution	Direct	Highly probable	Site-specific	Low	Short term	-ve Minor
	Vegetation clearance for site preparations	Direct	Definite	Site-specific	Low	Short term	-ve Minor
	Noise and vibration pollution	Direct	Highly probable	Site-specific	Low	Short term	-ve Minor
	Destruction of archaeological artefacts	Direct	Highly probable	Site-specific	Low	Short term	-ve Minor
Construction	Creation of local employment opportunities	Direct	Definite	Local	High	Short term	+ve Major
	Income generation opportunities to the local community, material/equipment suppliers and contractors	Direct	Definite	Regional	High	Short term	+ve Major
	Wastes generation and associated littering	Indirect	Highly probable	Site-specific	Low	Short term	-ve Minor
	Occupational health and safety hazards	Direct	Highly probable	Site-specific	Medium	Short term	-ve Moderate
	Ambient air quality and dust pollution	Direct	Probable	Site-specific	Low	Short term	-ve Minor

Risks/Impact		Impact evaluation criteria					Significance rating after mitigation
Phase	Description	Direct/ Indirect	Probability	Extent	Magnitude	Duration	
	Noise nuisance and vibration	Direct	Probable	Site-specific	Low	Short term	-ve Minor
	Increased incident of HIV/AIDS and STIs transmission	Direct	Probable	Local	Medium	Long term	-ve Moderate
	Construction related risks and accidents	Direct	Probable	Local	Medium	Long term	-ve Moderate
	Water sources, marine and coastal pollution	Direct	Highly probable	Site-specific	Low	Short term	-ve Minor
	Occurrence of public traffic accidents	Direct	Probable	Local	Medium	Long term	-ve Minor
	Damage of existing access roads to construction site	Direct	Probable	Local	Low	Short term	-ve Minor
	Transmission of COVID-19	Direct	Probable	Regional	High	Long term	-ve Moderate
	Emergence of GBV/SEA and SH Cases	Indirect	Highly probable	Local	Medium	Long term	-ve Moderate
	Potential child labor and increased school truancy	Indirect	Probable	Local	Low	Short term	-ve Minor
	Increased water demand	Direct	Highly probable	Site-specific	Low	Short term	-ve Minor

Risks/Impact		Impact evaluation criteria					Significance rating after mitigation
Phase	Description	Direct/ Indirect	Probability	Extent	Magnitude	Duration	
Operation	Creation of local employment opportunities	Direct	Definite	Regional	High	Long term	+ve Major
	Income generation opportunities to material/equipment suppliers	Direct	Definite	Regional	High	Long term	+ve Major
	Contribution to local socio-economic development	Indirect	Definite	Local	High	Long term	+ve Major
	Contribution to utilities revenues	Direct	Definite	Regional	High	Long term	+ve Major
	Increased student enrolment	Direct	Definite	Regional	High	Long term	+ve Major
	Solid wastes generation and associated contaminations	Indirect	Probable	Site-specific	Low	Long term	-ve Minor
	Liquid wastes generation and contaminations	Indirect	Probable	Site-specific	Low	Long term	-ve Minor
	Increased runoff and soil erosion due to climate change effects	Indirect	Highly Probable	Regional	Medium	Long term	-ve Moderate
	Occupational health and safety hazards related to project facility operations	Direct	Highly probable	Site-specific	Medium	Long term	-ve Moderate
Decommission	Loss of employment following project closure	Direct	Definite	Local	Medium	Long term	-ve Moderate

CHAPTER EIGHT

8.0 HEALTH AND SAFETY MANAGEMENT PLAN

8.1 The Need for Health and Safety Management Plan (HSMP)

The proposed project will involve construction activities which are likely to create environmental health and safety risk to construction workers, visitors, and adjacent local community members. Thus, during the construction phase, the Contractor is required to prepare site specific HSMP in order to mitigate or minimize health and safety risks associated with the project during construction.

The purpose of this HSMP is to guide the Contractor in preparing her site-specific HSMP to manage health and safety issues at the workplace and the construction site. The Contractor's HSMP will provide detailed measures to eliminate or minimize health and safety risks to construction workers and visitors and safeguard the workers' welfare.

8.2 Objectives of HSMP

The overall goal of HSMP is to protect employees, the public, and the environment to comply with applicable laws and protect the Company's reputation¹¹. HSMP has two general objectives: prevention of incidents or accidents that might result from abnormal operating conditions on the one hand and reduction of adverse effects that result from normal operating conditions on the other hand.

Thus, the Contractor will be required to prepare a project specific HSMP, which details on how the environmental health and safety requirements, will be implemented and managed at the construction site. The Contractor's HSMP will provide details on how the contractor will mitigate construction health and safety impacts/risks and documents the contractor's response to inspection, monitoring, verification, internal auditing and correcting or improving environmental health and safety performance.

Specifically, the objectives of this HSMP are to:

- Provide specific mitigation measures and controls that can be applied on-site to avoid or minimize environmental health and safety risk.
- Describe health and safety management related roles and responsibilities of key personnel in implementing the identified safety measures and corrective actions.
- Outline monitoring regime to check the adequacy of safety measures during construction phase.
- Provide emergency preparedness and response mechanism to during construction phase.

8.3 Organizational Structure and Responsibilities

The organizational structure for implementation of HSMP is provided in **Figure 8.3-1**. The organization structure indicates there will be a forward and back flow of information among the key personnel and site construction team during implementation of HSMP. The responsibilities of key personnel and site construction team are provided in **Table 9-1**. The key personnel for HSMP implementation may include the Project Manager; Site Manager; Health and Safety Manager; Materials Engineer; and Site Foreman.

¹¹ https://en.wikipedia.org/wiki/Environment,_health_and_safety

Table 8.3-1: Responsibilities of Key Personnel

S/n	Key Personnel	Responsibilities
1.	Project Manager	<ul style="list-style-type: none"> ▪ To ensure all works comply with relevant regulatory and Project requirements. ▪ To ensure the requirements of the EH&S Management Plan are fully implemented. ▪ To endorse and support the Project environmental health and safety policy. ▪ To liaise with consultant, the health and safety Representative and other government authorities as required. ▪ To participate and provide guidance in the regular review of this EH&S Management plan and supporting documentation. ▪ To provide adequate resources (personnel, financial and technological) to ensure effective development, implementation and maintenance of this plan. ▪ To ensure that all personnel receive appropriate induction training, including details of the environmental health and safety requirements. ▪ To ensure that complaints are investigated and issues raised resolved. ▪ To stop work immediately where there is an actual or potential risk on health and safety.
2.	Site Engineer / Manager	<ul style="list-style-type: none"> ▪ To plan construction works in a manner that avoids or minimizes health risk. ▪ To ensure the requirements of EH&S Management Plan is fully implemented. ▪ To ensure construction personnel manage construction works in accordance with statutory and approval requirements. <ul style="list-style-type: none"> • Ensure environmental health and safety management procedures and risk protection measures are implemented. • Ensure all Project personnel attend an induction prior to commencing works. ▪ To liaise with consultant, Health and Safety Representative and other government authorities as required. <ul style="list-style-type: none"> • Stop work immediately where there is an actual or potential risk on health and safety.
3.	Health and Safety Manager	<ul style="list-style-type: none"> ▪ Overall management of health and safety aspects of the Project. ▪ Development, implementation, monitoring and updating of the Contractor's EH&S Management Plan and Sub plans. ▪ Report to Project Manager on the performance and implementation of the EH&S Management Plan.

S/n	Key Personnel	Responsibilities
		<ul style="list-style-type: none"> ▪ Ensure management reviews of the EH&S Management Plan are undertaken annually, documented and actions implemented. ▪ Ensure environmental health and safety risks of the Project are identified and appropriate mitigation measures implemented. ▪ Identify where health and safety measures are not meeting the set targets and where improvement can be achieved. ▪ Ensure health and safety protocols are in place and managed. ▪ Ensure health and safety compliance. ▪ Obtain and update all safety licenses, approvals and permits as required. ▪ Lead liaison with health and safety Representative and approval authorities. ▪ Manage health and safety document control, reporting, inductions and training. ▪ Manage health and safety reporting within the Project team and to the UDSM and regulatory authorities. ▪ Prepare reports on a monthly basis outlining the Project Works undertaken, achievements and areas where improvements were made. ▪ Oversee site health and safety monitoring, inspections and internal audits. ▪ Manage all subcontractors and consultants with regards to health and safety matters, including assessing their safety capabilities and environmental documents. ▪ Develop and facilitate induction, toolbox talks and other training programs regarding health and safety requirements for all site personnel. ▪ Notify UDSM and relevant authorities in the event of a health and safety incident. ▪ Stop activities where there is actual or potential health risk of harm to prevent health and safety non-conformance and advice the Project Manager, Site Manager and Site Foremen. ▪ Assists the Communication Manager to resolve health and safety- related complaints.
4.	Materials Engineer / Site Foremen	<ul style="list-style-type: none"> ▪ Provide input into the preparation of environmental health and safety planning documents as required. ▪ Ensure instructions and information relating to project health and safety risks are provided to staff. ▪ Ensure that the works are carried out in accordance with the requirements of the plan and supporting documentation, including the implementation of all environmental health and safety controls. ▪ Identify health and safety risks.

S/n	Key Personnel	Responsibilities
		<ul style="list-style-type: none"> Identify resource needs for implementation of the plan requirements and related documents. Ensure that health and safety-related complaints are investigated to ensure effective resolution. Take action in the event of a health and safety incident and allocate the required resources to minimize environmental health and safety risk. Report any activity that has resulted, or has the potential to result in health and safety incident immediately to the Health and Safety Manager
5.	Site Construction Team	<ul style="list-style-type: none"> Comply with the relevant requirements of the plan and other health and safety documentation. Participate in the Project/site induction program. Report any health and safety incidents to the foreman immediately or as soon as practicable if reasonable steps can be adopted to control the incident. Undertake remedial action as required to ensure health and safety controls are maintained in good working order. Stop activities where there is actual or potential health risk of harm to the environment or to prevent health and safety non-conformance and advice the Project Manager, Site Manager and Site Foremen.

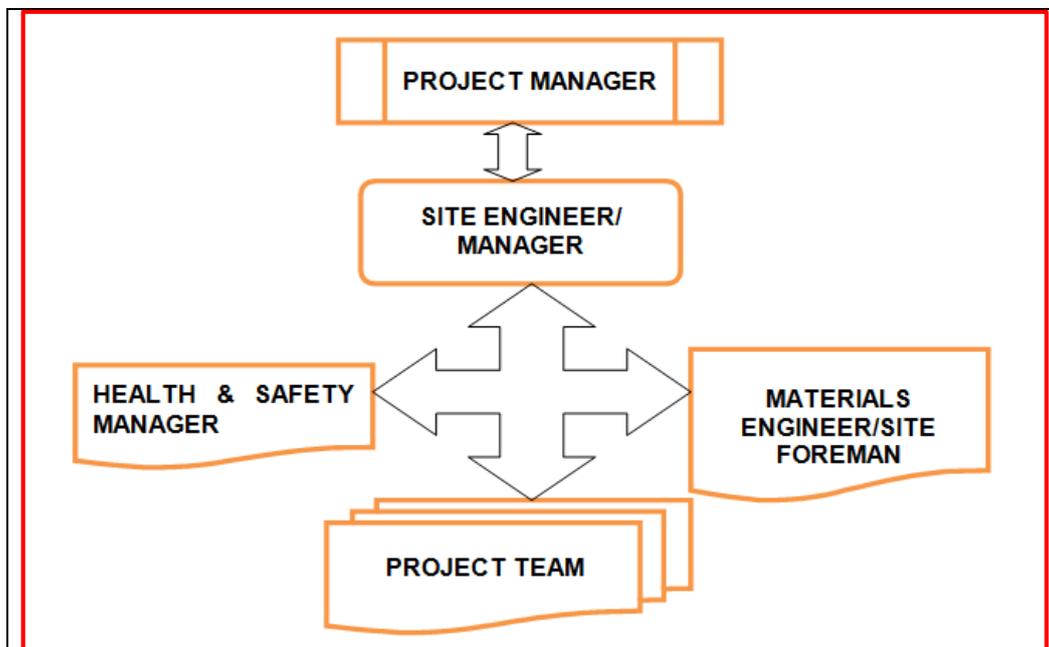


Table 8.3- 1: Organizational/ Structure for ESMP Implementation

8.4 Health and Safety Management System

The health and safety management system entails implementation of safety training and promotion of health and safety awareness, on the job-training, and toolbox talks

8.4.1 Safety Training and Promotion

The aims of safety training and promotion programs are:

- To update the safety awareness and technical skills of persons in the field of application.
- To orient new employees to the working environment.
- To identify and rectify hazards and convey the same to the workforce.
- To prepare the persons to select appropriate safety measures to overcome any unforeseen hazards/emergency situations.

To achieve the above aims, the following types of training shall be conducted at the site level:

(a) Induction training on health and safety: New or re-assigned employees shall be given health & safety introduction training pertaining to health & safety management and general safety rules and procedures, site-specific health & safety rules and their responsibility and accountability in safety performance. Health & safety introduction shall be given to all categories of personnel at the site by the health & safety manager.

(b) On the Job Training-- Based on the trade, individuals are given on the Job training. These trainings shall be focused on the safe ways of working in a particular trade including hazards involved. This shall be conducted by the foremen/supervisors in collaboration with Safety personnel. Trainer's performance after the program shall be assessed to evaluate the effectiveness of the training. All the employees shall be clearly explained the procedure to follow after an accident happens.

(c) Toolbox Talks (TB-s) - In addition to the formal training mentioned above, TBTs shall be conducted every day before the commencement of the job. TBTs shall be designed to highlight relevant safety and individual health issues to the workforce to raise their level of awareness. Such a meeting shall recall the risk assessment report and defects reported on previous performance. These shall be prepared and presented by the Supervisor/Foremen**(d) Safety Promotion**

Safety Promotion schemes shall be developed and implemented at site to promote safety awareness amongst the workforce. Individuals with best safety performance shall be recognized and rewarded. A safety suggestion scheme shall be implemented at site to encourage the workforce to come up with good safety practices and suggestions for improving working condition. The best suggestion shall be selected and the person shall be rewarded.

Health and safety posters and banners, including HIV/AIDS posters, shall be displayed around the worksite to raise awareness among the workforce. The posters shall be prepared in English and Kiswahili, which are commonly used at the site.

It is important that all persons involved in the project possess adequate safety knowledge and have a high degree of safety awareness so that they are able to:

- recognize the importance of safety and assign sufficient resources to handle it;
- give proper consideration to safety during planning and design stages to eliminate/reduce safety problems during later stages of the projects;
- take into account potential safety problems during the preparation/vetting of method statements;
- avoid performing unsafe acts;
- avoid creating unsafe conditions;

- identify unsafe acts/conditions and ask for rectification

Training and promotion notes, in the form of posters, booklets or similar may be developed and distributed to engineers, leading hands, foreman and others with a responsibility for managing specific work locations or activities. Notes may also be distributed to the broader workforce at daily pre-start meetings or made available in worker gathering facilities. The Environmental Health and Safety Representative from the Consultant will review and endorse the training program and monitor its implementation. Various EHS training programs will be carried out as detailed in **Table 8.4-1**.

Table 8.4-1: List of EHS Training Programs

S/n	Name of Programme	Resources
1.	Induction training on Health and Safety	<ul style="list-style-type: none"> ▪ Safeguard Expert ▪ OSHA representative
2.	On-the-job training	<ul style="list-style-type: none"> ▪ Project Manager ▪ Site Engineers/ Managers, and ▪ Site Foremen
3.	Tool Box Talks	<ul style="list-style-type: none"> ▪ Project Manager ▪ Safeguard Expert ▪ Site Engineers/ Managers, and ▪ Site Foremen
4.	Safety Promotion	<ul style="list-style-type: none"> ▪ Project Manager ▪ Safeguard Expert ▪ Site Engineers/ Managers, and ▪ Site Foremen
5.	Firefighting	<ul style="list-style-type: none"> ▪ Fire and Rescue Force ▪ Safeguard Expert ▪ Site Engineers/Managers

8.4.2 Safety Inspection and Follow-up Actions

The duty for inspection and follow-up actions is vested to Contractor's Health and Safety Manager in collaboration with Resident Engineer's Environmental Expert. Contractor's Health and Safety Manager shall inspect all project components using approved Site Safety Inspection Checklist.

8.4.3 Reporting of Accidents, Incidents and Investigation

Any accident or incident that will occur at the site shall be recorded using the Incident Record Data Sheet provided in the Occupational Safety and Health Act (2003), and the same information will be communicated to VC-UDSM and the World Bank within 24 hours from the time of the incident. The Contractor shall notify the Engineer and Employer as soon as reasonably possible after the occurrence of any accident which has resulted in damage or loss of property, disability or loss of human life.

The types of reported accidents include death; major injuries¹²; over 3-day injuries¹³; work related disease; and dangerous occurrences¹⁴. The majority of construction accidents or serious near misses must be reported to the Health and Safety Manager so they can be recorded officially and acted upon.

¹² It could be worker injuries or public member injuries.

¹³ Employee fails to perform normal duties work for 3 consecutive days.

¹⁴ These are near-miss happenings that are reportable.

All the incidents shall be investigated to find out the root causes and to prevent recurrences of the same kind. The methodology for the incident investigation shall be “Find out the facts, not the faults”.

A monthly safety performance report of the project shall be included in the Monthly Progress Report after the end of each month. Man-hours are defined as man-hours worked by all persons employed on site (including site supervisory staff, managerial staff and sub-contractors).

The monthly safety performance report must provide the following information:

- Total personnel at the site
- Total man hour worked
- No. of near missed
- No. of accidents
- No. of traffic/road accidents
- No. of lost days due to an accident
- No. of toolbox meeting
- No. of HSE training done
- No. of safety inspection carried out
- No. of statutory inspection
- No. of safety meetings
- No. of fatal accidents

8.5 Hazard Identification and Risk Assessment

The purpose of the hazard identification and risk assessment is to identify all potential hazards and associated risks during construction. The contractor shall take relevant measures to control all critical, high and moderate hazards. Low potential hazards will be eliminated. Prior to the commencement of any activity, detailed hazard identification shall be done by the site supervisory staff with the assistance of Health & Safety Manager and the hazards shall be communicated to the whole team deemed to execute the task.

8.5.1 Risk assessment

Assessing the risk includes considering things like:

- the severity of any injury or illness that could occur, for example is it a small isolated hazard that could result in a very minor injury or is it a significant hazard that could have wide ranging and severe affects, and
- The likelihood or chance that someone will suffer an illness or injury, for example, consider the number of people exposed to the hazard.

Severity and likelihood are combined to develop Risk Rating Matrix as shown in **Table 8.5-1**.

Table 8.5-1: Risk Rating Matrix

	Likelihood (L)				
Consequences (C)	Rare	Unlikely	Possible	Very Likely	Certain
Catastrophic	Moderate	Moderate	High	Critical	Critical
Major	Low	Moderate	Moderate	High	Critical
Moderate	Low	Moderate	Moderate	Moderate	High
Minor	Very Low	Low	Moderate	Moderate	Moderate
Insignificant	Very Low	Very Low	Low	Low	Moderate
Consequences (C)	How Severely Could Someone be Hurt?				
Catastrophic	Death or permanent disability				
Major	Serious Injury, hospital treatment required				

Moderate	Injury requiring medical treatment and some lost time
Minor	Minor injury, first aid only required
Insignificant	Injury requiring no treatment or first aid
Likelihood (L)	How Likely Are the Consequences?
Certain	Expected to occur in most circumstance
Very Likely	Will probably occur in most circumstance
Possible	Will occur occasionally
Unlikely	Could happen some time
Rare	May happen only in exceptional circumstances

8.5.2 Control the risks

The Contractor shall apply the hierarchy of risk control, whereby risks are ranked from the highest level of protection and reliability to the lowest. The first step is to eliminate a hazard, which is the most effective control. If this is not reasonably practicable, then risk will be minimized by substitution, isolation, and engineering controls.

If risk remains, it must be minimized by implementing *administrative controls*, and by using suitable *personal protective equipment*. However, administrative control measures and personal protective equipment rely on human behavior and supervision, and when used on their own, tend to be least effective in minimizing risks. Therefore, review control measures shall be used to be more effective.

8.5.3 Review control measures

Control measures must be reviewed regularly to make sure they remain effective. Controls can be checked by using the same methods as the initial hazard identification process. Common methods include workplace inspection, consultation, testing and analyzing records and data. The entire process of risk identification, assessment and control will be done by the contractor's Health and Safety Manager in collaboration with the entire construction team.

8.6 Risk Management Plan

8.6.1 Purpose of Risk Management Plan

A risk is an event or condition that, if it occurs, could have a positive or negative effect on a project's objectives. Risk Management is the process of identifying, assessing, responding to, monitoring, and reporting risks. This Risk Management Plan defines how risks associated with the project will be identified, analysed, and managed. It outlines how risk management activities will be performed, recorded, and monitored throughout the construction period of the project and provides templates and practices for recording and prioritizing risks.

The Risk Management Plan is created by the project manager (through the Health and Safety Manager) in the Planning Phase of the project and is monitored and updated throughout the project. The intended audience of this document is the project team, project sponsor and management.

8.6.2 Risk Management Procedures

8.6.2.1 Process

The project manager working with the project team and project sponsors will ensure that risks are actively identified, analysed, and managed throughout the construction period. Risks will be identified as early as possible in the project so as to minimize their impact. The steps for accomplishing this are outlined in the following sections. The Health and Safety Manager will serve as the Risk Manager for this project.

8.6.2.2 Risk identification

Risk identification will involve the project team and appropriate stakeholders and will include an evaluation of environmental factors, organizational culture, and the project management plan, as well as the project scope. Careful attention will be given to the project deliverables, assumptions, constraints, cost/effort estimates, resource plans, and other key project documents.

8.6.2.3 Risk Analysis

All identified risks will be assessed to identify the range of possible project outcomes. Qualification will be used to determine which risks are the top risks to pursue and respond to and which risks can be eliminated.

(a) Qualitative Risk Analysis

The probability and impact of occurrence for each identified risk will be assessed by the project manager, with input from the project team using the following approach:

Probability

High – Greater than <70%> probability of occurrence

Medium – Between <30%> and <70%> probability of occurrence

Low – Below <30%> probability of occurrence

Impact

High – Risk that has the potential to greatly impact project cost, project schedule or performance

Medium – Risk that has the potential to slightly impact project cost, project schedule or performance

Low – Risk that has relatively little impact on cost, schedule or performance

Risks that fall within the **RED** and **YELLOW** zones will have risk response planning which may include both risk mitigation and a risk contingency plan.

Impact	H	Yellow	Red	Red
	M	Green	Yellow	Red
	L	Green	Green	Yellow
		L	M	H
Probability				

(b) Quantitative Risk Analysis

Analysis of risk events that have been prioritized using the qualitative risk analysis process and their effect on project activities will be estimated, a numerical rating applied to each risk based on this analysis, and then documented in this section of the risk management plan.

8.6.2.4 Risk Response Planning

Each major risk (those falling in the Red & Yellow zones) will be assigned to a project team member for monitoring purposes to ensure that the risk will not “fall through the cracks”.

For each major risk, one of the following approaches will be selected to address it:

- **Avoid** – eliminate the threat by eliminating the cause
- **Mitigate** – Identify ways to reduce the probability or the impact of the risk
- **Accept** – Nothing will be done
- **Transfer** – Make another party responsible for the risk (buy insurance, outsourcing, etc.)

For each risk that will be mitigated, the project team will identify ways to prevent the risk from occurring or reduce its impact or probability of occurring. This may include prototyping, adding tasks to the project schedule, adding resources, etc.

For each major risk that is to be mitigated or that is accepted, a course of action will be outlined for the event that the risk does materialize in order to minimize its impact.

8.6.2.5 Risk Monitoring, Controlling, and Reporting

The level of risk on a project will be tracked, monitored and reported throughout the project lifecycle.

The project team will maintain a "Top 10 Risk List" that will be reported as part of the project status reporting process for this project.

All project change requests will be analysed for their possible impact on the project risks.

Management will be notified of important changes to risk status as a component of the Executive Project Status Report.

8.6.3 Tools and Practices

A Risk Log will be maintained by the project manager and will be reviewed as a standing agenda item for project team meetings.

8.6.4 Closing a risk

A risk will be considered closed when it meets the following criteria:

- Risk is no longer valid
- Risk Event has occurred
- Risk is no longer considered a risk
- Risk closure at the direction of the Project Manager

8.6.5 Lesson learned

The lessons learned will be captured and recorded in the project reports under the Health and Risk Management Plan.

8.7 9.6 Industrial Health and Hygiene

8.7.1 Potential health hazards

Potential hazards to health in the construction industry can arise from the use of materials, substances, and processes if they are not properly controlled. Some risks are caused by the inhalation of dust, toxic fumes, exposure to high temperatures, noise, vibration, radioactive substances, etc.

Contractor shall be responsible for maintaining healthy working conditions for all employees and sub-contractors. If it is not possible to remove the cause of harm, then suitable and sufficient Personal Protective Equipment (PPE) shall be provided to those who could be affected.

8.7.2 Sanitary Facilities

Adequate sanitary conveniences will be provided at strategic points of the workplace. Such conveniences are lavatories and washbasins. Such facilities shall be kept clean and in good working condition at all times.

Domestic wastes shall be collected per the environmental management plan and Environmental Guidelines.

8.7.3 Food, Drinking Water, and Canteen for Workers

Proper clean and free food (lunch) shall be provided by the Contractor to all construction workers. The food shall be prepared by local food vendors. During Construction, provision of food shall also be considered during the evening for construction workers if the construction works will continue beyond 18:00 hours. The Contractor shall provide a proper cooking and eating place (Canteen) for construction workers with a clean drinking water supply and sanitary facility. The canteen shall be of sufficient size and will have a cement floor made of timber and corrugated iron sheets. The Canteen shall have benches and tables and be well-ventilated to allow fresh air circulation.

8.7.4 Personal Protective Equipment

Personal Protective Equipment (PPE) will be provided to construction workers. Construction workers will be trained on the proper use of PPE. Individuals shall not be allowed to work if they are not equipped with the appropriate PPE. Visible signboards shall be posted at work area indicating potential hazards and PPE that is required to be worn in that area / for that activity, in both English and Kiswahili languages.

8.7.5 First Aid Facilities

All accidents, which involve personal injury, shall be given medical treatment and reported to the concerned Supervisor. A first aid station shall be set up at the Contractor's Camp area and experienced medical personnel will be in charge of the station.

All injury cases, except minor injuries shall be sent to medical center for treatment. In case of an accident with personal injury, doctors will attend such person in a prescribed hospital sent by Contractor's proper transport immediately after accident. Adequate number of first Aid boxes shall be available at work sites and offices. First aid boxes shall be frequently inspected and updated.

8.7.6 Fire Prevention and Fighting Facilities

Construction sites, offices and camp premises are very prone to fire hazards because of different kind of combustible material used in all the above places. The components of a fire are fuel (combustible substance), heat and oxygen.

Fire hazard evaluation shall be conducted at all the project sites and camps to identify the fire risk at each location. Depending upon the risk factors, fire prevention and fighting systems shall be provided and maintained.

8.8 Emergency Preparedness and Response Plan

This section provides general guidance for handling emergency situation on the project site. An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the project site or in the local community. Emergencies do not normally include safe work practices for frequent upsets or events that are covered by occupational health and safety. Proper emergency planning and response are important elements of the site.

8.8.1 Responsibilities

- **Project Management:** The management must be committed to the principle of safe working and ensure that no person shall ever put himself/herself at risk.
- **Site Management:** It is the responsibility of the site management to review and ensure the awareness of emergency procedures among all site personnel.
- **Employees:** It is also the responsibility of all employees to continually familiarize themselves with the assembly procedures for their relevant areas of work.
- **General:** Any information relayed about an emergency shall be clear and precise, giving the exact location, the nature and seriousness of the emergency, and contact numbers and names.

8.8.2 Emergency Plan

All actions will be coordinated with the overall emergency plan operated by the Engineer. The Project Manager has the overall responsibility of coordinating all emergency procedures along with the Health & Safety Manager.

All emergency telephone numbers and contact names shall be posted at strategic points on site. The following subsequent actions listed below shall be taken during emergency:

- Close all plant and equipment, if safe.
- Stop all work and report to the nearest evacuation area/assembly area and await further instructions.
- Stop all equipment and vehicles safely.
- Contact the Health & Safety Manager and relay the message to the Engineer / Employer
- Ensure all personnel are aware of the emergency.

(a) Emergency alarms

A combination of red warning lights and sirens as appropriate, will be used in case of:

- Major fire or an Explosion.
- Major transport accident/spill of flammable liquid.
- Major equipment accident.
- Entrapment of personnel

Emergency alarms shall be placed in all areas with a gathering of employees, including campsites, site offices, borrow pits, crushers and at specific work stations such as bridge sites.

The alarm shall be capable of being perceived above ambient noise or light levels by all employees in the affected portions of the workplace. Tactile devices may be used to alert those employees who would not otherwise be able to recognize the audible or visual alarm.

(b) Assembly Point

In an emergency, all personnel are to proceed in an orderly manner to the nearest safe assembly point. Adequate assembly points shall be provided in all areas where indoor works are done to provide a common meeting point in case of emergency. These assembly points shall all have signs written "*Assembly Point*" and be easily accessed.

(c) Headcount

After all the people have gathered at the assembly point, supervisors shall take a head count and check that all employees are present. He/she shall also inform the Engineer/ Employer of the result of the headcount.

(d) Rescue Team

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

(e) Fire Fighting

In case of a fire, after the alarm has been sounded, all efforts will be made to put off the fire by the proper use of fire extinguishers, fire hydrants, hoses etc. until more professional help come by. Fire extinguishers will be available on site at strategic locations, such workshop/garage; offices; laboratories; and accommodations areas.

Employees shall be aware of the standards for fire safety:

- smoke alarm signals and locations
- how to use fire extinguishers and fire blankets, etc.
- where emergency exits are located
- where fire extinguishers and other fire equipment are located in their work areas
- the purpose of each type of fire extinguisher

(f) All Clear

Normal work will be resumed only after the engineer gives a clear signal. As such, the supervisors shall make all arrangements to meet the concerned authorities.

CHAPTER NINE

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Overview of ESMP

This section provides detailed plans for the implementation of the impact mitigation measures and monitoring compliance checks during execution of the project throughout its life cycle notably: mobilization, construction, operation, and decommissioning. Objectively, an Environmental and Social Management Plan (ESMP) for the proposed project aims at minimizing environmental degradation and optimizing social benefits for the communities around the project area. Detailed environmental and social management plan as well as monitoring plans are presented in **Tables 8-1 and 8-2**.

An appropriate environmental and social management plan will depend on the scope of identified impacts to be addressed in the construction works. The ESMP defines the management procedures that allow the proposed project to avoid, mitigate, or minimize adverse environmental and social impacts of construction and operational activities. Where impacts are likely to be significantly adverse, the ESMP provides guidance for mitigating the Environmental and Social Impacts.

9.2 Objectives of ESMP

The overall purpose of the ESMP is to ensure that all activities within the project are not harmful to the surrounding communities and the environment as well. It also ensures sound compliance with the requirements of pertinent Acts and Regulations while bearing in mind the characteristics of the community-based development interventions. ESMP Table has been prepared in accordance with identified environmental and social impacts.

Specific objectives of ESMP include: -

- To give details of the feasible and cost-effective mitigation measures to be taken during the implementation and operation of the project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels,
- To make reasonable cost estimates of the potential residual environmental impacts of these measures; and
- To give institutional roles in mitigating adverse impacts
- To optimize the benefits of the project and ensure it is environmentally friendly and socially acceptable.
- Provide emergency preparedness and response mechanisms during the construction phase.

ESMP enhances effective monitoring of elements that may aid in the timely mitigation of adverse environmental and social impacts and the achievement of positive impacts. Other actions needed to implement these measures include training, capacity building, and organizational issues. Also, measures are proposed to mitigate or prevent major impacts that the project could bring about through improving the installation of facilities. For clarity, the measures have been divided into a) measures to be taken during the construction phase, b) measures to be taken during the operational phase, and c) measures to be taken during the eventual end of the initial engineering design of the project.

All contractors and subcontractors shall comply with the implementation of ESMP requirements applicable to the tasks they are employed to undertake.

The measures and procedures outlined in this ESMP are commitments made by the project proponent and, therefore, remain responsible for their implementation. It is recognised that

practical implementation of many of the measures may rest with Contractors and Subcontractors and consequently, the project proponent will require the implementation of a robust review/audit programme, as described in this ESMP, to measure and ensure that it is properly executed by the Contractor

9.3 Scope of the ESMP

This Environmental and Social Management Plan (ESMP) has been developed to identify the environmental and social management and mitigation actions required to implement the project in accordance with the requirements of the World Bank Safeguard Policies and applicable Tanzania national policies and legislation.

The ESMP will be used by the Contractor for preparation of Contractors' ESMP (C-ESMP) which will address site specific environmental and social issues. In addition, the Contractor will be required to prepare issues specific management plans, which provide details on the environmental and social management procedures, processes and mitigation and monitoring measures required to complete actions identified in the ESIA Report.

9.4 Implementation of ESMP

9.4.1 Institutional Roles and Responsibilities

The important stakeholders/agencies identified in this ESMP include the University of Dar Es Salaam (UDSM); Institute of Marine Sciences; World Bank; Magharibi B District Council; Fire and Rescue Force, Occupation Health and Safety Authority; Ward and Villages Development Committees, and Non-Governmental Organisations (NGOs) / Community Based Organisations (CBOs) dealing with project-related environmental and social aspects in the project area.

The responsible institutions for ESMP implantation include the University of Dar es Salaam (UDSM) on behalf of the Government of the United Republic of Tanzania; the World Bank (WB); Supervision Consultant; Contractor; Division of Environment in the Vice President's Office (VPO); Zanzibar Environment Management Authority (ZEMA), Ministries, Government Agencies and Local Government Authority (LGA). The organization chart for ESMP implementation is provided in **Figure 9.4-1**.

The effective implementation of ESMP also requires that all persons working on the project are aware of the importance of the environmental requirements of the project and their roles and responsibilities in the implementation of the ESMP. They should also be aware of the significant actual or potential environmental impacts of their work activities, the benefits of improved performance, and the consequences of not complying with environmental requirements.

9.4.1.1 Financing agency

The project is being financed by the University of Dar Es Salaam (UDSM) on behalf of the Government of the United Republic of Tanzania through credit support from the World Bank (WB). UDSM and the WB shall be responsible for review and approval of Contractor's ESMP (C-ESMP), subsequent Monthly Progress Reports and Monthly Environmental, Social, Health, and Safety (ESH&S) Compliance Reports submitted by the Supervision Consultant and Contractor, respectively. Certification of interim payments of the Contractor(s) shall be based on compliance performance on C-ESMP.

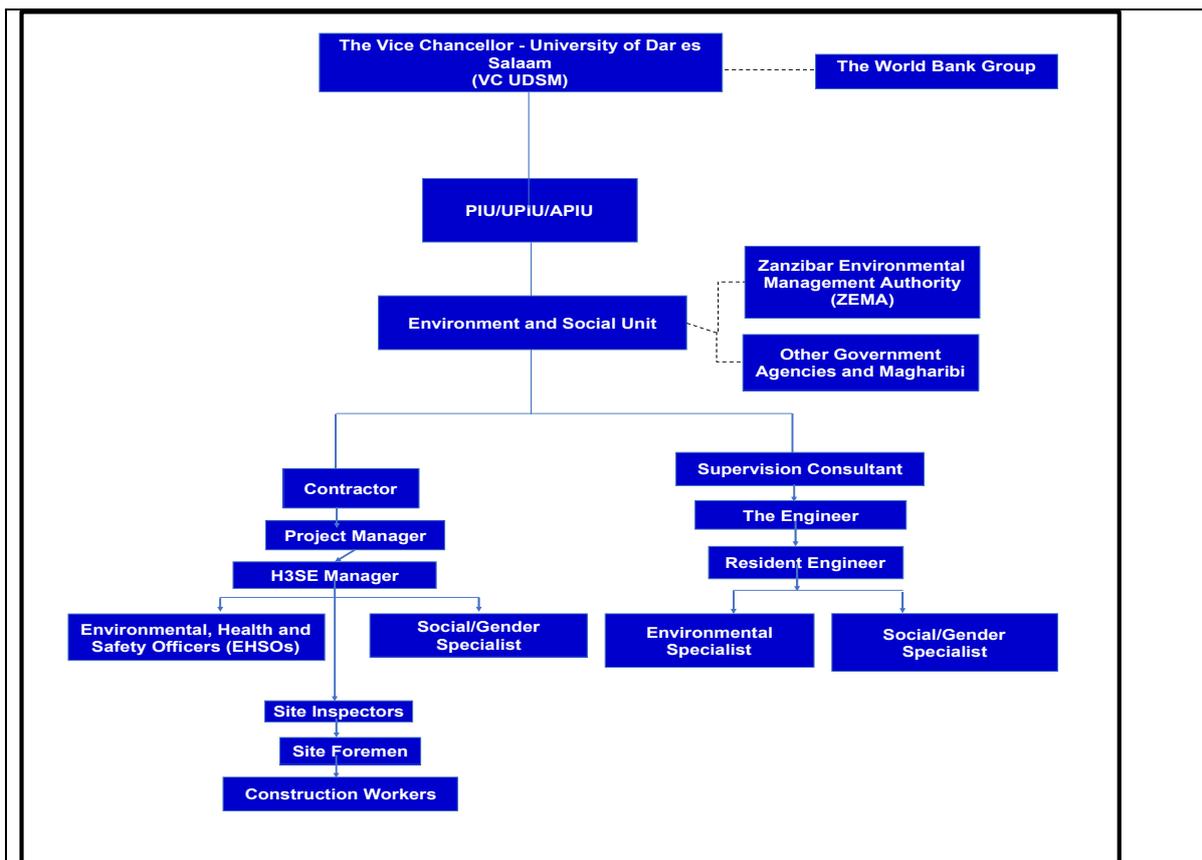


Figure 9.4-1: ESMP Organisation Chart for Proposed Project at IMS-Buyu Campus

9.4.1.2 Implementing Agency

The project is being implemented by the Vice Chancellor of University of Dar es Salaam (VC-UDSM) on behalf of the Government of the United Republic of Tanzania. In this regard, VC-UDSM also holds final responsibility for environmental performance of the project. Therefore, the VC-UDSM shall be responsible for overseeing the implementation of impact mitigation and enhancement measures. Specifically, the responsibility for environmental and social management in UDSM rests with the Safety and Environment Unit (SEU) under HEET Programme. Therefore, the DSM shall be responsible for overseeing implementation of mitigation measures and compliance monitoring through its Safety and Environment Unit (SEU).

9.4.1.3 Supervision Consultant

The Supervision Consultant will be appointed by the implementing agency and will be responsible for monitoring and supervision of the construction works including implementation of CESMP. The Supervision Consultant will appoint a Resident Engineer to oversee the construction works and monitor the works undertaken by the Contractor and implementation of ESMP to ensure compliance with contract specification and contractual requirements.

The Supervision Consultant will also appoint an Environmental Specialist (ES) and Social/Gender Specialist (SGS) to assist the Resident Engineer. The Environmental Specialist shall be responsible for Environmental, Health, Safety and Security (EHSS) Issues and the Social/Gender Specialist (SGS) shall be responsible for Worker’s Welfare, Resettlement / Compensations Issues, Grievances Redress Mechanism (GRM), Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH).

9.4.1.4 Contractor

The Contractor shall be responsible for implementing construction works and ensuring compliance with environmental and social requirements, including implementing the mitigation measures outlined in the ESMP. Therefore, the Contractor will be responsible for preparing and implementing the Contractor's site-specific ESMP (C-ESMP) based on this ESMP or Project ESMP (P-ESMP). The Contractor will ensure that the implementation of C-ESMP conforms to the requirements of all local laws, regulations, and contract clauses.

The Contractor shall appoint the Project Manager, who will be assisted by the ESH&S Team, which will be comprised of a Health, Social, Security, Safety, and Environmental (H3SE) Manager assisted by an Environmental, Health, and Safety Officer (EHSO) and a Social/Gender Officer (SGO).

The Environmental Manager shall be an overall in-charge responsible for overseeing the implementation of Environmental, Social, Health, Safety and Security (ESHSS) issues. However, for effective implementation of the ESMP, the Contractor will be required to appoint an Environmental, Health, and Safety Officer (EHSO) and a Social/Gender Specialist (SGO).

S/n	Title/Position	Responsibility
1.	Environmental Health and Safety Officer (EHSO)	Environmental, Health, Safety and Security Issues
2.	Social/Gender Officer (SGO)	Social, Gender and Resettlement Issues, including GRM, GBV/SEA and SH.

In order to ensure enforcement of ESHSS issues, the Site Inspectors and Site Foremen, apart from undertaking supervision of construction works, shall also be responsible for overseeing the implementation of outlined mitigation measures in the ESMP, including ESHSS issues.

9.5 Contractor's Environmental Specification

The Contractor's Environmental Specification will be incorporated into the Contract Document to provide to ensure the environment is free from the impacts of the Contractor's activities. The Contractor shall follow the guidelines determined in the Contract Document. General environmental problems related to the Contractor's activities include:

- Site management;
- Storage and treatment of fuel and material;
- Dust and noise hazard control;
- Solid Waste Management; and
- Wastewater Management.

9.5.1 Contractor's Environmental Protection Plan

The Contractor shall hold a copy of the Environmental and Social Management Plan (ESMP), which shall be included in the bidding documents. Before rehabilitation/construction, the Contractor shall submit an Environmental Protection Plan for the construction site to the Supervision Consultant's Resident and PIU for review and approval.

The Plan shall include the general mitigation measures for environmental impacts and the specific mitigation measures for response to emergency accidents, and the general measures shall include the following, but not be limited to the followings:

- General Rehabilitation Plan, indicating operation area, fuel storage area, fuel supply area, parking area, equipment maintenance area, material storage area and campsite;
- Waste Management Plan;
- Dust Control Plan; and
- Noise Control Plan

9.5.2 Site Facility

The Contractor's Office and Materials Storage Yard will be secured near the construction site. The Contractor will be required to prepare a site plan for review and approval by the Resident Engineer. This will include drawings showing the layout of the Contractor's Office and Materials Storage Yard.

9.5.3 Recruitment of Construction Workers

The Contractor will always give employment priority to the local people. The Contractor shall publish the required positions for employment in the local media and all signboards. The construction workers and other personnel shall be employed in accordance with the Employment and Labour Relations Act No.6 of 2004. The Contractor shall provide training for the construction workers on environmental protection, GBV / SEA, and occupational health and safety issues.

9.5.4 Requirements for Contractor's Office

Since all construction workers to be recruited will be from within the urban areas, there will not be any requirements for accommodation for the construction workers. However, the Contractor must provide cloth changing rooms, resting areas and sanitary facilities for the construction workers.

There shall be independent and sound bath facilities (toilets, bathroom) and cloth changing rooms) for male and female workers. The toilets shall have sufficient water and be equipped with soap and toilet paper, etc. All facilities shall be clean and available. The toilet shall be marked indicating separate toilets, bathrooms and cloth changing rooms for "Male" and "Female".

Other facilities shall include:

- Kitchen supplied with clean water, and in favourable sanitary condition.
- Septic Tank-Soak Pit System for treatment of domestic sewage before discharge into the seawater.
- First Aid Kit complete with medicine shall be available at the Contractor's Office managed by a qualified nurse. The nurse shall receive complete emergency rescue training and be capable of properly transferring the injured or patients to local referral hospital on time.

9.5.5 Code of Ethical Conduct

The Code of Ethical Conduct shall be established for the construction workers and emphasize appropriate conduct, strict prohibition of drug and alcohol and conformance to relevant laws and regulations to reduce the social impacts. All workers shall be familiar with the Code of Ethical Conduct. The local community shall also know the Code of Ethical Conduct for construction workers. The workers who fail to follow the Code of Ethical Conduct shall be punished. The Code of Ethical Conduct shall include, but not be limited to, the following measures:

- All workers shall abide by national laws and regulations.
- Dangerous goods and weapon are strictly forbidden at the construction site.
- Obscene goods and gambling are strictly forbidden at the construction site.
- Fighting is strictly forbidden at the construction site.
- Life and production of the surrounding area and the local people shall not be interfered.
- Local traditional culture, customs and traditional activities shall be respected.
- Smoking is only allowed in designated area.
- Dressing and personnel hygiene shall be appropriate.
- Sanitary conditions of accommodation shall be proper.

The Code of Ethical Conduct shall be followed even outside the project site in their residential areas during interaction with local community members.

The followings are strictly forbidden at the construction site and the surrounding area:

- Impacting or damaging the structure with historical or architectural value;
- Burning of solid wastes into the surroundings without permission from resident engineers.
- Drinking during working time.
- Mechanical maintenance (engine oil and lubricant addition) of vehicles outside the designated area.
- Dumping of solid wastes outside the designated area.
- Dangerous driving in the surrounding area and local roads.
- Failure to PPE (safety shoes, reflective vests, face masks, and helmet) at the construction site.
- Causing any health and safety impact to the surrounding people.
- Leakage of any pollutant leakage, like waste oil; and
- Dumping of solid waste into the surrounding environment (e.g., plastic bottles, plastic bags, food cans, etc.).

All Contractors, office workers or other personnel who violate the above regulations shall be subject to punishment of verbal warning or termination of employment contract, depending on the severity.

9.5.6 Health and Safety

The Contractor shall ensure the project conforms to all national and local safety regulations and other damage avoidance measures. Before construction, the Contractor shall execute safety training for the workers. Other measures include:

- Provision of sufficient sunlight during the day time and light during the night time.
- Provision of enclosure made up of corrugated iron sheet around the construction site, and shall be regularly inspected and maintained during construction. This will be reinforced by provision of written warning signboard in Kiswahili and English Language to prevent trespass by unauthorized persons into the construction site without the approval of the Contractor's personnel.
- Provision of Fire-fighting equipment, like fire extinguisher at the Contractor's Office.
- Provision of sufficient PPE such as eye goggles, protective gloves, face shield, dust cover, helmet, ear plugs, steel helmet, etc.) to the construction workers.
- Safety regulations, contingency plans and emergency contact information shall be indicated in the bulletin board at the construction site.
- Conducting medical examination for the construction workers annually;
- Provision of training on personal basic hygiene and epidemic prevention, including respiratory disease and communicable disease.
- Conducting HIV/AIDS prevention and control campaigns for construction workers and fish market users, including publicity at the construction site and the surrounding areas in the form of bulletin and training course.
- Provision of basic emergency rescue service and emergency measures for the construction workers.
- Complying with the advice provided by the Health and Safety Authority (DoSH) and the fire and rescue force

A detailed Health and Safety Management Plan (HSMP) for the project is presented in Chapter 9 of this report.

9.5.7 Storage of Fuel, Oil/Grease, and Other Hazardous or Toxic Material

All fuel shall be stored in a concrete paved the storage yard with bund walls and shall be 110% of the fuel storage container. Fuel storage sites shall not to be located near any water sources (i.e., within 100 m from the water source). Dangerous goods shall be stored in a designated storage device. Temporary storage regulations shall be prepared for fuel, oil and paint, etc.

Only authorized personnel are allowed to enter the storage area. The storage area shall be free from vehicle damage and shall be subject to periodic inspection for leakage, damage and pollution conditions.

Equipment maintenance can only be made at the workshop / garage. The operation surface (concrete floor within the rail area) must be properly designed to ensure the collection of oil and fuel in the appropriate container. In case of oil/fuel leakage, the soil pollution must be removed and transported to the approved area. Relevant preventive measures must be taken to prevent the grease, oil, fuel, solvent and chemicals from polluting soil and water.

9.5.8 Solid Waste Management

During construction, the Contractor must take proper measures to timely remove the waste at the construction site to the approved waste treatment equipment. Construction material accumulation shall be reduced by any possibility.

Household garbage produced during the Contractor's activities at the campsite must be placed in the can (210 L steel or plastic buckets) or garbage truck. The Contractor must ensure to empty the garbage container weekly or as required.

All garbage must be immediately put into the garbage can or truck. The garbage shall not be thrown about in operation area or Contractor's campsite.

The construction waste must be temporarily stored within the construction site and transported to the approved dumping site. Incineration or burning of any kind of solid wastes is strictly forbidden at the construction site.

9.5.9 Wastewater and Storm Water Management

Wastewater from the construction site and the campsite shall not be directly discharged to the surface waters. Domestic sewage must be discharged after proper treatment by using onsite sanitation system.

Storm water must be discharged to the sea through concrete lined storm water drainages to prevent sedimentation of the marine environment. Storm runoff discharged from the construction site (temporary drainage facility) shall be through concrete lined storm water drainages.

9.5.10 Noise Control

Construction works shall be confined to the daytime only, and construction near the sensitive receptors should be noise-free.

Personnel, visitor and construction worker at the site must wear proper hearing protection device to avoid hearing injury by noise.

The Environmental Specialist must check the site periodically to ensure the site complies with Occupation Health and Safety.

9.6 Grievances Redress Mechanism

The Contractor will be required to formulate a Grievances Redress Mechanism (GRM). The purpose of the GRM is to outline a process for dealing with or resolving project-level grievances raised by Aggrieved Person (AP) regarding specific activities, and/or unanticipated social impacts resulting from Project implementation. The GRM applies to the construction workers and local residents, and other stakeholders who are directly or indirectly affected by the project. The grievance process outlined hereunder provides procedures for handling complaints/claims internally in a transparent manner to avoid conflict and, therefore, maintain good relationships with various stakeholders.

The PIU will oversee the implementation of GRM during the execution of the Project to ensure the protection of the rights of APs and beneficiaries during Project implementation. The requirements for the GRM are as follows:

- The grievance process must not impose any cost to those raising the grievances (i.e., the complainants).
- Concerns arising from Project implementation must be adequately addressed promptly.
- Participation in the grievance process must not preclude the pursuit of legal remedies under the laws of Tanzania.

The issues covered by the GRM, among others, include complaints related to employment, sexual harassment, and gender-based violence. Specifically, for employment issues may include:

- Failure by the Contractor to serve the employment contract.
- Failure by the Contractor to pay minimum wage following the labour laws.
- Failure by the Contractor to remit monthly national social security contributions.
- Failure by the Contractor to provide medical treatment for a sick employee.
- Unlawful termination of a worker,
- General workers' welfare such as annual leave, and sick, maternity and family leave,
- Failure to provide Project workers with adequate periods of rest per week, as required by the labour laws.

In the case of GBV/SEA and SH, a proper reception channel will be in place by appointing a local NGO (or CBO) to handle all kinds of complaints related to GBV/SEA and SH, including providing appropriate counselling to the victims.

Formation of Grievances Redress Committee

To address grievances, a Grievance Redress Committee (GRC) will be formed to deal with grievances as they arise. The GRC will be comprised of the following: -

- Environmental and Social Unit (ESU)'s Safeguard Officer,
- Supervision Consultant's Environmental Specialist and Social/Gender Specialist
- Contractor's Human Resource Officer,
- Magharibi "B" District Environmental Management Officer (DEMO) and District Community Development Officer (DCDO), and
- Shakani Shehia.

Note that the presence of the local government authorities is important because some of the grievances may originate outside the project boundaries. The involvement of an NGO or CBO will also be necessary. For example, if a project worker is involved in sexual harassment of a local community member, the matter will be handled by a qualified NGO or CBO.

The construction workers and fish market users will be informed of the existence of the GRM as soon as it is in place, as well as of the following:

- Members of the Grievances Redress Committee (GRC)
- How to access the GRC.

- How to lodge a formal complaint.
- The timeframes for each stage of the process.
- Characteristics of the GRC: confidentiality, responsiveness, and transparency.
- Alternative avenues of grievance resolution in case of conflicts of interest.

9.6.1 Role and Responsibility of Grievances Redress Committee

The Gender Redress Committee (GRC) will be Chaired by SEU's Safeguard Officer, who will be responsible for receiving and registering grievances. The Supervision Consultant's Social/Gender Specialist will be the Secretary of the GRC and will assist the Chairperson in documenting, registering, communicating, and reporting issues related to grievance management.

The grievance management procedure will be simple and will be administered as far as possible by the GRC at the Project Level. The GRC will prepare monthly reports showing how received grievances were handled in summary and submit to the University of Dar es Salaam and WB for record purposes. To ensure transparency, the Grievance Redress Procedure will be printed in A3 Size Paper and posted at all strategic locations within the Buyu (IMS) project sites to be read by construction workers and local community members.

The GRC shall disseminate detailed procedures to redress grievances and appeal processes among the construction workers and local community members through their local government offices (e.g., Ward Office, Shehia, and Village Office).

9.6.2 Grievance Redress Procedures

The formal, detailed GRM to be developed will contain specific grievance procedures, including both informal and formal grievance mechanisms. The grievance redress mechanism for dealing with complaints is summarized in **(Figure 9.6-1)**.

In general, complaints and disputes should be resolved at the project level. Each grievance will be treated confidentially.

The grievance resolution process is comprised of four stages:

- Reception
- Investigation and inquiry.
- Response
- Follow up and closeout.

The access to the GRM will be easy and quick, in particular to aPs, who are the people most likely to need it. The formal grievance will be:

- Documented in a written Grievance Form and recorded in a logbook:
- Assessed on its level of urgency/severity and
- Assigned to GRC, which will then inform the complainant within seven (7) days that it has received the grievance and that it is under review.

The Aggrieved Person (AP) will report his/her grievance to the GRC through its Chairperson. If a grievance is received face-to-face or over the phone and the aggrieved wishes to address it formally, it is the responsibility of the Chairperson who receives the grievance to complete a Grievance Registration Form.

In general, grievances should be resolved within 30 days. The Chairperson will communicate the findings of the investigation and resolution and seek approval from the AP, who will either accept or appeal the outcome. If the AP is satisfied with the outcome, then the grievance is closed out and will provide his/her signature (or fingerprint) on the Grievance Form as confirmation.

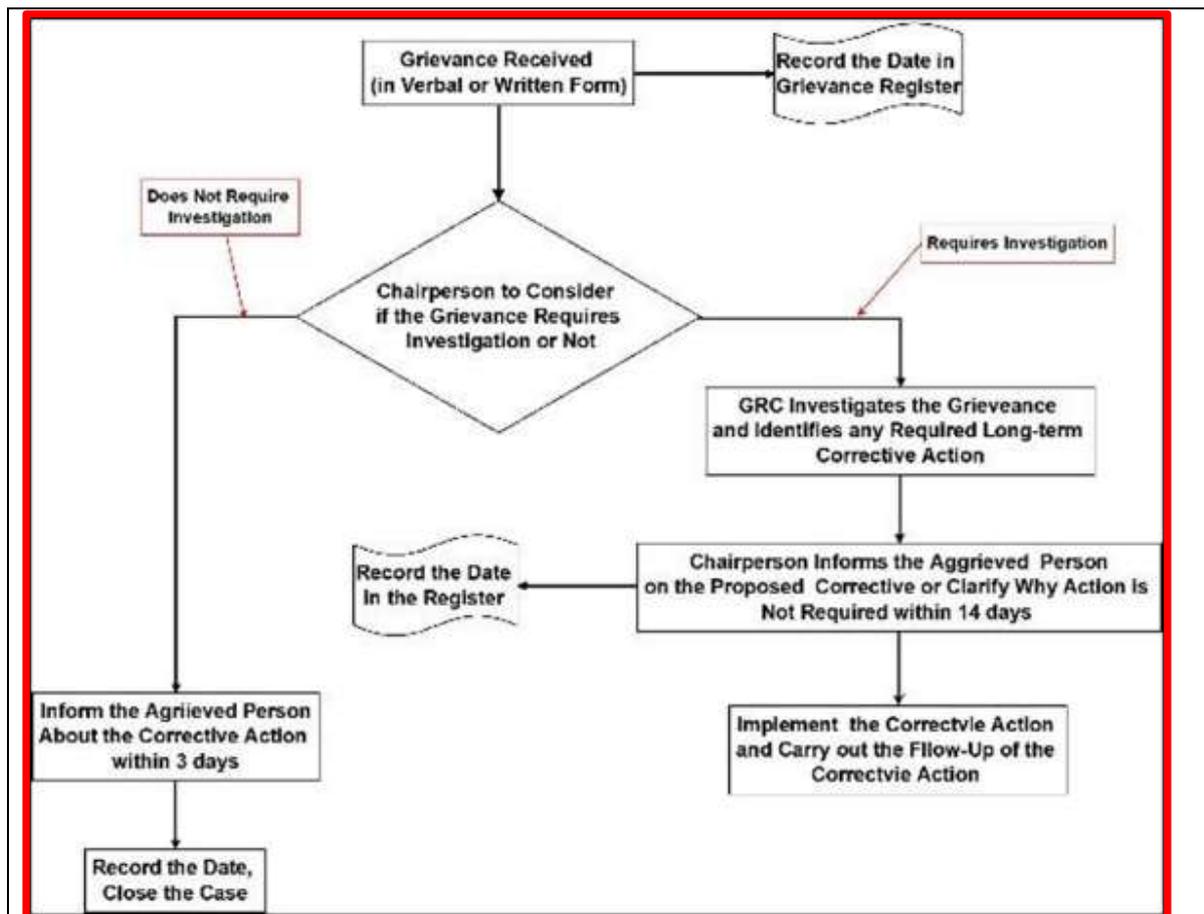


Figure 9.6- 1: Grievances Redress Mechanism.

Source: Author 2023.

If an agreement is unable to be reached between the AP and the GRC, the grievance will be submitted to VC-UDSM via PIU as a lead Project Implementation Agency for review and a final decision through its HEET Team. If necessary, further action will be taken to resolve the issue. The national courts are the last avenue for addressing grievances. In case the AP reaches the judicial system, there should be no cost to the claimant.

A grievance is closed out when no further action can be or needs to be taken. Closure status will be entered into the Grievance database as follows:

- **Resolved:** the resolution of the complaint was reached and implemented and signed documentary evidence exists.
- **Unresolved:** the agreed resolution of the complaint was not reached and the case has been authorized for closeout by the Grievance Redress Committee (GRC).
- **Abandoned:** complaints in which efforts to contact a given complainant were unsuccessful for two months after receipt of the formal grievance.

Specifically, depending on the issues that may arise during project implementation the following stages will be observed in the grievances redress process: -

Stage 1: Reception

The Aggrieved Persons (AP) is documented in the appropriate form to be provided by Chairperson. If, during the process, it appears that the AP does not understand the procedures, this will be explained. The Chairperson should not discourage the filing of a grievance form.

The grievance will also be documented in the Grievance/Issues Register. The Grievance Registration Form should be signed and dated by the aggrieved person. Where the aggrieved person is unable to write, he shall obtain assistance from the Chairperson to fill the form and emboss the form with his/her thumbprint.

Step 2: Investigation

If the issue is easily resolvable and it does not require investigation the Chairperson will refer to the GRC, which will carry out the hearing of the grievances and provide the answer within 3 days, after the date of hearing the grievances. If the grievance is a more complex project-related issue, it will be investigated further, and then arrange the hearing within 7 days after the date of registration. The Chairperson will arrange the hearing day within 7, which shall be attended by the AP and the party causing the grievances. The Chairperson will notify both parties within 3 days after the date of hearing the grievance.

Step 3: Response

It is assumed that all cases shall be solved at the GRC level. However, some cases may remain unresolved. For such cases, the AP shall have the option to refer his/her case to the District Commissioner for a final amicable solution. The Chairperson will prepare a preliminary report containing the details of the grievance and hearing date and the decision of GRC and submit it to the District Commissioner.

Step 4: Follow Up and Close-Out

If no amicable solution is reached in Step 3 the AP will have recourse to the court of law as a last resort. This can be a labour court, criminal court, or civil court depending on the type of grievance. This is a stage that although should always be open and available, it will be discouraged by all positive means such as timely communication and open negotiations. The institutional arrangement has been designed to allow for the process to detect and deal with problems in a timely and satisfactory manner for all parties concerned. Therefore, the GRC shall take necessary measures to ensure that solutions are reached by consensus based on negotiation and agreement.

9.7 Stakeholder Consultations

Stakeholder consultations has been carried out in during site visit and preparation of this ESIA Report also will be carried out during preparation of Environmental and Social Management Plan (ESMP) and relevant stakeholders will be given the opportunity to raise issues and their concerns regarding the project. All the raised issues /concerns will be taken into consideration during the project design and ESMP. However, in order to properly address environmental and social issues, further stakeholder consultation will be necessary during the project implementation.

The stakeholder consultations are aimed at providing a two-way communication or information exchange between the Contractor and the PAPs and the public. This is to ensure that information on the impact of the project is timely delivered by the Contractor and Project Proponent to the PAPs and the public. The Contractor shall disclose relevant content of the Project, potential environmental and social impacts and mitigation measures, GBV /SEA issues and EH&S issues.

The following actions will be taken by the Contractor during construction phase:

- During construction, the Contractor shall maintain open communication with local government and the surrounding local community members.
- Before construction, the Contractor shall disseminate the project information to the PAPs and surrounding local community members and the public in general in the form of brochures written in both Kiswahili and English Languages.

- Relevant project information to be published in the brochures shall include, but not be limited to: -
 - Project Overview;
 - Construction Plan;
 - Main Construction Activities;
 - Main Environmental Problems and Mitigation Measures; and
 - Name and phone number of the Contractor's Project Manager, the Consultant's Resident Engineer and PIU Safeguard Officer.
- The Contractor shall regularly communicate with the Supervision Consultant's Environmental Specialist and Social/Gender Specialist on the main sensitive subjects and to mitigate any unfavourable environmental and social impacts.
- The Contractor shall provide training to the workers before commencement of construction works on Grievances Redress Mechanism, Contractor's Code of Ethical Conduct and Code of Conduct on EH&S and GBV/SEA, and thereafter regularly (monthly) throughout the project implementation period.
- Relevant information on Grievances Redress Mechanism, Ethical Code of Conduct, and Code of Conduct on GBV/SEA will be posted at strategic locations for easy access by construction workers in Kiswahili and English Languages.
- Complaint recording shall be placed at the Contractor's Office, whereby all submitted complaints problems and other matters shall be included in the Monthly Progress Reports and submitted to the Resident Engineer and ESU for review and approval.

9.7.1 Institutional Capacity Building

To ensure the sustainability of this project there is a need for institutional capacity building. The purpose of institutional capacity building is to ensure the sustainability of the benefits obtained after the construction these infrastructure and effective implementation of the outlined enhancement / mitigation measures in the ESMP during operation phase.

Therefore, institutional capacity building will involve:

- Training of the EHSO and SGO on the environmental, social, gender, health and safety issues during construction phase; and environmental and social monitoring issues during operation phase.
- Training of Contractor's Staff and Construction Workers.

9.7.2 Training of ESU Staff and Technicians

The objective of organizing training for ESU Staff is to strength environmental management during construction and operation phase, and to ensure the quality of environmental monitoring and effective environmental management, thus improving the quality of the construction works. At the end of the training the ESU Staff will be able to understand the main environmental and social issues during the construction and operation phase, and have a better understanding of existing problems and deficiencies on environmental management; and take necessary preventive and control measures as soon as possible.

The training shall be conducted by Supervision Consultant's Environmental Specialist in collaboration with Social/Gender Specialist. In addition, the ESU's Environmental Health and Safety Officer (EHSO) and Social/Gender Officer (SGO) will be involved on on-the job training by participating in the environmental and social monitoring during construction phase. They will be submitting their environmental and social monitoring reports for assessment by the Supervision Consultant's Environmental Specialist in collaboration with Social/Gender Specialist.

9.7.3 Training of Contractor's Staff and Construction Workers

Before commencement of construction works training will be organized for the responsible personnel and construction workers, in order to avoid environmental damages due to project implementation during construction. For contract responsible personnel, the objective of training is to define the environmental protection responsibilities of the contractor; and for construction workers, the objective is to ensure the proper construction practice during the construction period in order to avoid some construction behaviours, which have adverse impacts on the environment.

The training will be helpful for the project responsible personnel to understand their obligations in environmental protection needed to be assumed and possible consequences of the environmental damage. The construction workers will have a better understanding of the protection level and methods for environmental sensitive areas. Based on the actual situation of the Project, the training period for construction workers will not be more than one week.

9.7.4 Cost Estimates for Mitigation Measures

The cost estimate for mitigation measures takes into consideration those costs to be incurred due to affected resources as a result of rehabilitation works/ activities and costs to be incurred as a result of the Contractor's adherence to good engineering practice.

Those costs resulting from implementation of mitigation measures for negative environmental and social impacts are considered as extra costs outside the Project Budget. However, the project will not be responsible for costs that arise out of normal responsibility of the project proponent or implementing agency. Therefore, for that reason, recurrent costs during operation and maintenance are excluded.

The cost estimates for the implementation of ESMP mitigation measures are cost due to the implementation of specific mitigation measures. These include Implementation of GBV/SEA Awareness Programme Prevention and Control of COVID-19; HIV/AIDS Prevention and Control Programme; and Health and Safety Management Plan.

In this regard, the following cost estimates for mitigation measures have been considered for protection of environmental and social resources; and as such for implementation of ESMP. The total cost for implementation of mitigation measures has been estimated to be about TZS 154,800,000.00 (Say, Tanzania Shillings One Hundred Fifty-four Eight Hundred Thousand Only). These costs will be included in the Bill of Quantities during the preparation of the Bidding Document. The cost estimates have been based on the Consultant's experience on projects of similar nature.

9.8 ESMP Implementation Schedule

Specifically, the ESMP schedule, as shown in Table 9.8-1, summarizes all anticipated significant adverse environmental impacts and provides a specific description of institutional arrangement for carrying out mitigation measures. In order to have effective ESMP, efforts must be integrated among various institutions/stakeholders. This ESMP, therefore, specifies the roles and responsibilities of various institutions/stakeholders during implementation. However, it is important that all responsible institutions /stakeholders should appreciate that they are united and should interact and work towards a common purpose.

Table 9.8-1: Environmental and Social Management Matrix

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
A. Pre-construction Phase				
A1. Vegetation clearance due to access creation to the construction site.	<ul style="list-style-type: none"> ▪ Avoid unnecessary vegetation clearance beyond access road. ▪ Vegetation plantation after completion of construction works 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	Existence of natural vegetation	3,000,000.00
A2. Waste generation due to clearance of vegetation at access road to construction site	<ul style="list-style-type: none"> ▪ Designate a place for separate and temporary storage of cleared trees and stripped topsoil. ▪ Allow community to reuse cleared trees as firewood. ▪ Stripped topsoil shall be preserved for vegetation regeneration after completion of construction works 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	Complete reuse of cleared vegetation biomass	1,200,000.00
A3. Increased employment opportunities for local people due to recruitment of construction workers	<ul style="list-style-type: none"> ▪ Give employment priority to local people and provide equal employment opportunity for both males and females ▪ Ensure there is not any kind of discrimination at work place discrimination. ▪ Ensure there is not any kind of Sexual Harassment and Gender Based Violence at work place. 	The contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	At least 40% of employee workers originate from surrounding community	2,000,000.00
A4. Destruction of archaeological artefacts due to land excavation during preparation of Buyu project site	<ul style="list-style-type: none"> ▪ Formulation and implementation of chance find procedures for any archaeological findings. ▪ There should be Chance Finding (CF) procedure in place to allow any identified archaeological artefact to be salvaged from construction site 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	All archaeological artefacts are salvaged from site	4,500,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
	<ul style="list-style-type: none"> ▪ The workforce shall be trained on CF ▪ The CF shall be reported to the Antiquities Department of Zanzibar. 			
B. Construction Phase				
B1. Air pollution due to dust emission from soil excavations, earthworks and earth moving activities	<ul style="list-style-type: none"> ▪ Sprinkling water on dusty construction areas. ▪ Minimize stockpiling of excavated soils within the construction site by immediate removal and transportation to approved dumping site. 	Contractor monitored by Supervision Consultant's Environmental Expert & ZEMA	<ul style="list-style-type: none"> • 0.021mg/m³ for PM₁₀ as per ZBS • 0.015mg/m³ for PM_{2.5} as per ZBS • 0.12ppm for NO₂ as per ZBS • 0.5ppm for SO₂ as per ZBS • 10ppm for CO as per ZBS Construction workers wearing dust protection gears, (ISO 45001)	3,600,000.00
B2. Air pollution due to dust emission along access roads during transportation of construction materials to site.	<ul style="list-style-type: none"> ▪ Sprinkling water along access roads and human settlement areas. ▪ Whenever, possible select transportation route to avoid densely populated and cultivated areas. 	Contractor monitored by Supervision Consultant's Environmental Expert & ZEMA	<ul style="list-style-type: none"> • .021mg/m³ for PM₁₀ as per ZBS • 0.015mg/m³ for PM_{2.5} as per ZBS • 0.12ppm for NO₂ as per ZBS • 0.5ppm for SO₂ as per ZBS • 10ppm for CO as per ZBS Construction workers wearing dust protection gears, (ISO 45001)	3,600,000.00
B3. Noise nuisance to the students and adjacent local residents due to	<ul style="list-style-type: none"> ▪ Limiting noisy construction activities only to day time hours. 	Contractor monitored by Supervision	Noise Noise<60dB (A)	2,500,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
operation of mobile construction equipment /machinery.	<ul style="list-style-type: none"> ▪ Prohibit the use of old equipment / machinery which produce high noise levels and ensure noise emission from heavy trucks and mobile construction equipment do not exceed 75 dB, in accordance with Tanzania Noise Emission Standards¹⁵. ▪ Ensure exhausts of heavy trucks and mobile equipment /machinery are fitted with noise reducing mufflers. ▪ Provide ear protection muffs to construction workers operating high pitch noise creating equipment /machinery. ▪ Carry out regular maintenance of vehicles and mobile equipment / machinery. 	Consultant's Environmental Expert & ZEMA		
B4. Vibration effects on adjacent building structures due to soil compaction and movement of heavy vehicles and machines in project area.	<ul style="list-style-type: none"> ▪ Inform students and staff that they should expect ground vibrations. ▪ Conduct inventory of existing crack on adjacent buildings before commencement of compaction works. 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert ZEMA	Not exceeding ZBS Limit 85dB	1,900,000.00
B5. Noise nuisance to adjacent local residents due to movement of heavy trucks along access roads to materials extraction sites.	<ul style="list-style-type: none"> ▪ Limiting transportation of construction materials only to daytime hours. ▪ Whenever, possible avoid passing through human settlement areas. 	Contractor monitored by Supervision Consultant's Environmental Expert	Noise Noise<60dB (A)	Covered under B3

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
		ZEMA		
<p>B6. Loss of aesthetic value of the surrounding environment due to accumulation of excavated soil materials and construction solid wastes.</p>	<ul style="list-style-type: none"> ▪ All stockpiled soil materials and construction related solid wastes must be immediately removed and transported to the permitted dumping site. ▪ Useful soil materials can be retained, but properly stockpiled for landscaping purpose. 	<p>Contractor monitored by Supervision Consultant's Environmental Expert</p> <p>ZEMA</p>	<p>None as minimum as possible</p>	<p>1,500,000.00</p>
<p>B7. Increased transmission of HIV/AIDS and STIs due to social interaction between construction workers, students and local residents.</p>	<ul style="list-style-type: none"> ▪ Formulation and implementation of HIV/AIDS prevention and control programme. ▪ Giving employment priority to local people to minimize the number of new comers, hence minimizing the likelihood of new HIV transmission. ▪ Collaboration with local NGOs/CBOs dealing with HIV/AIDS to promote awareness and education campaigns. 	<p>Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert</p>	<p>None</p>	<p>18,000,000.00</p>
<p>B8. Increased risk of COVID-19 transmission due to induced influx of people</p>	<ul style="list-style-type: none"> ▪ The Contractor will take necessary precautions as stipulated in the ESF/Safeguards Interim Note: COVID-19 Consideration in Construction/Civil Works Projects. These include: <ul style="list-style-type: none"> - Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site. 	<p>Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert</p>	<p>None</p>	<p>5,000,000.00</p>

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
	<ul style="list-style-type: none"> - Providing daily briefings to workers prior to commencing work, focusing on COVID-19 specific considerations including cough etiquette, hand hygiene and distancing measures, using demonstrations and participatory methods. - Preventing a worker from an affected area or who has been in contact with an infected person from returning to the site for 14 days or (if that is not possible) isolating such worker for 14 days. - Preventing a sick worker from entering the site, referring them to local health facilities if necessary or requiring them to isolate at home for 14 days. - Provision of hand sanitizers, hand washing basins and soap at the entry gate. <ul style="list-style-type: none"> ▪ Stakeholder consultations will be carried out before commencement of construction works to create awareness among the local residents on prevention and control of COVID-19. 			
B9. Creation of occupational health and safety risk due to handling of hazardous construction materials.	<ul style="list-style-type: none"> ▪ Provision of Personal Protection Equipment (PPE) to construction workers such as dust masks, ear plugs, safety boots, etc. 	Contractor monitored by Supervision Consultant's Environmental Expert	Zero Occupational accident/incident	18,000,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
	<ul style="list-style-type: none"> ▪ Formulation and implementation of Health and Safety Management Plan (HSMP). 	and Social/Gender Expert		
B10. Creation of risk of exposure to hand-arm injury due to operation of handheld vibrating construction equipment.	<ul style="list-style-type: none"> ▪ Provision of appropriate gloves to the construction workers. ▪ Avoid prolonged use of hand-held equipment by workers beyond the prescribed 8 hours in accordance with Zanzibar Standards. 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	Zero Occupational accident/incident	Covered under Item B9.
B11. Creation of construction related risk of accidents due to operation of mobile construction equipment /machinery.	<ul style="list-style-type: none"> ▪ Fitting all mobile construction equipment / machinery and trucks with alarm and signal device to warn people, especially during backward movement. ▪ Placing written warning signs at strategic locations to prohibit or prevent entrance of unauthorized persons into the construction site. ▪ Restrict operation of mobile construction machinery / equipment to trained personnel only. ▪ Fencing the construction sites with corrugated iron sheets to prevent unauthorized people from entering the construction site. This will be supplemented by putting a written warning in both English and Kiswahili at a strategic location to restrict unauthorized movement to the construction site. 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	Zero Occupational accident/incident	3,600,000
B12. Increased risk of public traffic accidents due to movement of heavy	<ul style="list-style-type: none"> ▪ Develop and implement traffic management plan. This includes deploying flag persons to guide traffic movement along the road. 	Contractor monitored by Supervision Consultant's Environmental Expert	Zero public traffic accident	6,000,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
trucks to and from the construction site.	The involvement of traffic police may be useful, whenever possible.	and Social/Gender Expert		
B13. Risk of emergence of Gender-Based Violence, Sexual Exploitation and Abuse cases due to influx of people into the IMS project site.	<ul style="list-style-type: none"> ▪ Ensuring there are codes of conduct in place that forbid and place penalties for Gender-Based Violence and Sexual Exploitation and Abuse. ▪ Ensure a Code of Ethical Conduct (CEC) is signed and understood by all project workers. This will include the provision of training and information regarding Worker Code of Conduct in Kiswahili ▪ As a prevention measure, the contractor will be required to develop a code of conduct of GBV that will be attached to the ESMP and signed by all workers. An example of Code of Conduct for EHS and GBV. ▪ Contractor will engage a qualified NGO to carry out awareness raising campaign against GBV and SEA on monthly basis during the construction phase. ▪ Provision of cultural sensitization training for workers regarding engagement with local community. ▪ Grievances Redress Mechanism will be in place to deal with any conflicts between the construction workers and fish market community members. 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	None	18,000,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
B14. Increased income generation opportunities for local people due to increased demand for food and other items from construction workers.	<ul style="list-style-type: none"> Provide enabling environment for food vendors to sell their food in a clean and hygienic environment by providing shelter and water supply. 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	As high as possible	2,000,000.00
B15. Climate change Impact due to increased runoff and subsequent soil erosion	<ul style="list-style-type: none"> Provision of adequate storm water surface drainage with screened ducts especially during the monsoon rains will be developed in advance and in accordance with the contractor's obligations for storm water Management plan. Maintaining existing green belt to increase surface infiltration rate and subsequence base flow 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert	As Minimum as possible	6,000,000.00
B16. Risk of damaging existing local access roads due to overloading by heavy trucks.	<ul style="list-style-type: none"> The Traffic Management Plan shall be developed and enforced to restrict overloading by materials hauling trucks Ensure that any damaged local roads are immediately repaired/rehabilitated to make them passable throughout the construction period. 	Contractor supervised by monitored by Supervision Consultant's Environmental Expert.	As Minimum as possible	4,000,000.00
B17. Risk of water sources, Marine and coastal pollution	<ul style="list-style-type: none"> Non-hazard solid waste shall continue be managed through use of waste bins in collection and engagement of third-part company in removal from site to municipal disposal site. Liquid waste shall be handled on site through septic tank system 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert ZEMA	Zero Contamination	5,500,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
	<ul style="list-style-type: none"> ▪ All hazardous substances (solid and liquid) must be stored on an impervious surface. ▪ Carry out regular emptying of soak pits and maintenance of sewage chambers to prevent overflow of raw sewage into the environment. ▪ All discharged wastewater from sewage treatment plant must not exceed Tanzania Effluent Discharge Standards¹⁶. ▪ Contractor has to deploy the equipment with good condition and the Maintenance of the vehicles should be done often. 			
B18. Contamination of the site and beach area with construction wastes and debris	<ul style="list-style-type: none"> ▪ Ensure disposal of construction wastes and debris in a secured and approved location by IMS 	Contractor monitored by Supervision Consultant's Environmental Expert and Social/Gender Expert ZEMA	Zero Contamination	2,000,000.00
C. Demobilization Phase				
C1. Loss of temporary employment due to retrenchment of	<ul style="list-style-type: none"> ▪ Give employment priority to local people, because after project 	Contractor monitored by Supervision Consultant's	Retrenchment to go as smoothly as possible	3,500,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
construction workers after project completion.	<p>closure they will easily revert back to their normal economic activities.</p> <ul style="list-style-type: none"> Ensure that all construction workers are registered with social security funds and are paid their terminal benefits immediately before retrenchment from jobs. 	Environmental Expert and Social/Gender Expert		
D. Operation Phase				
D1. Increases scenic value of the project area.	<ul style="list-style-type: none"> Regular maintenance of the IMS Campus and development of the proposed future plan. 	VC-UDSM/PIU	N/A	1,200,000.00
D2. Increase in employment opportunities	<ul style="list-style-type: none"> Employment opportunity priorities should be given to the local Tender for supply of food and other products should be prioritised to the local individuals Cleaning firms and cafeteria operators should within the project area 	VC-UDSM/PIU	N/A	700,000.00
D3. Increased student enrolment	<ul style="list-style-type: none"> Encourage female students to apply for various courses offered at IMS through media outlets 	VC-UDSM/PIU	At least 50% student enrolment is composed by female	2,500,000.00
D4. Increase in production of solid waste	<ul style="list-style-type: none"> Continue engagement of third-part company for solid waste handling at IMS-Buyu Campus Provision of adequate dustbins at cafeteria, hostel and etc. 	VC-UDSM/PIU	Zero pollution	7,000,000.00
D5. Increased domestic water demand for students and staff	<ul style="list-style-type: none"> Development of an alternative borehole that will used as source of water for construction works. Harvesting rainwater through roof catchment to suffice increased water demand. 	VC-UDSM/PIU	No water deficit	28,000,000.00

Effects/Impacts	Mitigation/Enhancement Measures	Responsibility	Target level /standard	Cost Estimates (TZS)
	<ul style="list-style-type: none">▪ After completion of construction works, the developed alternative borehole shall be connected to existing IMS-Buyu water supply system to augment production yield.			

CHAPTER TEN

10.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

10.1 Overview of Environmental and Social Monitoring

The overall objective of this Environmental and Social Monitoring Plan (ESMoP) is to ensure that activities carried out during construction and operations are environmentally and socially acceptable and sustainable. The project developer, in collaboration with other stakeholders, is responsible for follow-up of the monitoring program. In this document, monitoring refers to the systematic collection of data through repetitive measurements over a long period of time to provide information on the characteristics and functioning of environmental and social variables relevant to the specific project.

Analysis of the ESMoP has taken into account types of impact, indicator/parameter, time and frequency of environmental monitoring as well as the institution of environmental and social monitoring or implementer of environmental and social monitoring. **Table 10.1-1**, provide details of the attributes to be monitored. Generally, the ESMoP is prepared to prevent, overcome, and increase the positive impact of activities so as to fulfil its objective.

10.2 Environmental Audit

The proponent shall undertake environmental audits within three-six-month cycles. The audits will be part of the long-term environmental management plan for the project. The audits will reveal the actual performance of mitigation measures on a long-term basis.

10.3 Monitoring Parameters

Monitoring parameters have been selected considering the impacts identified and predictions made. The parameters will reveal the effectiveness of the mitigation measures as well as the project's overall environmental performance. Monitoring of the parameters will be done at various stages of the project as follows:

- **Pre-construction stage** - Monitoring of the parameters at this stage is meant to establish the baseline information of the target parameters in the project area. This must be completed before any other activity in this phase.
- **Construction stage** - Monitoring at this stage is meant to establish the pollution levels that arise from the construction activities.
- **Operation stage** - Monitoring at this stage is meant to check on the impacts that might arise as the result of normal use of the infrastructure.

In view of the above, the objectives of the ESMoP are to:

- demonstrate (present and future) compliance with Zanzibar legislation and World Bank ESSs;
- proved risk management and (significant) environmental and social impacts
- control and improve the project on the basis of practice information;
- keep track of ongoing progress;
- provide a simple framework to improve the level of environmental and social management;
- co-ordinate and integrate the tasks of the proponent and the governmental agencies involved in project operation; and
- Integrate present and future environmental and social management and monitoring activities.

Priority has been given to effects:

- that can be measured.
- that will occur within a reasonable time frame.
- that has a cause-effect relationship with the project.

- that is uncertain.
- that can be mitigated or prevented.
- that has played an important role in decision-making;
- that is important to the public.
- that may be important to future projects, and
- that can be measured against reasonable costs.

The ESMoP indicates impacts; parameters; monitoring frequency; sampling area; measurement unit; method; target level/standard and responsibility of monitoring.

The monitoring activities will be comprised of visual observation during site inspection and will be carried out at the same time as the engineering supervision activities. Site inspections will take place with emphasis on early identification of any environmental problems and the initiation of suitable remedial action. Where remedial actions have been required on the part of the Contractor, further checks will need to be made to ensure that these are actually being implemented to the agreed schedule and in the required form.

All sites where construction is taking place will be formally inspected from an environmental view point on a regular basis. However, in addition to visual observation there shall be informal questioning of members of the local communities and their leaders who live near the project. This is because they may be aware of matters which are unsatisfactory but may not be readily apparent or recognized during normal site inspection visits.

The monitoring plan will also be integrated with other construction supervision and carried out by the Resident Engineer. The Resident Engineer will decide on the appropriate course of action to be taken in cases where unsatisfactory reports are received from the field staff regarding environmental matters. In case of relatively minor matters, advice to the Contractor on the need for remedial action may suffice, but in all serious cases, the Resident Engineer will issue a formal instruction to the Contractor to take remedial action, depending on the extent of delegated powers.

10.4 Definition of Roles, Responsibilities of Monitoring Authorities

The successful implementation and monitoring of the environmental and social management framework, monitoring would depend on collaboration of different stakeholders at the Shehia, District level, regional level and at the central level with Zanzibar Environmental Management Authority.

This is necessary because the implementation of the activities would require inputs, expertise and resources which would be adequately taken care of if the concerned parties work together. The following sections outline some of the selected and recommended activities to be done by each major stakeholder in the environmental activities.

10.4.1 Zanzibar Environmental Management Authority

The Director General of ZEMA will be responsible for coordinating all the above institutions for monitoring the synchronizations of recommended environmental and social mitigation measures for the proposed project during construction, operations, and during decommissioning phases.

10.4.2 Zanzibar Building Authority (ZBA)

The institution responsible for construction will ensure that all constructors' standards and procedures including provision of building permits, construction regulations and guidelines are complied with.

10.4.3 Commission for Lands

The commission will ensure that all legal and regulatory issues concerning surveyed land, building permits, resettlement action framework, boundary lines, coastal set back buffer zone regulation, and other requirements are clearly enforced and complied with.

10.4.4 Department of Forestry and Non-Renewable Natural Resources

The Department of Forestry and Non-Renewable Natural Resources (DoFNRNR) will ensure compliance with protection of vulnerable and threatened species of flora and fauna while conserving vegetation and regulating utilization of non-renewable natural resources.

10.4.5 Department of Fisheries Development

The Department of Fisheries Development (DoFD) will ensure compliance with conservation of the lagoon's ecosystem, coral reefs, sand banks, fish landing site, and protection of marine environment.

10.4.6 Directorate of Occupational Safety and Health

The Directorate of Occupational Safety and Health (DoSH) will ensure compliance with the safety of workers at the project site and enforcement of standards related to safe execution of construction tasks.

10.4.7 Magharibi B Local Council

The Magharibi B Local Council will be responsible for ensuring that all environmental services related to waste management, wastewater discharge, and other requirements are properly accounted for.

10.4.8 Shakani Shehia Development Committee

The Shehia Development Committee will be responsible to follow on the implementation of the proponent's commitment in ensuring that rights of local communities, and conservation of local environment programs are properly managed, monitored and respected.

10.5 Monitoring and Reporting Responsibilities

10.5.1 Supervision Consultant

The Supervision Consultant will appoint an Environmental Specialist and Social /Gender Specialist who shall be responsible for Environmental and Social Compliance Monitoring. The Supervision Consultant's Environmental Specialist and Social / Gender Specialist shall be making a daily site inspection and shall be attending Engineer's Site Meetings.

The participation of Environmental Specialist and Social /Gender Specialist in the Engineer's Site Meetings shall enable the Environmental Specialist and Social /Gender Specialist to:

- Review the status of any problem addressed in the previous meeting; propose additional mitigation measures, if the problem has not been resolved.
- Review the main construction activities and any environmental problem that occurred since the last meeting.
- Review the construction activities and general environmental performance as listed in the ESMP.

The Environmental Specialist and Social/Gender Specialist shall be preparing Monthly Environmental and Social Monitoring Reports which will highlight:

- The extent to which the Contractor is complying with the environmental and social specifications and contract conditions (compliance monitoring).
- Any unforeseen environmental and social impacts (i.e., the failure or inadequacy of the mitigation measures) and recommendations on how to manage unforeseen impacts.

In addition, the Vice councillor of UDSM shall deploy an Environmental Officer and Social/Gender Officer who shall collaborate with the Supervision Consultant's Environmental Specialist and Social /Gender Specialist to oversee the implementation of ESMP. The Environmental Officer and Social/Gender Officer, apart from making a close follow-up on engineering issues, shall be responsible for environmental and social monitoring on a monthly basis.

There must be feedback from monitoring to ensure that failure to implement an approved measure incurs a penalty to the Contractor. The Resident Engineer's responsibility will include enforcement of mitigation measures. In case an approved measure turns out to be ineffective or results in unforeseen adverse impacts, it should be reported to the Vice-Chancellor councillor of UDSM through the Campus Manager, who would be capable of finding out why and of commissioning appropriate further measures.

10.5.2 Contractor

The Contractor will be responsible for implementation of environmental and social mitigation measures under the supervision of Resident Engineer. This is to ensure that technical and environmental clauses are followed and well implemented by the Contractor.

The Contractor shall assign an Environmental Manager who shall be responsible for carrying out monitoring on daily basis and overseeing compliance with environmental and social mitigation measures. The Contractor's Environmental Manager will be assisted by EHSO and Social/Gender Specialist.

The Contractor's Environmental Manager shall submit a Monthly Environmental, Social, Health, and Safety (ESH&S) Compliance report to the Resident Engineer specifying that:

- All previously notified failures to comply with the mitigation measures have been rectified.
- All newly notified requirements have been fulfilled, and all standard requirements (as specified in this report) have been put into effect.

The Resident Engineer shall countersign the report and make it available to the UDSM and World Bank. UDSM, in turn, should pass a copy to Lindi Municipal Council within a reasonable period not exceeding 30 days from receipt.

10.6 Monitoring Methods

The purpose of monitoring is to ensure that the Contractor implements the outlined mitigation measures in the ESMP. Therefore, monitoring methods will be based mainly on visual inspection and will be carried out by the Supervision Consultant's Environmental Specialist and Social/Gender Specialists in collaboration with the Contractor's Environmental Manager, assisted by the Environmental, Health and Safety Officer (EHSO) and Social/Gender Specialist on daily basis.

To verify environmental effects predictions, and to evaluate the effectiveness of mitigation measures committed during the ESMP preparation, it is necessary to collect baseline data before the commencement of the construction works that may result in changes to the environment. The purpose of baseline data collection is to update the baseline information and establish the existing conditions at the construction site.

Establishing baseline conditions allows for a comparison with conditions before and after construction works to determine the extent of any project-related environmental effects, the need for additional mitigation measures, and/or to confirm the effectiveness of mitigation measures that have been or are being implemented.

In case any environmentally and socially sensitive issues have been identified during baseline monitoring and not covered during the ESMP preparation, adaptive measures and additional monitoring or mitigation will be developed and implemented as may be necessary.

10.7 Environmental and Social Monitoring Costs

The cost of environmental and social monitoring will be included in the cost of Construction Supervision. The Supervision Consultant will be responsible for the cost of environmental and social monitoring. These costs include payment of professional fees for the Environmental Specialist and Social/Gender Specialist. However, these costs will be included in the overall costs of commissioning the Supervision Consultant.

10.8 ESMP Monitoring Schedule

The ESMP monitoring schedule as summarized in **Table 10.8-1**, addresses the following questions:

- WHAT parameter to be monitored? (Monitoring Parameters)
- WHY is the parameter being monitored? (Monitoring Objective)
- WHAT indicator to be used in monitoring? (Monitoring Indicators)
- WHERE to be monitored? (Monitoring Location).
- HOW is to be monitored? (Monitoring Methods).
- HOW frequent is to be monitored? (Monitoring Frequency)
- WHAT is the monitoring targets or standards? (Performance Standards)
- WHO is responsible for monitoring? (Monitoring Responsibility)

Table 10.8-1: Environmental and Social Monitoring Matrix

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
A. Pre-construction Phase							
A1. Submission of Contractor's Site Plan	To ensure compatibility of the site plan with local land use plan.	Submitted Contractor's Site Plan	Contractor Office/ Camp Site	Visual inspection.	Once before construction works.	<ul style="list-style-type: none"> Site Plan is compatible with local land use plan. Office / camp site is equipped with all support facilities. 	Developer's Site Engineer.
A2. Access of local people to employment in the project area	<ul style="list-style-type: none"> To ensure employment priority is given to local people. To ensure equal employment opportunity without gender and/or racial discrimination. To ensure Contractor is providing employment contracts in accordance with the labour laws. 	Number of local people employed in the project by gender.	Contractor's Office	Contractor's Monthly ESH&S Compliance Report. Sample of Employment Contract.	Continues throughout construction period.	<ul style="list-style-type: none"> Employment priority is being given to the local people. Number of reported cases of gender or racial discrimination. Employment contracts are in accordance with labour laws. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer
A3. Submission of C-ESMP, HSMP and HIV/AIDS Programme.	<ul style="list-style-type: none"> To ensure compliance with EH&S 	Submitted C-ESMP, HSMP, HIV/AIDS programme.	Based on the submission of the documents to the Engineer.	Review of C-ESMP and HSMP documents.	Once, before construction works.	<ul style="list-style-type: none"> C-ESMP, HSMP and HIV/AIDS Programme have been 	Independent Environmental and Social Consultant

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
	issues by Contractor.					approved and are being implemented.	(IESC) in collaboration with Site Engineer
B. Construction Phase							
B1. Dust and smoke emissions around the project site.	<ul style="list-style-type: none"> To minimize impacts from dust and exhaust emissions. 	Intensity of visible dust and smoke emission.	Construction sites.	Visual inspection.	Continuous	<ul style="list-style-type: none"> Write the TBS and WB limits for ambient pollutant gases, PM10 & PM2.5 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer
B2. Dust emission along access roads to during transportation of construction materials from borrow to site.	<ul style="list-style-type: none"> To minimize dust emission along the access roads. 	Intensity of visible dust emission.	Along the access roads.	Visual observation.	Continuous	<ul style="list-style-type: none"> No visible dust emission along the access roads. Dust emission control measures are being implemented. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer
B3. Noise nuisance and vibration effects.	<ul style="list-style-type: none"> To minimize noise and vibration impacts from construction activities 	Noise and Vibration Levels	At the boundaries of construction sites.	Audible noise.	Continuous	<ul style="list-style-type: none"> Noise standard limits for daytime and nighttime for both TBS and WB should be written here 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
B4. Overflow of raw sewage into the surrounding environment.	<ul style="list-style-type: none"> To prevent ground and 	Presence of wastewater in	Contractor's Office/Camp Site.	Visual Inspection	Continuous	<ul style="list-style-type: none"> No accumulation of wastewater into the 	Independent Environmental and Social

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
	surface water pollution.	the surrounding environment.				surrounding environment.	Consultant (IESC) in collaboration with Site Engineer.
B5. Accumulation of excavated soil materials and construction solid wastes.	<ul style="list-style-type: none"> To prevent or minimize landscape degradation. 	Presence of excavated soil materials and construction solid wastes.	At the construction sites.	Visual inspection.	Continuous	<ul style="list-style-type: none"> No accumulation of excavated soil materials and construction solid wastes. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
B6. Implementation of HIV/AIDs Prevention and Control Programme.	<ul style="list-style-type: none"> To minimize risk of HIV transmission. 	<ul style="list-style-type: none"> Number of HIV/AIDs campaigns and training sessions. Number of participants by gender. 	Based on submission of HIV/AIDs Campaign reports	Monthly ESH&S Compliance Reports.	Monthly	<ul style="list-style-type: none"> Number of Voluntary Clinical Testes (VCTs) HIV//AIDs program is in place and being implemented on a regular basis. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
B7. Implementation of COVID-19 prevention and control programme.	<ul style="list-style-type: none"> To prevent or minimize risk of COVID-19 transmission. 	<ul style="list-style-type: none"> Number Covid-19 campaigns and training sessions. Number of participants by gender. 	Based on submission of Covid-19 reports	Monthly ESH&S Compliance Reports.	Monthly	<ul style="list-style-type: none"> Precautions being taken as stipulated in the ESF/ Safeguards Interim Note: Covid-19 Consideration in Construction/Civil Works Projects. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
B2. Health and Safety of Construction workers.	<ul style="list-style-type: none"> To prevent or minimize occupational health and safety risks. 	<ul style="list-style-type: none"> Number of toolbox sessions. Number of workers provided with and using appropriate PPE. Presence of approved Health & Safety Management Plan (HSMP) 	Construction sites	<ul style="list-style-type: none"> Visual inspection. An informal interview with workers. Monthly ESH&S Compliance Reports. 	Continuous	<ul style="list-style-type: none"> Number of reported occupational incidents/accidents. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
B8. Construction related risk of accidents.	<ul style="list-style-type: none"> To prevent or minimize construction related accidents. 	<ul style="list-style-type: none"> Presence of fence around the construction site. Presence of written warning signboard in Kiswahili and English. Presence of trained mobile equipment /machine operators. 	Construction sites.	Visual inspection.	Continuous.	<ul style="list-style-type: none"> Number of reported constructions related accidents. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
B9. Incidence of traffic accidents due to movement of	<ul style="list-style-type: none"> To prevent or minimize risk 	<ul style="list-style-type: none"> Presence of traffic 	At the junction of access road and local road.	Visual inspection	Continuous	<ul style="list-style-type: none"> Number of reported cases 	Independent Environmental and Social

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
heavy trucks to and from the construction site.	of traffic accidents,	management plan. • Presence of flag persons at strategic locations.				of traffic accidents	Consultant (IESC) in collaboration with Site Engineer.
B10. Incidence of Gender-Based Violence (GBV)/ Sexual Exploitation and Abuse (SEA and Sexual Harassment (SH).	• To prevent incidence of GBV/SEA and SH.	Number of awareness sessions.	Office/Camp Site and Construction sites.	<ul style="list-style-type: none"> • Verification of awareness sessions organized with workers • Verification of consultations with and involvement of local communities 	After every 15 days	<ul style="list-style-type: none"> • Number of workers who participated in awareness sessions by gender. • Consistent and regular involvement of local community members 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
B11. Workers Welfare ¹⁷ and Child labour.	• To ensure compliance with labour laws.	<ul style="list-style-type: none"> • Monthly Salary Slips; • ZSSF Monthly Payment Receipts. 	Based on submission of Monthly Compliance Reports.	Monthly ESH&S Compliance Reports	Monthly	<ul style="list-style-type: none"> • Number of reported complaints regarding minimum wages. • Reported cases of non-payment of Monthly ZSSF contributions. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
B12. Income generation opportunities for local people.	<ul style="list-style-type: none"> To facilitate income generation opportunities for local residents. 	Provision of clean and hygienic environment.	Food vending areas around the project ate.	Visual inspection.	Continuous	<ul style="list-style-type: none"> Food vendors to selling food in a clean and hygienic environment. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
C. Demobilization Phase							
C1. Retrenchment of workers during project completion.	<ul style="list-style-type: none"> To ensure ZSSF contributions and terminal benefits have been paid to all retrenched workers. 	Number of retrenched workers	Contractor's and Engineer's Office	Monthly Compliance Site Closure Report	Once, during project completion.	<ul style="list-style-type: none"> All retrenched workers have been paid their terminal benefits and ZSSF contributions. 	Independent Environmental and Social Consultant (IESC) in collaboration with Site Engineer.
D. Operation Phase							
D1. Proper use of parking area.	<ul style="list-style-type: none"> To ensure vehicles are properly parked. 	Incidence of parking violation.	Vehicle parking area.	Visual Inspection.	Continuous	<ul style="list-style-type: none"> There is no violation of parking rules. All vehicles are properly parked in their parking slots. 	Developer in collaboration with tenants and vehicle owners.
D2. Use of new building structure and associated facilitates.	<ul style="list-style-type: none"> To ensure new building structures are properly used by tenants. 	Signs of damage on the building structures.	Constructed Building Premises.	Visual Inspection.	Continuous	<ul style="list-style-type: none"> No any sign of damage on the building structures and associated facilities. Defaulters are being task to repair or pay for 	Developer

Monitoring Parameters	Monitoring Objective	Monitoring Indicators	Monitoring Locations	Monitoring Methods	Monitoring Frequency	Performance target/ Standards	Monitoring Responsibility
						any damage caused.	
D3. Provision of solid disposal containers and sanitary facilities.	<ul style="list-style-type: none"> To ensure provision of solid wastes disposal containers and sanitary facilities. 	Presence of solid wastes disposal containers and pay toilets.	Constructed Building Premises	Visual inspection.	Continuous	<ul style="list-style-type: none"> There are adequate solid wastes disposal containers and pay toilets managed by private operators. 	Developer in collaboration with Magharibi B District Authority

CHAPTER ELEVEN

11.0 RESOURCE EVALUATION OR COST-BENEFIT ANALYSIS

11.1 Project Costs and Benefits

11.1.1 Project Costs

The estimated total construction cost of the proposed project at IMS-Buyu is given in **Table 11-1**.

Table 11-1: Estimated Construction Cost for the Proposed Project

S/n	Project Components	Amount (in USD)	Amount (in TZS)
1	Completing of Phase II Building	4,445,000.00	10,356,850,000.00
2	Construction of Two Hostel Buildings	525,000.00	1,223,250,000.00
Total:		4,970,000.00	11,580,100,000.00

Source: (Excerpt from Project BOQ)

11.1.2 Project Benefits

The project is expected to have both short-term and long-term socio-economic benefits to the local community and the nation.

11.1.2.1 Short-term Benefits

The short-term socio-economic benefits include the creation of temporary employment and increased income generation opportunities for the local people. It is expected that during construction employment priority will be given to the local people.

During construction, some local people, especially women, will get the opportunity to increase their income by selling food items to the construction workers. This benefit will be enhanced by providing water supply and sanitary facilities to enable them to sell their food in a clean and hygienic environment, hence preventing transmission of hygiene-related diseases like cholera and diarrhoea to the construction workers.

11.1.2.2 Long-term Benefits

The long-term socio-economic benefits include increased revenue due to increased student enrolment, increased productivity due to the operation of the administration block and student hostels, and increased revenue for infrastructure/utility providers due to increased demand for power, water supply, and telecommunication services.

11.1.3 Environmental and Social Costs

The cost of environmental mitigation measures, as shown in Table 8-1 above, is considered to be the environmental cost to be incurred due to implementing mitigation measures for this project, which is estimated to be **TZS 154,800,000.00**.

11.1.4 Determination of Benefit/Cost Ratio

The resource evaluation or cost-benefits analysis focuses on comparing the project costs and environmental and social costs. The environmental and social costs for this project are TZS 154,800,000.00, and the total project costs are estimated to be TZS 11,734,900,000.00, after including the environmental and social costs.

When compared with total project costs (TZS 11,734,900,000.00), the overall environmental and social cost is about 1.32% of the total project costs. It can be concluded that the environmental and social costs are significantly small and can be tolerated for this project.

The benefit/cost ratio is a good indicator of project viability from economic, environmental, and social point of view. However, due to lack of economic analysis the benefit/cost ratio cannot be determined for this project.

Nevertheless, it is anticipated that there will not be any significant difference in Benefit/Cost Ratio before and after incorporating environmental and social costs, because the environmental and social costs have been found to be significantly small and do not have any significant effects on the project costs. Ultimately, the Benefit/Ratio is expected to be greater than 1, hence making the project to be economically viable, and therefore it should be implemented without delay.

CHAPTER TWELVE

12.0 DECOMMISSIONING AND CLOSURE PLAN

12.1 Implementation of Decommissioning Plan

The decommissioning/demobilization and site reclamation process is one of the required project management activities during the project completion or closure of the projects. The decommissioning activities will involve the removal of all mobilized items and cleaning up of the construction site. It will include the removal of all temporary safety signs, temporary fencing, construction debris including crushed stone aggregates, pieces of wood, construction stakes, and other construction-related refuse, and temporary facilities or works. The restoration of surfaces to an equal or better than the existing condition shall be considered to be part of demobilization. Site reclamation includes reclamation of areas disturbed during construction, other than access and staging areas, to pre-project conditions or better.

In order to ensure that all demobilization and site reclamation works are done in a comprehensive way right from the beginning, it is important to have a demobilization checklist which shows all items that need to be completed during the implementation of the decommissioning and closure plan. Environmental and Social Decommissioning/Demobilization Checklist groups the different items that need to be completed and inspected. The checklist covers the following issues and areas to be considered during the implementation of the demonization plan:

- Workers Welfare Management
- Camp Sites and Office Facilities; Solid Waste Management; Soil Erosion and Sedimentation Control; Groundwater and Dewatering Control.
- Workshops/Garages, Vehicle Washing and Refuelling Areas.
- Fuel and Chemical Storage Area
- Sanitary and Wastewater Disposal Facilities.
- Landscape Management and Run-off Control
- Borrow pits/Quarry Sites Rehabilitation.

The demobilization checklist will be used by Supervision Consultant's Environmental Specialist. For each inspection item, the form has a column for the work completion status (Yes, No or Not Applicable), observation comments made by the inspector for non-compliance works that need to be rectified by the Contractor and the target completion date for completing the non-conformant works. The Environmental Inspector will be taking some photographs during the site inspection for recording purpose. The photographs will be attached to the Environmental Demobilization Checklist and submitted to the Resident Engineer for action.

12.2 Retrenchment of Employees

Three (3) months before completion of the project, the Contractor through Human Resource Officer (HRO) will make sure social security contributions for all construction workers have been paid to the ZSSF. This will involve posting of the names of all employees on the notice board indicating their Names, ZSSF numbers and cumulative monthly ZSSF contributions. This is to ensure that all of the monthly ZSSF deductions have been paid by the Contractor inclusively and allow rectification for any identified shortcomings before retrenchment of employees.

12.3 Exit Medical Examination for Employees

The Contractor will carry out an exit medical examination for all employees before retrenchment. This is the requirements of Sub-section 24(2) of the Tanzania Occupational Health and Safety Act No. 5 of 2003. The legislation requires the Contractor shall carry out an exit medical examination through a qualified occupational health physician. According to Sub-section 24(3), the Contractor shall be responsible for the prescribed fee and all other medical expenses.

12.4 Restoration of Utilities and Landscape

During demobilization phase all work areas, offices, workshops /garages, and other temporary installations will be cleaned up and the site will be restored. These includes removal of temporary buildings, surplus materials, pieces of wood, pieces of bricks or any other material that is not in the area before construction works.

Damaged trees will be chopped / lopped and crosscut and removed from the construction sites. The site will be cleared of equipment, solid wastes, debris, and overburden resulting from construction works.

12.5 Restoration of Workshops / Garages and Materials Storage Areas

The workshop and other materials storage areas will be cleaned to remove petroleum products like oils and grease. All blocks, cements, stockpiled gravels, and any other surplus materials will be removed from the Materials storage yard.

The useable materials should be taken away and stored in a safe place far from the construction site. The spilled materials must be removed and the site must be properly cleaned and restored to its original state. If possible, the site must be prepared and planted with vegetation to the unpaved areas as approved by Resident Engineer.

12.6 Restoration of Solid Wastes and Spoil Materials Dumping Sites

All unwanted soil/spoil materials will be removed from temporary dumping sites and transported to permitted disposal site. The remaining useful soil materials will be mixed with surrounding topsoil, properly levelled, and graded to allow vegetation growth.

The on-site solid waste temporary storage area will be cleared, levelled, and returned to a regular form. All hazardous waste materials shall be removed by registered company and transported to authorized recycling or disposal facilities.

CHAPTER TWELVE

13.0 CONCLUSION AND RECOMMENDATIONS

13.1 Conclusion

An overview of the environmental and social assessment of the proposed construction of student hostels and completing Phase II construction of academic and administration block for the Institute of Marine Sciences, University of Dar es Salaam located at Buyu, Shehia of Shakani, Magharibi B district can be summarized in the following context:

- The project is of national importance and is aimed at establishing the goals of the HEET project to enhance performance of higher education in the country.
- The proposed project has received positive socio-economic response from most the institutional and key stakeholders with greater expectations about the implementation of the expanding higher education opportunities.
- Here are concerns about the possibility of coastal and marine pollution, issues of waste management and sewage disposal, degradation of the existing vegetation cover, and impacts on the local fishermen and other users. These are considered at the level of low impacts which can be managed and mitigated if all the developed environmental and social mitigation measures are implemented inclusively.

13.2 Recommendations

The Study Team recommends the following:

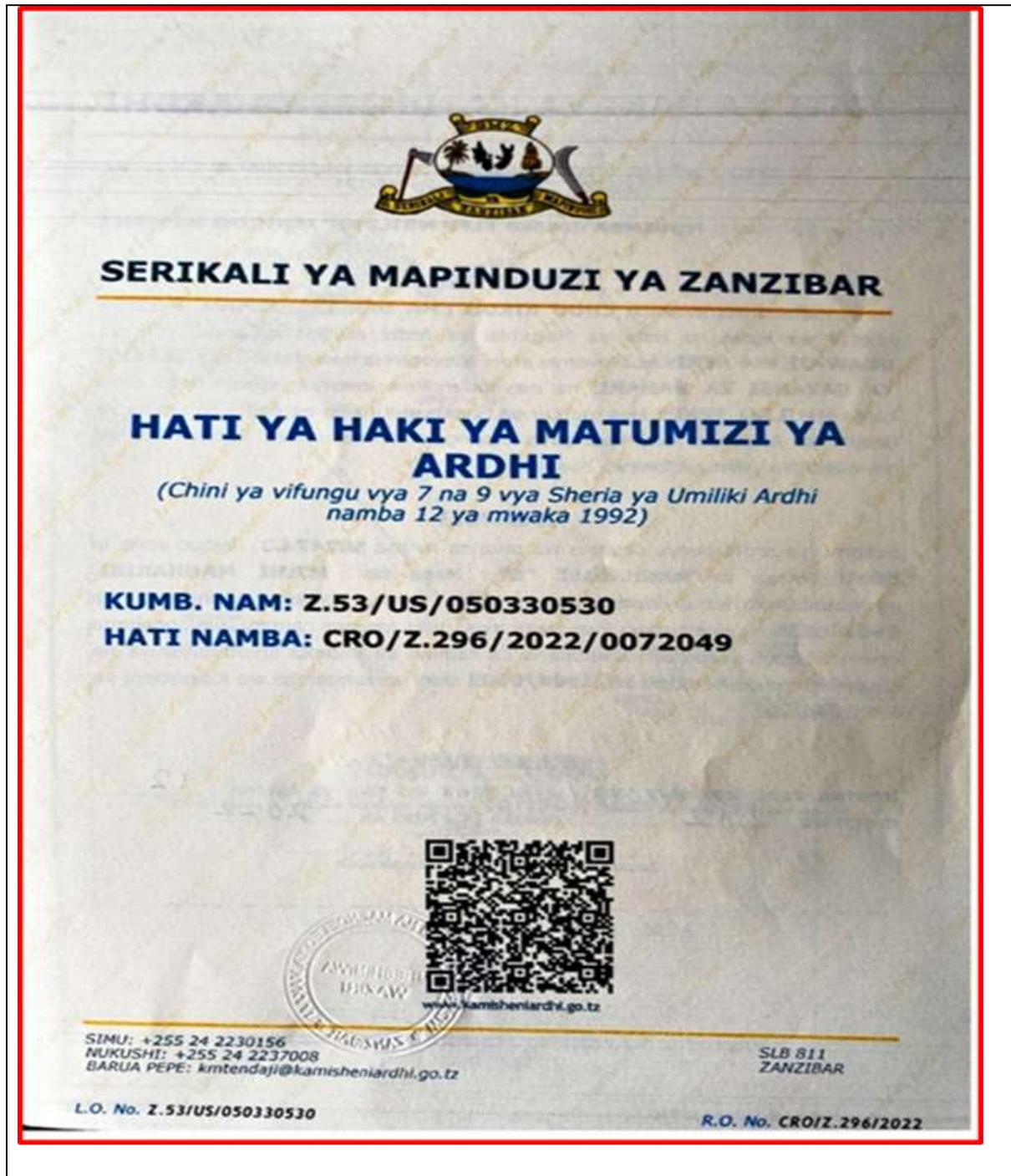
1. There should be enhancement measures in improving the environmental profile of the Institute of Marine Sciences of University of Dar es Salam at Buyu along with enhancement of the security of the area by providing fencing facility of entire area.
2. Construction works should be actively monitored and supervised so that no one takes advantage of negatively exploiting the existing flora and fauna.
3. The rights and interests of the local communities should be safeguarded in a manner of fairness and equity.

14.0 REFERENCES

1. EIA Regulations of Zanzibar 2019
2. IFC (2007) Environmental, Health, and Safety Guidelines: Construction Materials Extraction.
3. IFC (2007) Environmental, Health, and Safety Guidelines: General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality.
4. IFC (2007) Environmental, Health, and Safety Guidelines: General EHS Guidelines: Construction and Decommissioning.
5. IFC (2007) Environmental, Health, and Safety Guidelines: General EHS Guidelines: Mining.
6. International Finance Corporation (IFC). 2012. Performance Standards on Environmental and Social Sustainability.
7. International Labour Organization (ILO). 1991. Safety and Health in Open Cast Mines. Geneva, Switzerland.
8. Ministry Of Education, Science and Technology, (MoEST) Project Operational Manual (POM) Higher Education for Economic Transformation Project (HEET), P166415, PE July 2021.
9. The world Bank, Project Appraisal Document (POM), Higher Education for Economic Transformation Project (HEET), P166415, (2021).
10. The Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations (2014). The Government Notice No. 32, published on 30/01/2015.
11. WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide Global update 2005.
12. World Health Organization (WHO). 1999. Guidelines for Community Noise. Eds. B. Berglund, T. Lindvall, D.H. Schwela. Geneva.
13. Zanzibar Employment Act no11 of 2005.
14. Zanzibar Environmental Management Act no 3 of 2015.
15. Zanzibar Environmental Policy 2013.
16. Zanzibar labour Relation Act no 1 of 2005

APPENDICES

APPENDIX 1: TIITLLE DEED FOR IMS BUYU CAMPUS-ZANZIBAR



APPENDIX 2: WATER QULIAYT EXAMINATION RESULTS



ZANZIBAR WATER AUTHORITY

Water Laboratory

WATER ANALYSIS REPORT

Name of site: SHAKANI Region URBAN WEST
 Sample source: BORE HOLE Climate RANNY
 Time analysis was: 12:28PM ON 12th JUNE 2023
 Name of owner: UNIVERSITY OF DAR ES SALAAM
 Water: Not treated/Filtered/Chlorinated

Physical and chemical quality

		Guidelines WHO	TZ
Turbidity, NTU	<u>2.24</u>	5	50
Conductivity, us/cm	<u>773</u>	400	2500
Total dissolved solids, mg/L	<u>387</u>	500	1500
pH	<u>6.94</u>	6.5-8.5	6.5-9.2
Dissolve oxygen, mg/L	<u>5.10</u>		
Temperature, °C	<u>29.9</u>		

Bacteriological quality:

Total coli forms	<u>NIL/100ml</u>	NIL	NIL
Escherichia coli	<u>NIL/100ml</u>	NIL	NIL

Bacteriological quality: potable/suspicious/contaminated.
 Remarks and action recommended:
According to the result above physical and bacteria are fit standard except DO, so we recommend periodic test is need.

Date: 13/06/2023



signature: [Signature]
 TEL: 2231151

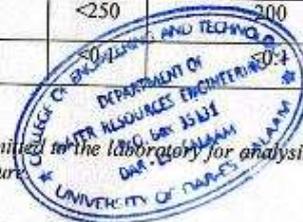
Table 1: Summary of Physical and Chemical analyses of the analysed water sample for domestic purpose from Shakani Borehole

S/N	PARAMETERS	UNITS	MEASURED VALUE	WHO STDS	TANZANIA STDS Natural Potable Water Limit (TZS 789:2018)
1	Nitrate N	mg/l	0.010	<10	<10
2	Chromium	mg/l	NIL	<0.1	<0.1
3	E/Conductivity	$\mu\text{S/cm}$	552	N.M	<2500
4	BOD	mg/l	5	<5	<5
5	Total Hardness	mg/l as CaCO_3	110	<500	<600
6	COD	mg/l	9	<10	<10
7	Chlorides	mg/l	61.5	<250	250
8	Sulphates	mg/l	50.7	<400	400
9	Potassium	mg/l	1.56	<200	50
10	Magnesium	mg/l	9.6	<150	100
11	Calcium	mg/l	11.2	<250	150
12	Iron	mg/l	0.001	<0.3	<0.3
13	Fluoride	mg/l	0.01	<1.5	<1.5
14	Sodium	mg/l	21.5	<250	200
15	Manganese	mg/l	0.013		

KEY:

N.M = Not Mentioned

NB. The result in this report pertains to the sample submitted to the laboratory for analysis and not necessarily to any other sample(s) of similar nature.



Block A 204, College of Engineering and Technology, P.O. Box 35131, Dar es Salaam.
 Phone: +255 22 2410500, General, Phone: +255 22 2410762 – Direct, Fax +255 22 2410114
 Email: wrap@udsm.ac.tz, Website: www.coet.udsm.ac.tz

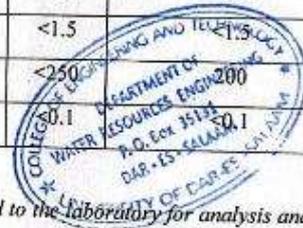
Table 2: Summary of Physical and Chemical analyses of the analysed water sample for domestic purpose from TAP (ISM)

S/N	PARAMETERS	UNITS	MEASURED VALUE	WHO STDS	TANZANIA STDS Natural Potable Water Limit (TZS 789:2018)
1	Nitrate N	mg/l	0.036	<10	<10
2	Chromium	mg/l	NIL	<0.1	<0.1
3	E/Conductivity	µS/cm	690	N.M	<2500
4	BOD	mg/l	5	<5	<5
5	Total Hardness	mg/l as CaCO ₃	140	<500	<600
6	COD	mg/l	8.8	<10	<10
7	Chlorides	mg/l	74.8	<250	250
8	Sulphates	mg/l	63.6	<400	400
9	Potassium	mg/l	2.03	<200	50
10	Magnesium	mg/l	23.1	<150	100
11	Calcium	mg/l	28.2	<250	150
12	Iron	mg/l	0.06	<0.3	<0.3
13	Fluoride	mg/l	0.01	<1.5	<1.5
14	Sodium	mg/l	21.9	<250	200
15	Manganese	mg/l	0.013	<0.1	<0.1

KEY:

N.M = Not Mentioned

NB. The result in this report pertains to the sample submitted to the laboratory for analysis and not necessarily to any other sample(s) of similar nature.



Block A 204, College of Engineering and Technology, P.O. Box 35131, Dar es Salaam.
 Phone: +255 22 2410500, General, Phone: +255 22 2410762 – Direct, Fax +255 22 2410114
 Email: wrep@udsm.ac.tz, Website: www.coet.udsm.ac.tz

APPENDIX 3: BASELINE DATA ON AIR QUALITY, NOISE AND VIBRATIONS**Appendix 3a: Average ambient Particulate Matter measured at two stations.**

Station Code	Location		Particulate Matter		
	GPS Readings		TSP	PM10	PM2.5
	Latitudes	Longitudes	mg/m ³	mg/m ³	mg/m ³
AQMS1	-6.260553	39.236244	0.045	0.031	0.017
AQMS2	-6.259225	39.233969	0.036	0.025	0.013
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

Source: Measurements on February 2024

Appendix 3b: Average values of measured ambient pollutant gases

Station Code	Location		Ambient Pollutant Gases				
	GPS Readings		CO	NO ₂	SO ₂	H ₂ S	VOCs
	Latitudes	Longitudes	mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³
AQMS1	-6.260553	39.236244	1.66	0.097	0.32	0.13	3.8
AQMS2	-6.259225	39.233969	1.04	0.102	0.38	0.19	4.3
TBS Limits			15	0.12	0.5	-	6.0
WHO/IFC Guidelines			30	0.2	0.5	-	--

Source: Field Measurements on February 2024.

Appendix 3c: Average ambient Noise Levels measured at two stations

Station Code	Location		Noise Levels in dBA	
	GPS Readings		Daytime	Night-time
	Latitudes	Longitudes	dBA	dBA
AQMS1	-6.260553	39.236244	45.8	44.5
AQMS2	-6.259225	39.233969	46.9	42.9
TBS Limits for Institution areas			<52	<42
WHO/IFC/WB Guidelines			<60	<45

Source: Field Measurements on February 2024

Appendix 3d: Average vibrations measured at two stations.

Station Code	Location		Vibration Levels (mm/s PPV)
	GPS Readings		
	Latitudes	Longitudes	
AQMS1	-6.260553	39.236244	0.002
AQMS2	-6.259225	39.233969	0.001
Human detection level			<0.15
TBS Limit			5
British Limit			0.3

Source: Field Measurements on February 2024.

APPENDIX 4: ENVIRONMENTAL IMPACT ASSESSMENT MATRIX

Affected Valued Environmental Components (VECs)	Project Related Activities	Potential Environmental Effects/Impacts	Importance (A1)	Magnitude (A2)	Permanance (B1)	Reversibility (B2)	Cumulativity (B3)	$\alpha1 \times \alpha2 = \partial T$	$\beta1 + \beta2 + \beta3 = \sigma T$	$\partial T \times \sigma T = ES$	Significance	Ranking	Mobilization Phase	Construction Phase	Demobilization Phase	Operation Phase
1. Atmospheric Environment	Construction activities (soil excavations and transportation of dry soil materials and dusty construction materials)	Creation of air pollution due to dust emission	1	-2	2	3	3	-2	8	-16	Low	-2	0	P	P	0
2. Acoustic Environment	Operation of construction equipment / machinery	Creation of noise nuisance to the nearby sensitive receptors.	2	-2	2	3	3	-4	8	-32	Medium	-3	0	P	0	0
3. Terrestrial Environment	Accumulation of construction and domestic	Creation of landscape degradation and loss of	1	-3	2	2	1	-3	5	-15	Low	-2	0	P	0	0

Affected Valued Environmental Components (VECs)	Project Related Activities	Potential Environmental Effects/Impacts	Importance (A1)	Magnitude (A2)	Permanance (B1)	Reversibility (B2)	Cumulativity (B3)	$\alpha1 \times \alpha2 = \partial T$	$\beta1 + \beta2 + \beta3 = \sigma T$	$\partial T \times \sigma T = ES$	Significance	Ranking	Mobilization Phase	Construction Phase	Demobilization Phase	Operation Phase
	solid wastes into the surrounding environment.	aesthetic value of the surrounding environment.														
	Removal of existing vegetation/trees.	Loss of ecological and landscape value of the surrounding environment.	2	-2	3	3	2	-4	8	-32	Medium	-3	0	P	0	0
4. Public Health and Safety	Social interaction between construction workers and local community	Increased prevalence of HIV/AIDS and STIs.	3	-2	2	3	3	-6	8	-48	High	-4	P	P	0	0
	Handling and operation of hazardous construction	Creation of occupational health and safety risks.	1	-3	2	2	1	-3	5	-15	Low	-2	P	P	0	0

Affected Valued Environmental Components (VECs)	Project Related Activities	Potential Environmental Effects/Impacts	Importance (A1)	Magnitude (A2)	Permanance (B1)	Reversibility (B2)	Cumulativity (B3)	$\alpha1 \times \alpha2 = \partial T$	$\beta1 + \beta2 + \beta3 = \sigma T$	$\partial T \times \sigma T = ES$	Significance	Ranking	Mobilization Phase	Construction Phase	Demobilization Phase	Operation Phase
	materials and equipment.															
	Induced influx of people into the project sites.	Increased risk of exposure to COVID-19 transmission.	3	-2	2	3	3	-6	8	-48	High	-4	P	P	0	0
	Trespassing by unauthorized persons into the construction site.	Increased risk of construction related accidents.	1	-2	2	3	2	-2	7	-14	Low	-2	P	P	0	0
	Movement of heavy trucks to and from the construction site.	Increased risk of traffic accidents.	1	-2	2	3	2	-2	7	-14	Low	-2	P	P	0	0

Affected Valued Environmental Components (VECs)	Project Related Activities	Potential Environmental Effects/Impacts	Importance (A1)	Magnitude (A2)	Permanance (B1)	Reversibility (B2)	Cumulativity (B3)	$\alpha1 \times \alpha2 = \partial T$	$\beta1 + \beta2 + \beta3 = \sigma T$	$\partial T \times \sigma T = ES$	Significance	Ranking	Mobilization Phase	Construction Phase	Demobilization Phase	Operation Phase
5. Labour and Economy	Recruitment of construction workers	Creation of employment opportunity for local people.	2	3	2	1	2	+6	5	+30	Medium	+3	P	P	0	0
	Increased demand for food and other items from construction workers	Creation of income generation opportunities for local people	2	2	2	1	2	+4	5	+20	Medium	+3	P	P	0	0
	Interaction among the project employees with differences in gender and socio-economic status.	Risk of Emergence of Gender Based Violence, Sexual Exploitation and Sexual Harassment	3	-2	2	3	3	-6	8	-48	High	-4	0	P	0	0

Affected Valued Environmental Components (VECs)	Project Related Activities	Potential Environmental Effects/Impacts	Importance (A1)	Magnitude (A2)	Permanance (B1)	Reversibility (B2)	Cumulativity (B3)	$\alpha1 \times \alpha2 = \partial T$	$\beta1 + \beta2 + \beta3 = \sigma T$	$\partial T \times \sigma T = ES$	Significance	Ranking	Mobilization Phase	Construction Phase	Demobilization Phase	Operation Phase
	Retrenchment of construction workers after project completion.	Loss of temporary employment by local people.	2	-1	3	3	3	-2	9	-18	Low	-2	0	0	P	0

	Operation of IMS Buildings after construction.	Increased enrolment of students.	4	3	3	1	1	12	5	60	High	+4	0	0	0	P
6. Community and Public Service Infrastructure/Utilities.	Increased demand for infrastructure/utility services.	Increased revenue for infrastructure and utility service providers.	2	3	3	1	3	+6	7	+42	High	+4	0	0	0	P
7. Current Land and Resource Use.	Removal of outdoor concrete desks from the proposed construction site.	Disruption of outdoor concrete desks for IMS students.	1	-2	3	3	2	-2	8	-16	Low	-2	P	0	0	0