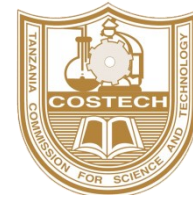


**UNITED REPUBLIC OF TANZANIA**

**MINISTRY OF EDUCATION, SCIENCE AND  
TECHNOLOGY**



ISO 9001 : 2015 Certified

**TANZANIA COMMISSION FOR SCIENCE AND  
TECHNOLOGY**

**P.O. Box 4302, Ali Hassan Mwinyi Road, Kijitonyama,  
COSTECH Building, Dar es Salaam  
Phone: +255 222 771 358  
Email: dg@costech.or.tz**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED  
CONSTRUCTION OF SCIENCE, TECHNOLOGY AND INNOVATION COMPLEX AT PLOT  
No. 11, BLOCK 'B', NCC MLIMANI AREA, SALMINI MTA, TAMBUKARELI WARD IN  
DODOMA CITY, DODOMA REGION**

**September 2024**

## EXECUTIVE SUMMARY

### 1. Introduction

The Tanzania Commission for Science and Technology (COSTECH) is a government institution which was established by the Act of Parliament No. 7 of 1986 as the successor to the Tanzania National Scientific Research Council (UTAFITI) as a parastatal organization with the responsibility of coordinating and promoting research and technology development activities in the country. It serves under the ministry responsible for science and technology as the chief advisor to the Government on all matters pertaining to Science, Technology and Innovation (STI) and their application to the socio-economic development of the country. COSTECH has received financial support from the World Bank (WB) under the Higher Education for Economic Transformation (HEET) Project and intends to use part of the funds to establish the STI Complex at Plot No. 11, Block 'B' at NCC Mlimani area, Dodoma city.

The HEET project of the Government of Tanzania (GoT) is supported through the World Bank with a Project Development Objective (PDO) of strengthening the learning environment and labour market alignment of priority programmes at beneficiary higher education institutions and improving the management of the higher education system. Generally, it is done under various strategic focus areas such as:

- a) Upgrading learning resources and equipment;
- b) Promoting applied research and innovation capacity;
- c) Building functional linkages with private sector/industry;
- d) Strengthening use of digital technology, and
- e) Promote self-generated income

In contributing to the main project development objective, COSTECH feeds on the second component of the PDO which aims at Strengthening the Management of the Higher Education System. This is due to COSTECH having a role to play in all aspects ranging from strengthening innovation environment in higher education, labour market orientation and management of higher education in respect to research and innovation. The primary task will be to facilitate uptake of innovations and other research outputs for economic transformation. Moreover, infrastructure development is among the activities that will be implemented under the HEET project.

The Construction works of the proposed STI complex will be comprised of:

- a) Technology and innovation functions with workshops, innovation hub and incubation space;
- b) Science functions with digital science museum and science auditorium;
- c) Knowledge management functions with modern server room, communication lab/studio and digital library;
- d) Administrative and common facilities such as offices, conference hall, boardroom, archive and strong room, CCTV camera room and toilets (ladies, gents & people with special needs); and
- e) Main entrance, guard house, power house, parking lots and perimeter wall.

The proposed STI Complex will be erected on a plot with an area of 4,639 square meters where the proposed structure will take into account basic architectural principles, such as orientation of the building relative to the sunrise and sunset, placement of building in relation to the access roads and view. Large openings to allow enough natural ventilation in the building. Facades that not only function well but also create an inviting element to passers-by. High quality materials, large terraces and car parking space. However, the construction of the proposed STI Complex and associated activities will inevitably have adverse environmental, social and economic

impacts. These impacts need to be identified, predicted and evaluated so that positive impacts are enhanced while mitigation measures are developed for negative impacts. The Environmental Management Act of 2004 of Tanzania requires project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. In accordance with the categories identified in the Third Schedule to Environmental Management Act, Cap 191 and First Schedule to Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, the nature of this project is subject to full EIA study.

Similarly, the World Bank provides Environmental and Social Framework (ESF) and relevant Environmental and Social Standards (ESSs), which aim to offset the anticipated social and environmental impacts of Investment Projects Financing. The ESS1 sets out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and development of mitigation measures.

In fulfillment of national and international requirement, COSTECH has engaged Assess Consulting Company Limited (a registered environmental firm of experts) of Dar es Salaam to conduct the ESIA. The study shall be conducted in accordance with the requirements of the Environmental Management Act No 20 of 2004 and Environmental Impact Assessment and Audit Regulations (2005) as amended in 2018. The ESIA study has also adhered to the World Bank Policies, frameworks and standards requirements and other important legal provisions which provide guidance on environmental and social issues pertaining to construction activities.

## **2. Project Description**

The project site is situated within a thriving urban environment, boasting a diverse array of government and private offices, complemented by essential infrastructural amenities such as well-established access roads, utilities including water and electricity, and a robust stormwater drainage system. The designated project area is undeveloped land that exhibits a predominantly flat terrain, gently sloping from its northern reaches to the southern boundary. Elevations within the site range from 1139 meters to 1140 meters above mean sea level, with a slight gradient noticeable from west to east. The landscape is adorned with natural vegetation comprising a blend of short grasses, shrubs, and secondary vegetation, typically rejuvenated after the brief rainy season. Importantly, there are neither endangered flora nor fauna species and sensitive ecological sites within close proximity to the proposed project site.

While not designated as a wildlife corridor or conservation area, the area showcases a moderate level of biodiversity, with flora and fauna species adapted to semi-arid conditions flourishing in the area. This diverse ecosystem contributes to the overall environmental resilience of the locality, supporting a variety of plant and small animal life characteristic of the broader region.

## **3. Relevant Policies and Legislation**

Tanzania is committed to attaining sustainable development goal. Some of the policies and legislation that have a close bearing to this project have been discussed in the report which are:-

- i. The Environmental Management Act, Cap 191, 2004
- ii. The Land Act, [Cap.113 R.E 2019]
- iii. The Water Resource Management Act, 2009 (Act No. 11/2009)
- iv. The Occupational Health and Safety Act No. 5 of 2003
- v. The Contractors Registration Act No. 17 Of 2008
- vi. The Engineers Registration Act, 2007
- vii. The Employment and Labour Relation Act, 2019
- viii. The Workmen's Compensation Act, Cap 263 of 2008

- ix. The Local Government (Urban Authorities) Act, [Cap.288 R.E 2019]
- x. The HIV and AIDS (Prevention and Control) Act of 2008
- xi. The Fire and Rescue Force Act No. 14 of 2007
- xii. The Persons with Disability Act, 2010
- xiii. The Child Act of 2009
- xiv. The Environmental Management (Environment Impact Assessment and Audit) (Amendment) Regulations of 2018 National Environmental Policy (NEP) (2021),
- xv. Construction Industry Policy (2003),
- xvi. National Land Policy of 1995,
- xvii. National Human Settlements Development Policy (2000),
- xviii. National Gender Policy (2023),
- xix. National Policy on HIV/AIDS (2001),
- xx. The National Health Policy (URT, 2003),
- xxi. National Energy Policy (2015),
- xxii. The National Water Policy (URT, 2002),
- xxiii. National Investment Promotion Policy (1996),
- xxiv. National Economic Empowerment Policy (2004),
- xxv. Urban Planning and Space Standards Policy (2012) and
- xxvi. Education Training Policy (2014)

Furthermore, this ESIA study has also complied with the following tools:

- i) World Bank's new Environmental and Social Framework (ESF);
- ii) 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- Assessment and Management of Environmental and Social Risks and Impacts;
  - ESS2 - Labor and Working Conditions;
  - ESS3 - Resource Efficiency and Pollution Prevention and Management;
  - ESS4 - Community Health and Safety;
  - ESS 5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
  - ESS8 – Cultural Heritage; and
  - ESS10 - Stakeholder Engagement and Information Disclosure.

The environmental and social impact assessment for the project has been carried out in compliance with these policies, legislations, standards, regulations, and guidelines to ensure that the proposed development aligns with and abides by all relevant legal and regulatory requirements related to environmental management, health and safety, land use, and pollution control.

#### **4. Stakeholders Engagement**

Stakeholders identification and involvement adheres to guidelines specified in the Environmental Impact Assessment (EIA) and Audit Regulations (2005, as amended in 2018), World Bank Environmental and Social Standards (ESS10), and the Stakeholders Engagement Plan (SEP). Public consultations entails the sharing of project details, comprehension of stakeholder concerns, and cultivation of community relationships. Key stakeholders were pinpointed based on their roles, significance, influence, and potential impact on the project. The Stakeholders Engagement Plan (SEP) encompassed both national and sub-national levels, with a particular emphasis on sub-national stakeholders. It delineated the specifics of engagement pertaining to project activities, encompassing stakeholders at regional, city, ward and sub-ward tiers. Consultations shall occur throughout the project's implementation duration, and mechanisms shall be instituted to address issues related to the project implementation

Stakeholders' consultation was carried out during the study to identify and respond to project issues of concern to stakeholders. Details of the meetings and focus group discussions with individuals and groups of stakeholders has been appended in this Environmental Impact Statement (EIS). Stakeholders consulted included all individuals and groups that might be affected or might affect (positively or negatively) the proposed development in one way or another. They are found at the Regional, City, and local levels. At the Regional level, the following stakeholders were consulted Occupational, Safety and Health Authority (OSHA), Fire and Rescue Force, Dodoma Water Supply and Sanitation Authority (DUWASA) and Dodoma City Council. At the local level, the Ward Executive Officer (WEO) and Mtaa Executive Officer (MEO) as well as community members were consulted.

## **5. Environmental Impact Assessment and Identification of Alternative**

The project implementation will have environmental and social consequences at various stages throughout its lifecycle. The construction, operation, and decommissioning phases of the proposed project will generate impacts. One of the most significant and noticeable impacts will be the pollution of the surrounding environment, affecting water, land, air, and vegetation. Despite the fact that the project will be enclosed within a fence, there is still a possibility of direct or indirect impacts on these elements due to the project implementation.

### **Significant positive social impact of the project**

- a. *Job Creation*
- b. *Economic Growth*
- c. *Improved Infrastructure*
- d. *Social Interaction*
- e. *Increased Property Values*
- f. *Diversification of Economy*
- g. *Increased skills and impartation of knowledge to local communities*
- h. *Production of skilled labour force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation.*

### **Significant negative social impact of the project**

- a) *Increased Traffic and Congestion:*
- b) *Changes in Property Value*
- c) *Community Disruption*
- d) *Changes in community dynamics*
- e) *Social Segregation*
- f) *Child labor*
- g) *Increase level of crimes*
- h) *Spread of Diseases*
- i) *Gender Based Violence, Sexual Harassment and Sexual Exploitation & Abuse due to Labour Influx*

### **Significant environmental impact of the project**

The following is a summary of the environmental impacts:

- a. *Air Quality pollution*
- b. *Noise Pollution*
- c. *Increased runoff due to the removal of vegetation and soil disturbance.*
- d. *Waste Generation*
- e. *Occupational Health Hazards*
- f. *Water Pollution*
- g. *Loss of vegetation.*

- h. Soil Erosion*
- i. Disruption of local ecosystems and natural drainage patterns.*
- j. Increased energy and water consumption during construction and operation phases*
- k. Increased Vibration*
- l. Contribution to Climate change*
- m. Loss of Visual Aesthetics*

## **6. Environmental and Social Management Plan**

The Environmental and Social Management Plan (ESMP) identifies feasible and cost-effective Measures required for the environmental and social monitoring of key environmental and social aspects of the project during project implementation. The ESMP will include an overview of Impacts and Mitigations plan that will include for each impact/issue, (i) suggested mitigation measures to avoid, reduce or minimize, or compensate or offset significant adverse risks and impacts identified and assessed in the ESIA; (ii) the responsible party for implementation and for supervision; (iii) the time frame and periodicity for assessing each mitigating measure; (iv) monitoring indicators; (v) anticipated cost; as well as (vi) party responsible for financing each monitoring measure. The ESMP will summarize mitigation measures to address impacts as identified by the ESIA report. ESMP will split into three rows for ease of use, with one each for use during construction, second for the length of project operation and the last one for the closure period.

## **7. Environmental and Social Monitoring Plan (ESMoP)**

The environmental and social monitoring plan is developed to ensure that the prediction for the impacts is accurate and assure that the mitigation measures are implemented and they are effective in performing its objectives. The monitoring plan will include the monitoring activities (How?), the monitoring indicator (What?), responsible party for monitoring (Who?), the frequency of monitoring (How many?), and the anticipated cost and the party responsible for financing the monitoring activities. The main monitoring actions for the proposed project for construction phase and for operation phase are summarized and presented in this ESIA report. The responsible parties for environmental and social management and monitoring during construction will be the construction contractor, COSTECH and other relevant authorities while the responsible parties during system operations will COSTECH.

## **8. Cost Benefit Analysis**

The Environmental and Social Impact Assessment report evaluates the project by considering its negative impacts in relation to the socio-economic benefits that would be missed if the project wouldn't be carried out. The analysis of the environmental cost-benefit assesses and the ratio between the negative and positive impacts has been done. The project offers significant potential financial and social benefits, while the environmental impacts can be adequately mitigated. The financial resources required for mitigating the negative impacts are relatively small compared to the overall investment needed.

## **9. Decommissioning Plan**

The project is anticipated to last for over 50 years, and this document outlines an initial decommissioning plan. The plan aims to establish practical decommissioning approaches that can be executed safely, without endangering the public's health and safety, decommissioning personnel, or causing harm to the environment. It adheres to the guidelines and regulations set by relevant regulatory agencies. The purpose of this preliminary decommissioning plan is to

ensure that the decommissioning and final disposition of the project though it's not expected to happen are taken into account during the project's initial design phase.

## **11. Conclusion**

The project is anticipated to have both favorable (positive) and adverse (negative) effects on the environment and the surrounding community. It is projected that the majority of the positive impacts will manifest over the long term during the operational phase, whereas the negative impacts are expected to be primarily short-term and concentrated during the construction phase. Consequently, it is reasoned that the benefits of the project will outweigh its drawbacks, especially considering that most of the negative impacts will be short-lived and can be effectively addressed through proactive design and sound engineering practices. Furthermore, an Environmental and Social Management Plan (ESMP) has been meticulously crafted to ensure the implementation of prescribed mitigation measures.

To optimize the positive impacts, the project will focus on enhancing its beneficial aspects. COSTECH as a project proponent is entrusted with the responsibility of overseeing the comprehensive execution of the Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMoP) delineated in this report. Following a thorough Environmental and Social Impact Assessment (ESIA), it is recommended that the proposed project proceed, contingent upon the proponent's strict adherence to the ESMP outlined in the report and any supplementary conditions stipulated by regulatory bodies such as the National Environment Management Council (NEMC), World Bank ESF and ESSs, and other pertinent authorities.

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	<b>i</b>
<b>TABLE OF CONTENTS</b> .....	<b>vii</b>
<b>LIST OF TABLES</b> .....	<b>xiii</b>
<b>LIST OF FIGURES</b> .....	<b>xiv</b>
<b>LIST OF ABBREVIATION</b> .....	<b>xv</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 Background Information .....	1
1.2 Rationale and Objectives of the project .....	2
1.3 Objectives of ESIA Study .....	2
1.4 Methodology and ESIA Team .....	2
1.4.1 Document Review .....	3
1.4.2 Site visits .....	3
1.4.3 Stakeholder involvement .....	3
1.4.4 Baseline Data and Information .....	3
1.4.5 Identification of Impacts .....	4
1.4.6 Impact Evaluation .....	5
1.5 Report Structure .....	5
<b>CHAPTER TWO</b> .....	<b>6</b>
<b>2 PROJECT DESCRIPTION</b> .....	<b>6</b>
2.1 Location and Accessibility .....	6
2.1.1 Location .....	6
2.1.2 Accessibility .....	6
2.1.3 Site Description .....	9
2.1.4 Major Adjacent developments .....	9
2.2 Project Scope and Activities .....	10
2.2.1 Project Activities .....	10
2.2.2 Design phase .....	10
2.2.3 Sustainable design elements of the proposed project .....	11
2.2.4 Mobilization and demolition phase .....	12
2.2.5 Pre-construction stage .....	12
2.2.6 Construction phase .....	12
2.2.7 Operation phase .....	14
2.2.8 Electricity .....	15
2.2.9 Sanitary facilities .....	15



2.2.10	Firefighting system.....	15
2.3	Waste Management strategies .....	15
2.3.1	Mobilization Phase.....	15
2.3.2	Construction Phase.....	15
2.3.3	Operational Phase .....	16
2.4	Labor Requirements (Construction and Operations) .....	16
2.5	Occupational Health and Safety (OHS).....	17
2.5.1	OHS During construction phase.....	17
2.5.2	OHS During operation phase .....	20
2.6	Disaster Risk Management.....	20
2.7	Gender analysis and mainstreaming .....	20
2.8	Project Boundaries.....	21
2.8.1	Institutional boundaries.....	21
2.8.2	Temporal boundaries .....	21
2.8.3	Spatial boundaries .....	21
2.9	Project Cost.....	22
<b>CHAPTER THREE</b>	<b>.....</b>	<b>23</b>
<b>3</b>	<b>POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORK .....</b>	<b>23</b>
3.1	Introduction.....	23
3.2	Policies Relevant to the Project.....	23
3.2.1	The National Environmental Policy, 2021 .....	23
3.2.2	The National Land Policy (1997) .....	23
3.2.3	The Construction Industry Policy (2003) .....	24
3.2.4	The National Employment Policy (2008).....	24
3.2.5	The National Gender Policy (2002) .....	24
3.2.6	National Policy on HIV/AIDS (2001).....	24
3.2.7	The National Energy Policy (2015).....	25
3.2.8	The National Water Policy (2002).....	25
3.2.9	The National Health Policy ( 2008).....	25
3.2.10	The National Transportation Policy (2003).....	26
3.3	Relevant Legal Framework .....	26
3.3.1	Environmental Management Act, Cap 191, 2004 .....	26
3.3.2	Occupational Health and Safety Act NO. 5 of 2003.....	26
3.3.3	The Land Act, 1999, [Cap. 113 R.E. 2019] .....	27
3.3.4	The Urban Planning Act (2007).....	27
3.3.5	Employment and Labour Relations Act, R.E 2019.....	27

3.3.6	The Engineers Registration Act, 2007 .....	27
3.3.7	The Contractors Registration Act, 1997 .....	28
3.3.8	The Architects and Quantity Surveyors, Act 2010 .....	28
3.3.9	Public Health Act, 2009 .....	28
3.3.10	Fire and Rescue Force Act, 2007 .....	28
3.3.11	Water Resources Management Act, 2009 .....	29
3.3.12	The Workers Compensation Act, 2015 .....	29
3.3.13	Prevention and Control of HIV/AIDS Act, 2008 .....	29
3.3.14	The Child Act, 2019 .....	29
3.3.15	The Roads and Fuel Toll Act, [Cap.220 R.E.2019] .....	30
3.3.16	The Road Act, 2007 .....	30
3.3.17	Standard Act of 2009 .....	30
3.3.18	The Local Government (Urban Authorities) Act, [Cap.288 R.E 2019] .....	31
3.3.19	The Persons with Disability Act, 2010 .....	31
3.4	Relevant Plans, Regulations and Guidelines .....	31
3.4.1	The Environmental Impact Assessment and. Audit(Amendment) Regulations, 2018 31	
3.4.2	The Registration and Practice of Environmental Experts) Regulations 2021 .....	31
3.4.3	The Environmental Management (Fees and Charges) Regulations, 2021 .....	32
3.4.4	Environmental Management (Air Quality Standards) Regulations, 2007 .....	32
3.4.5	Environmental Management (Soil Quality Standards) Regulations, 2007 .....	32
3.4.6	Environmental Management (Water Quality Standards) Regulations, 2007 .....	33
3.4.7	The Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015 .....	33
3.4.8	The Urban Planning (Use Groups and Use Classes) Regulations, 2018 .....	33
3.4.9	The Urban Planning (Application for Planning Consent) Regulations, 2018 .....	33
3.4.10	The Urban Planning (Planning Space Standards) Regulations, 2018 .....	34
3.4.11	The Urban Planning (Zoning of Land Uses) Regulations, 2018 .....	34
3.4.12	The Industries and Consumer Chemicals [Management and Control] Regulations, 2020	34
3.4.13	The Environmental Management [Control of Ozone Depleting Substances] Regulations, 2007 .....	35
3.4.14	The Environmental Management (Solid Waste Management) Regulation, 2009 as amended in 2016 .....	35
3.4.15	Environmental Management Act (Hazardous Waste Control) Regulations, 2021	35
3.4.16	The Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations, 2021 .....	36
3.5	Relevant National Plans/Strategies .....	36

3.5.1	The Tanzania Development Vision 2025 .....	36
3.5.2	The Five Years Development Plan (FYDP) 2021/2022-2025/2026.....	36
3.6	Relevant International Agreements, Conventions and Treaties.....	40
3.6.1	United Nations Framework Convention on Climate Change (1992).....	40
3.6.2	Paris Agreement (2015).....	40
3.6.3	The Convention on Biological Diversity (1992) .....	40
3.6.4	United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification (UNCCD-1994).....	40
<b>3.6.5</b>	<b>Other Relevant convention to the proposed project.....</b>	<b>41</b>
3.7	Institutional Framework for the Management of Environment .....	41
3.8	Environmental and Social Management Framework (ESMF) <b>Error! Bookmark not defined.</b>	
3.8.1	Objective of the Environmental and Social Management Framework..... <b>Error! Bookmark not defined.</b>	
3.8.2	Assessment and Management of Environmental and Social Risks and Impacts (ESS1).....	44
3.8.3	Labor and Working Conditions (ESS2) .....	45
3.8.4	Resource Efficiency and Pollution Prevention and Management (ESS3).....	45
3.8.5	Community Health and Safety (ESS4).....	46
3.8.6	Cultural Heritage (ESS8) .....	46
3.8.7	Stakeholder Engagement and Information Disclosure (ESS10).....	47
3.8.8	World Bank Group ESHS Guidelines .....	47
<b>CHAPTER FOUR</b>	<b>.....</b>	<b>48</b>
<b>4</b>	<b>BASELINE CONDITIONS OF THE PROJECT AREA .....</b>	<b>48</b>
<b>4.1</b>	<b>Introduction .....</b>	<b>48</b>
4.1.1	Area of Influence.....	48
<b>4.2</b>	<b>Physical Characteristics .....</b>	<b>48</b>
4.2.1	Topography.....	48
4.2.2	Climate .....	48
4.2.3	Soil, Geology and Hydrology characteristics.....	50
<b>4.2.4</b>	<b>Air quality monitoring results .....</b>	<b>51</b>
<b>4.2.5</b>	<b>Noise.....</b>	<b>53</b>
<b>4.2.6</b>	<b>Vibration.....</b>	<b>54</b>
<b>4.3</b>	<b>Biological Characteristics.....</b>	<b>55</b>
<b>4.4</b>	<b>Socio economic conditions and infrastructure.....</b>	<b>59</b>
4.4.1	Population .....	59
4.4.2	Cultural Heritage, Aspirations and Traditions.....	60
4.4.3	Economic Activities .....	60

4.4.4	Agriculture .....	60
4.4.5	Livestock keeping .....	60
4.4.6	Industrial Development .....	60
4.4.7	Economic Infrastructure .....	60
<b>CHAPTER FIVE.....</b>		<b>62</b>
<b>5 STAKEHOLDER ENGAGEMENT PLAN AND AND GRIEVANCES REDRESS MECHANISM.....</b>		<b>62</b>
5.1	Introduction.....	62
5.2	Stakeholders Identification and Analysis .....	62
5.3	Requirement of Stakeholder Engagement .....	<b>Error! Bookmark not defined.</b>
5.4	Objectives of Stakeholder Engagement .....	<b>Error! Bookmark not defined.</b>
5.5	Stakeholders Engagement and Disclosure Methodologies .....	63
5.5.1	Community Meetings .....	63
5.5.2	Formal Meetings .....	63
5.5.3	One on one interviews .....	63
5.5.4	Site visits .....	64
5.5.5	Disclosure .....	64
5.6	Stakeholders Concerns.....	64
5.7	. Stakeholders Engagement Plan (SEP) .....	<b>Error! Bookmark not defined.</b>
5.8	Grievance Redress Mechanism.....	69
5.8.1	Purpose.....	69
5.8.2	Scope .....	70
5.8.3	Features of Grievance Redress Mechanism.....	70
5.8.4	Grievance Mechanism Process or Procedures.....	71
<b>CHAPTER SIX.....</b>		<b>75</b>
<b>6 IMPACTS ASSESSMENT, MITIGATION MEASURES AND PROJECT ALTERNATIVE .</b>		<b>75</b>
6.1	Introduction.....	75
6.1.1	Nature of Impact .....	75
6.1.2	Duration of Impact.....	76
6.2	Environmental Impact Rating Scale.....	76
6.2.1	Severity/Benefit.....	76
6.2.2	Spatial scale.....	77
6.2.3	Temporal scale .....	77
6.2.4	Criteria and Significance Rating .....	78
6.3	Possible Potential Impacts during Mobilization and Construction Phase .....	79
6.4	Possible Potential Impacts during Operations Phase .....	93
6.5	Possible Potential Impacts during Decommissioning Phase .....	98

6.6	Cumulative impacts .....	102
6.7	Project Alternatives .....	102
<b>CHAPTER SEVEN .....</b>		<b>108</b>
<b>7</b>	<b>ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN .....</b>	<b>108</b>
7.1	Introduction.....	108
7.2	Purpose of the ESMP.....	108
7.3	ESMP Implementation Responsibility.....	108
7.4	Environmental and Social Cost.....	110
<b>CHAPTER EIGHT.....</b>		<b>136</b>
<b>8</b>	<b>ENVIRONMENTAL AND SOCIAL MONITORING PLAN.....</b>	<b>136</b>
8.1	Introduction.....	136
8.2	Monitoring Frequency and reporting.....	136
8.3	8.3 Monitoring Plan .....	137
<b>CHAPTER NINE .....</b>		<b>146</b>
<b>9</b>	<b>COST BENEFIT ANALYSIS.....</b>	<b>146</b>
9.1	Introduction.....	146
9.2	Relevance and challenges.....	146
9.3	Costs analysis .....	146
9.4	Benefit analysis .....	146
9.5	Cost of utilities and maintenances.....	147
9.6	Financial analysis.....	147
9.7	Environmental cost benefit analysis .....	147
9.8	Social economic cost benefit analysis .....	147
9.9	Net present value (npv) analysis .....	147
9.10	Conclusion.....	148
9.11	Recommendations .....	148
<b>CHAPTER TEN .....</b>		<b>149</b>
<b>10</b>	<b>DECOMMISSIONING PLAN.....</b>	<b>149</b>
10.1	Preliminary Decommissioning Plan .....	149
10.2	Objectives of the Plan .....	149
10.3	Preliminary Plan .....	150
10.3.3	Decommissioning Phase.....	151
<b>CHAPTER ELEVEN: .....</b>		<b>154</b>
<b>11</b>	<b>SUMMARY AND CONCLUSION .....</b>	<b>154</b>
11.1	Summary .....	154
11.2	Conclusion.....	154

<b>BIBLIOGRAPHY .....</b>	<b>156</b>
---------------------------	------------

### LIST OF TABLES

Table 1-1 : Classification of Impacts significance .....	5
Table 2-1: GPS coordinates of the project area.....	6
Table 2-2: Water demand.....	14
Table 2-3: Waste Generation and treatment during Construction Phase.....	15
Table 3-1: Key Institutions relevant to the ESIA process.....	41
Table 3-2: World Bank Environmental and Social Standards.....	<b>Error! Bookmark not defined.</b>
Table 4-1: Gas monitoring results .....	53
Table 4-2: Noise Monitoring results.....	53
<b>Table 4-3: Vibration measurement results .....</b>	<b>54</b>
Table 4-4: Population of Dodoma Municipal Council .....	59
Table 5-1: List of Stakeholders identified, their roles and the rate of interest in the Project.....	62
Table 5-2: Details of Stakeholders concerns .....	65
Table 6-1: Severity rating scale .....	76
Table 6-2: Spatial scale .....	77
Table 6-3: Temporal scale Bottom of Form.....	78
Table 6-4: Significance of an Impacts .....	78
Table 7-1: Roles and responsibilities of respective entities .....	109
Table 7-2: Proposed Environmental Social Management Plan (ESMP) for Mobilisation, construction, demobilization, operation and maintenance, and decommissioning phase. ....	111
Table 8-1: Proposed Environmental and Social Monitoring Plan (ESMP) for mobilisation/planning phase, construction phase, demobilisation phase and operation phase.....	138
Table 10-1: Decommissioning and Closure Plan .....	151

## LIST OF FIGURES

Figure 2-1: Location Map.....	7
Figure 2-2: Map showing Site location .....	8
Figure 4-1:Particulate matter monitoring results .....	52
Figure 6-1: Impacts Identification (Source: Assess Consultant, 2024).....	75
Figure 9-1: Cost and Benefit Analysis for CBA .....	146

## LIST OF ABBREVIATION

AIDS	Acquired Immune Deficiency Syndrome
AQRB	Architects and Quantity Surveyors Registration Board
ARU	Ardhi University
CBA	Cost Benefit Analysis
C-ESMP	Contractor Environmental and Social Management Plan
CSO	Civil Society Organisation
COSTECH	Commision for Science and Technology
CSR	Community Social Responsibility
DED	District Executive Director
DUWASA	Dodoma Urban Water Supply and Sanitation Authority
ERD	Engineering Registration Board
EHSG	Enviromental, Health,Safet and guideline
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan
ESMF	Environmental and Social Management Framework
FS	Financial strategy
FYDP	Five year development plan
GA	Government Authority/Agence
GBV	Gender Based Violence
GFCI	Ground fault circuit interrupted
GHG	Greenhouse gas
GIIP	Good international industry pracitce
GHOs	Grievance Handling Officer
GRIC	Grievance Redress Integrity Committee
GRM	Grievance Redress Mechanism
HEET	Higher Education for Economic Transformation
HIV	Human Immunodeficiency Virus
HSE	Health, Safety and Environment
ILO	International Labour Organisation
LED	Light Emmiting Diode
LGA	Local Government Authority
LPG	Lequidefied petroleum Gas
MDD	Maximam dry density
MEO	Mtaa Executive Officer
MES	Monitoring and environmrnt strategy
MoEST	Ministry of Education, Science and Technology
NEMC	National Environment Management Council
NESC	National Environmental Standards Compendium
NIMRI	National Institute for Medical Research
NOX	Nitrogen oxide
NGOs	Non – Government Organisation
NEAP	National Environment Action plan
NPIU	National Project Implementation Unit
NPV	Net present value
OIP	Other Interested Patries
OHS	Occupational Health and Safety



OSHA	Occupational Safety and Health Authority
PAD	Project Appraisal Document
PDO	Project Development Objective
PEE	Person protection equipment
PIT	Project Implementation Team
PM	Particulate Matters
POM	Project Operational Manual
PAP	Project Affected person
RUWASA	Rural Water Supply Authority
SGR	Standard Gauge Railway
SH	Sexual Harrassment
SEA	Sexual Exploitation and Abuse
SEP	Stakeholders Engagement Plan
STI	Science, Technology and Innovation
ESS	Environmental and Social Standard
TAA	Tanzania Arports authority
TANESCO	Tanzania Electricity Supply Company
TBA	Tanzania Building Agency
TBS	Tanazania bureul standard
TANESCO	Tanzania Electricity Supply Company
TDV	Tanzania Development vision
TIRDO	Tanzania Industrial Research and Development Organisation
ToR	Terms of Reference
TTCL	Tanzania Telecommunications Company Limited
TZS	Tanzanian Shillings
URT	United Republic of Tanzania
VETA	Vocational Education and Training Authority
WB	World Bank
WEE	Waste Electrical and Electronic Equipment
WEO	Ward Executive Officer
WHO	Word health organisation
WSP	Wastewater Stabilisation Pond

## CHAPTER ONE

### 1 INTRODUCTION

#### 1.1 Background Information

Tanzania Commission for Science and Technology (COSTECH) is a government institution which was established by the Act of Parliament No. 7 of 1986 as the successor to the Tanzania National Scientific Research Council (UTAFITI) as a parastatal organization with the responsibility of coordinating and promoting research and technology development activities in the country. It serves under the ministry responsible for science and technology as the chief advisor to the Government on all matters pertaining to science, technology and innovation and their application to the socio-economic development of the country.

COSTECH as among government institutions under the Ministry of Education, Science and Technology (MoEST) that has received financial support from the World Bank (WB) to establish the Science, Technology and Innovation Complex at plot No. 11, Block B at NCC Mlimani, Dodoma Region. The financial support is through Higher Education for Economic Transformation Project (HEET). The HEET project is supported by the Government of the United Republic of Tanzania (GoT) through the World Bank with a Project Development Objective (PDO) of strengthening the learning environment and labour market alignment of priority programmes at beneficiary higher education institutions and improving the management of the higher education system. In contributing to this main PDO, COSTECH feeds on the second component of the PDO which aims at Strengthening the Management of the Higher Education System. This is due to COSTECH having a role to play in all aspects ranging from strengthening innovation environment in higher education, labour market orientation and management of Higher Education in respect to research and Innovation. Primary task is infrastructure development to facilitate uptake of innovations and other research outputs for economic transformation.

To pave the way for the construction of the new COSTECH building, various steps will involve site clearance, excavation and construction activities. Recognizing the multifaceted impacts inherent in such undertakings spanning environmental, social, and economic realms, it is imperative to proactively identify these effects and implement appropriate measures to mitigate them, thereby ensuring the project's sustainability. In accordance with the World Bank Environmental and Social Standards particularly referencing ESS1 and Environmental Management Act of 2004 of Tanzania as well as the Environmental Impact Assessment and Audit (Amendment) Regulations of 2018, project proponents and developers are required to conduct a comprehensive Environmental and Social Impact Assessment (ESIA) prior to the commencement of the project.

Therefore, COSTECH has commissioned Assess Consulting Company Limited (*a registered environmental firm of experts*) of Dar es Salaam to conduct the ESIA. The study shall be conducted in accordance with the requirements of the Environmental Management Act No 20 of 2004 and Environmental Impact Assessment and Audit Regulations (2005). The ESIA study has also adhered to World Bank Environmental and Social Framework, and Standards requirement and other important legal provisions which provide guidance on environmental and social issues pertaining to construction activities.

## **1.2 Rationale and Objectives of the project**

The rationale behind constructing the STI Complex lies in the need to foster innovation, collaboration, and advancement in the fields of science and technology. As our society continues to evolve in the digital age, there is an increasing demand for cutting-edge research, development, and dissemination of knowledge in these domains. By providing a dedicated space for offices, innovation and incubation spaces, prototyping workshops, and scientific conferences; the institution aims to create an environment conducive to interdisciplinary collaboration, knowledge exchange, and technological breakthroughs. This facility will serve as a hub for scientists, researchers, innovators, policymakers, and industry leaders to come together, share ideas, and address pressing challenges facing our world today.

Firstly, the objective of this project seeks to establish a state-of-the-art infrastructure that meets the evolving needs of the institution and its stakeholders. This includes providing modern facilities equipped with the latest technology, ensuring safety standards for laboratory work, and fostering an environment that promotes creativity and productivity. Secondly, the project aims to enhance the institution's capacity to undertake groundbreaking research and development initiatives across various scientific, innovation and technological disciplines. By centralizing resources and expertise, the institution can streamline operations, optimize resource allocation, and maximize its impact on society. Ultimately, the goal is to position the institution as a leader in science and technology, driving innovation, economic growth, and societal progress in the country.

### **1.3 Objectives of ESIA Study**

The objective of the ESIA study is to ensure that environmental concerns are integrated in all the proposed project activities in order to contribute to sustainable development. The specific objectives of conducting the Environment and Social Impact Assessment study with respect to the project was to:

- a. To identify social and environmental risks and impacts in the project site and nearby environment;
- b. To analyse and assess environmental and social risks and impacts of the proposed establishment;
- c. To describe the pertinent regulations and standards governing; environmental quality, health and safety, protection of sensitive areas, protections of endangered species and land use control at international, national regional and local levels.
- d. To ensure that the project comply with key relevant policy, legal and institutional frameworks and compliance of Environmental and Social Standards
- e. To recommend cost-effective measures for minimizing or eliminating adverse impacts of the proposed design, construction, operation and maintenance of the project;
- f. To prepare Environmental and Social Management Plan (ESMP), including Health and Safety Management for design, construction, operation and maintenance phases of the Project.
- g. To identify key stakeholders, the roles and responsibilities of the project implementation entity, implementing agencies and other stakeholders, legislative and regulatory requirements for the implementation of the ESMP.
- h. To inform statutory and public stakeholders about the potential impacts as well as risks and opportunities of the project and about the proposed mitigation measures.

### **1.4 Methodology and ESIA Team**

The ESIA investigation utilized various participatory approaches to engage all relevant stakeholders. The methods employed align with the guidelines outlined in the Environmental Management Act,

Cap 191, and the Environmental Management (Environment Impact Assessment and Audit) (Amendment) Regulations of 2018.

The ESIA being a multidisciplinary field involved a team of experts, the key ones being EIA Expert (Team Leader), Environmental Engineer, Sanitation Scientist, Sociologist, Biodiversity expert, Occupational Health and Safety Specialist, GIS experts, Municipal and Civil services engineer. The team of experts worked in close collaboration with the relevant stakeholders to carry out the ESIA study. The study included the following main tasks.

#### **1.4.1 Document Review**

Literature review involved acquisition and review of project documents, reports maps and drawings relevant to the project. Other documents reviewed included different pieces of national legislation, policies, guidelines and regulations as well as international policies and guidelines and procedures. Examples of the information obtained from the different documents include project design and planned project activities.

#### **1.4.2 Site visits**

This involved undertaking systematic assessments within and around the proposed establishment. All observations were analyzed and documented. Furthermore, experts' observations and technical methods related to the issues in question were explored as detailed in this report. To get wide scope of the existing situation on the site, appraisal was made on physical and environmental conditions of the proposed establishment and areas that may be impacted by the project, including land use and drainage system as well as assessment of other relevant socio-economic parameters.

#### **1.4.3 Stakeholder involvement**

The study applied different participatory methods to involve all stakeholders. One-on-one interviews with individuals based upon a list of general topics or questions and partly based on an open discussion, were conducted. Focused group discussion was also used to gather information. Stakeholders for this proposed establishment of new facilities include government authorities, local authorities and neighbors around the area of the proposed establishment. Some of the stakeholders of relevance to ESIA study are listed below. A list of stakeholders consulted is as follows;

- COSTECH Staff
- Mtaa officials.
- Ward officials
- Dodoma City Council
- Occupational Safety and Health Authority (OSHA)
- Fire and Rescue Force
- DUWASA
- NIMRI
- ARU
- TBA
- VETA
- TIRDO
- AQRB

#### **1.4.4 Baseline Data and Information**

The initial phase of collecting baseline data for the proposed project at the project site played a crucial role in defining the scope of the ESIA. This essential step enabled the study team to assess

the necessity for more detailed information about the environmental and social conditions surrounding the development site and to determine effective means and sources for acquiring such data.

The data collection strategy incorporated both primary and secondary sources. Primary data involved direct measurements, on-site observations, and semi-structured interviews with relevant stakeholders. Simultaneously, secondary data were obtained from various outlets, including Dodoma City Council socioeconomic profiles, and a range of official and unofficial documents.

The environmental and social study team conducted multiple surveys, concentrating on key parameters like air quality and noise levels at the project area for the proposed establishment of facilities. These surveys established a foundational benchmark, facilitating continuous monitoring of these parameters throughout subsequent project phases. This comprehensive approach to data collection laid a robust foundation for the assessment, ensuring that future monitoring activities align with the established baseline measurements.

#### **1.4.4.1 Baseline data on Air quality, Noise, and Vibration**

On-site assessments were conducted to determine the current levels of noise, vibration, ambient pollutant gases, and dust at the project site, tailored to the proposed project's characteristics. A digital sound level meter was employed to capture noise levels in accordance with ISO standards 19961:2003 and ISO 3095:2001. Additionally, both ambient pollutant gases and dust, categorized as particulate matter (PM10 & PM2.5), were measured on-site using Dust and Pollutant Gases Monitors, capable of detecting dust particles of various sizes (10, 5.0, 2.5, <1.0, 0.3, and >10 microns). Also, data logger vibrometer was utilized to quantify the ground vibration at sampling location, representing the onsite and offsite receptors. The device has an accuracy of  $\pm 5\%$ , acceleration of 200 m/s<sup>2</sup>, a wide frequency ranges of 10 Hz to 1 kHz capable for capturing almost all possible vibration levels at working environment. The device was designed to measure vibration at the workplace according to European standard EN 14253:2003.

All equipment complies with the EMC Directive 89/336/EEC of the European Union in accordance to manufacturer procedure and applicable local standards and/or international environmental guidelines. The devices have been tested according to the standard delivery schedule and complies with the EN 50081-1:1992 and EN 50081-2:1993 standards.

For the collection of baseline data on ambient air quality, noise, and vibration at the area, specific criteria were used to ensure comprehensive and accurate assessment. For ambient air quality, monitoring locations were selected based on population density, proximity to emission sources, and prevailing wind directions, using standardized equipment to measure pollutants over a continuous 8-hour period. Noise data was gathered using calibrated sound level meters at various times of day and night to capture fluctuations and identify peak noise periods. Vibration measurements were taken near potential sources of ground-borne vibrations, including construction sites and traffic routes, employing seismographs to record frequency and amplitude.

#### **1.4.5 Identification of Impacts**

Potential direct environmental and social impacts are a result of interactions between project activities with the relevant baseline aspects. Principles guiding impact identification involve; Impacts identification link to causes of impacts (cause-effect interactions) and identification shall extend through entire project cycle, and all valued receptors – physical, chemical, biological, built or human on subproject site, immediate vicinity or off-site locations needs to be considered as required during the planning, designing and implementing stages of projects. The impacts were categorized as direct or indirect and whether positive or negative.

### 1.4.6 Impact Evaluation

Evaluation of impacts is based on the extent, duration and Magnitude. Impacts were then classified in terms of significance as shown in Table 1.1:

**Table 1-1 : Classification of Impacts significance**

Classifications	Comments
Insignificant	Impacts that have minimal extent, duration and magnitude
Very low	Impacts that have a combination of a small extent and short duration with low or moderate magnitude
Low	
Moderate	Impacts that have a combination of moderate extent, duration or magnitude
High	Impacts that have a combination of large extent, long duration or high magnitude
Very high	

Source: Assess Consulting Company Ltd

### 1.5 Report Structure

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

- i) Executive Summary
  - ii) Table of Contents
  - iii) List of Abbreviations and Acronyms
  1. Introduction
  2. Project description
  3. Policy, administrative and legal framework
  4. Baseline/ Existing conditions
  5. Stakeholders Analysis
  6. Assessment of Impacts and Identification of Alternatives
  7. Environmental and Social Mitigation Measures
  8. Environmental and Social Management Plan
  9. Environmental and Social Monitoring Plan
  10. Resource Evaluation / Cost Benefit Analysis
  11. Decommissioning and Closure
  12. Summary and Conclusions
- References  
Appendices

## CHAPTER TWO

### 2 PROJECT DESCRIPTION

#### 2.1 Location and Accessibility

##### 2.1.1 Location

The proposed STI Complex project will be located within Salmini Mtaa, Tambukareli Ward in Dodoma City, Dodoma Region. Geographically the site lies along Coordinates listed on table 2.1. Generally, the project site is relatively flat with elevation ranging from 1138 m to 1139 m above mean sea level on the North – South direction and elevation values ranging from 1139m to 1140m on the West – East direction.

**Table 2-1: GPS coordinates of the project area**

Points	LATITUDE (S)	LONGITUDE (E)
1	9314733.72	805075.35
2	9314791.23	805367.01
3	9314745.93	805455.03
4	9314803.04	805446.34

Source: Assess Consulting, February 2024

##### 2.1.2 Accessibility

The site is conveniently accessible via the University of Dodoma road. To reach the site, one must proceed to the Jakaya Kikwete Convention Centre area and then transit onto the earth road leading towards the project area, situated approximately 0.7km on the right-hand side of the road when driving from the city center towards the University of Dodoma.

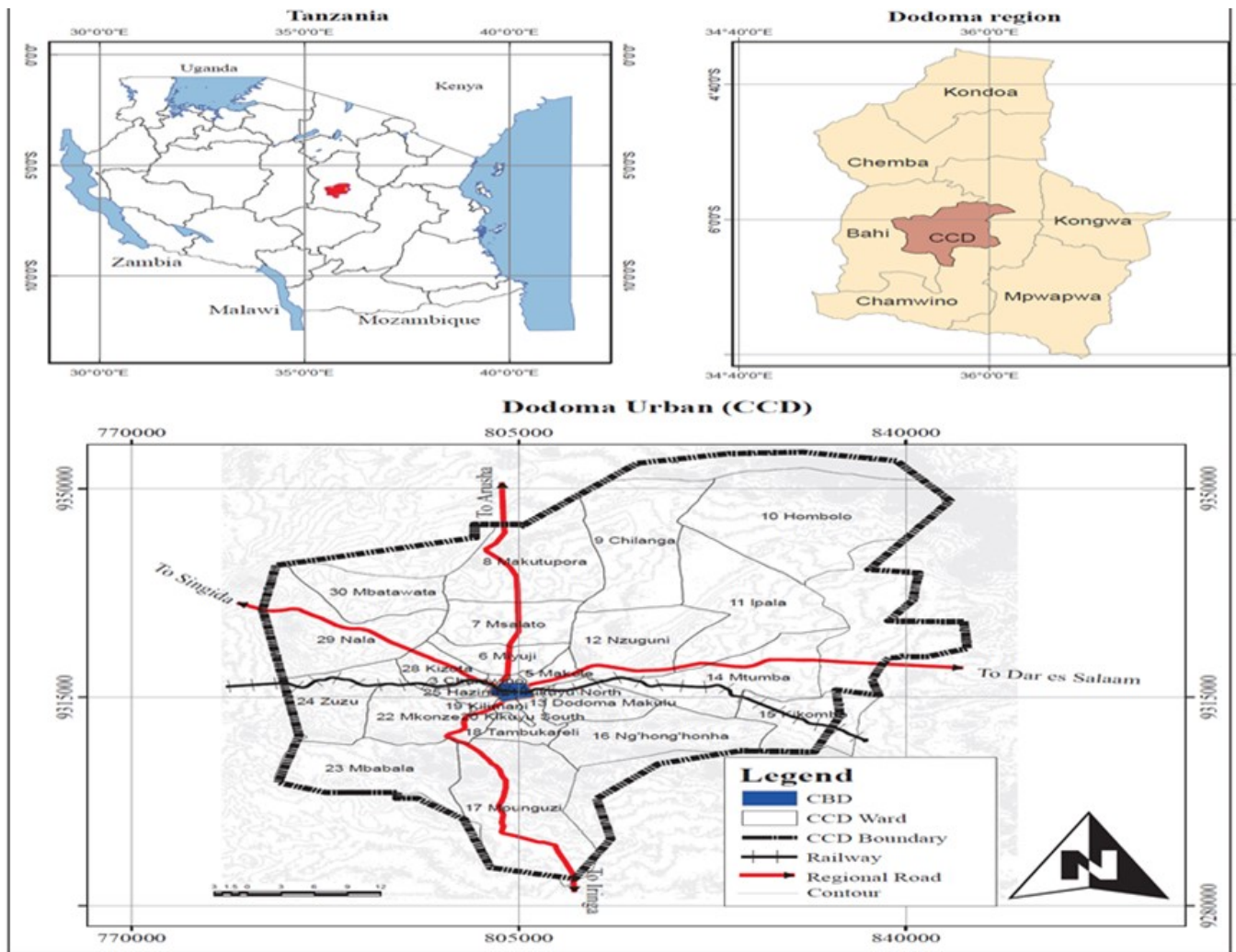


Figure 2-1: Location Map

(Source: Dodoma City Master Plan, 2023)



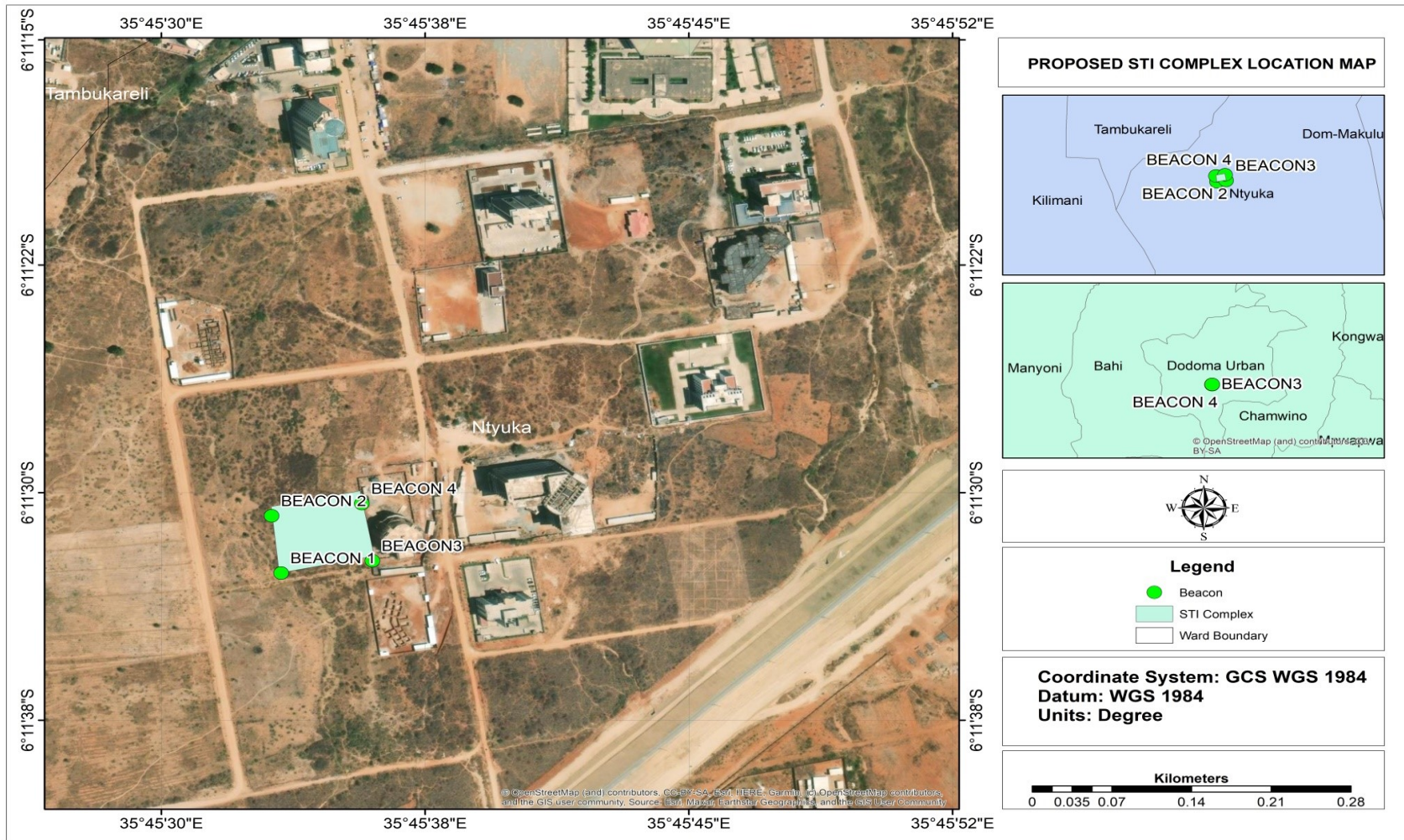


Figure 2-2: Map showing Site location

### 2.1.3 Site Description

The present condition of the site features a largely flat topography, gently sloping from the northern section to the southern side. The site is covered by natural vegetation including a mix of short and long grasses and shrubs most of which are secondary vegetation following the short rainy season. There are no endangered flora, fauna or sensitive ecological sites found near or within the proposed site.

Due to the nature of the area and the vegetation cover, there are no indications of wild animals in the area. However, common mobile insects and earth burrowing species cannot be overlooked in the area. In this respect the area does not present ecologically significance environment in terms of rare, endemic or endangered species.

The land on which the proposed project of STI Complex will be implemented has 4,639 square meters which is legally owned by COSTECH and certificate of right of occupanchas been issued. The land use is designated for offices purposes only use group "G" use class 'a' as defined in the Town and Country Planning (use classes) Regulation of 1960 as amended in 1993. Therefore, the proposed land use (STI Complex) is compatible to the designated land uses.

### 2.1.4 Major Adjacent developments

The project site is situated amidst a dynamic landscape: to the west lies the under-construction Public Leaders Ethics Secretariat office building, to the east are undeveloped plots awaiting future development, to the north stretches there is an expanse of un developed land culminating in the distant presence of the SGR track, approximately 400 meters away, and to the south, the site is flanked by un developed plots and existing government offices, approximately 600 meters away.



**P<sub>1</sub>. Public Leaders Ethics Secretariat office buiding adjacent to the project site**



**P<sub>2</sub>. Other Government institution offices at approximatery 600m from the project site**



**P<sub>3</sub>. SGR Track at distant of 400 meters from the project site**  
**Photo 1: Photo showing adjacent land uses at the project site**  
Source: Assess Consulting, February 2024

## **2.2 Project Scope and Activities**

### **2.2.1 Project Activities**

During the implementation of the proposed STI Complex there will be some project activities that will be done during mobilization/designing phase, site clearance Construction Phase, Operation Phase and Decommissioning Phase. The project activities in both phases are summarized in the sections below.

### **2.2.2 Design phase**

Concept Designing of this project has already been done. The project will involve construction of Technology and innovation functions with workshops, innovation hub, incubation space, Science functions with Digital science museum, Science auditorium, Knowledge management functions with Modern server room, Communication lab/studio and Digital library, and Administrative and Common Facilities such as offices, conference hall, boardroom, archive and strong room, CCTV camera room and toilets (ladies, gents & people with special needs) as well as Main entrance, guard house, power house, parking lots and perimeter wall.

Number of design parameters for local and international standards were considered during concept design of the buildings and services. Since the project is expected to be used for various activities, it will therefore have both dead and live loads within it, so a number of structural members will be part and parcel of the design so as to ensure stability and safety of the building. The geotechnical study of the soil in which the building structure will be situated shall be done prior to construction and the result will also be used in the structural analysis of the buildings. As far as the details in the buildings is concerned, the following are some design details to be considered in the design and that will be constructed to the buildings

- The floor to ceiling height for the building will range from 3.0 – 4.0m,

- Ceilings in the office areas will be equal to 'white, high quality mineral fibre acoustic tiles in an exposed two-way metal grid and based on a 1500mm planning module,
- The typical distance between the soffit of the ceiling system and the underside of the typical internal beams is approximately 600 mm and to the underside of the slab is approximately 900 mm,
- Fire stairs will be treated to encourage inter-floor traffic and readily accessible from the floor plate,
- Each floor shall be provided with male and female toilet provisions including pans, basins and urinals - the quantities in accordance with the BS requirements
- A disabled toilet shall be provided with alternate handing,
- Bin storage shall be provided - final number of bins is to be determined,
- All paints and undercoats for the project will be selected to suit their interior or exterior location and to achieve the targeted Green star credits relating to paint selection.

### **2.2.3 Sustainable design elements of the proposed project**

#### **a. Indoor Environmental Quality**

- The buildings has been designed to use a mixed mode cooling system, using either natural ventilation or air-conditioning systems when required. The shallow depth of the floor plates is well within the limits of natural ventilation. During hot periods when natural ventilation is not effective, air conditioning will be used.
- The building will be naturally lit through the use of curtain wall facades. However, curtain walling brings problems of overheating and glare, which have been dealt with by the introduction of solar shading glass panels to cut back both solar heat gain and glare into the offices.

#### **b. Energy**

- Passive solar design principles incorporating good orientation, solar shading, natural ventilation and natural lighting shall be used.
- The design also emphasizes energy efficient fittings and appliances, which will be specified further during implementation.

#### **c. Water**

- Water saving devices (Urinals, time delay taps, low flush cisterns etc.)
- Rainwater harvesting will be used to supply non-portable use such as landscape, ablutions and water use in toilets.

#### **d. Construction materials**

- Materials with recycled content such as post-consumer recycled steel and aluminum.
- Using as little non-renewable materials as possible in order to conserve the environment.
- Materials will be sourced from within the region as much as possible.

#### **e. Landscape and Ecology**

- Maximization of open space design.
- Storm water management design in the surface car parking.
- Reduction of heat island effect with green roofs.
- Protection and restoration of habitat during the construction period and after.

#### **f. Emissions**

- Eliminating the use of ozone depleting refrigerants for the proposed air conditioning system.

- Minimizing light pollution by choosing and placing the luminaires correctly.

#### **2.2.4 Mobilization and demolition phase**

This is the initial phase of project implementation. All vegetation cover and other unwanted facilities will be removed by using excavators. The proponent shall seek site clearance approval from relevant authorities. The contractor shall recruit all necessary administrative and engineering staff for the project including transportation of construction equipment to the site. Mobilization phase also entails establishment of offices, assembling equipment, site fencing, and geo technical investigations as well as procuring construction of materials and workforce.

#### **2.2.5 Pre-construction stage**

Pre-construction activities include work in support of acquisition of all regulatory requirements including approval from the regulatory authorities. The planning stage of the project also involved reconnaissance site visit to the project locations while considering issues of; staging of operations, location of the facilities and road traffic.

#### **2.2.6 Construction phase**

The construction phase will take place subsequent to the issuing relevant permits/certificates. The construction phase for the entire project sites is expected to be approximately 30 to 36 months maximum. This will involve the following:

- **Establishment of related works and all support infrastructures that are significant for the construction work:** This will involve the transportation of machinery and deployment of the workers to the construction sites. The machinery will be used for ground breaking and for transportation of materials from the sources to the sites. It is important to note that light machinery will be used at this stage. The major machineries that would be used include: Mixers, Welding machines and transmission machines. The contractor would also mobilise human workforce to the site.
- **Construction crew:** The construction will be done by a contractor as such the project will not employ individuals. The contractor may decide to erect a temporary site office within the project site. However, some of the construction crew will reside within the project site.
- **Storage of construction materials:** Materials will be used immediately after delivery i.e. no piling up is expected. There will be on site camp site and services bay/repair facilities within the project area.
- **Site Clearance:** This will involve clearing of the site of any debris and foreign materials.
- **Acquisition and transportation of building materials:** The contractor shall source for materials for construction from the various available suppliers. Supply of materials will be a continuous activity throughout the project life since different materials will be needed at different phases of the construction. The materials that shall be used in the construction include among others building stones, sand, ballast, cement, timber, reinforced concrete frame, steel, bars, G.I pipes, PVC pipes, sanitary wears, pavement blocks, concrete slabs, moram, hard core, insulated electrical cables and timber among others.
- **Construction of the building facilities:** The engineering designs and site layout plans that have been approved shall be implemented. The setting will comply with the specifications set out by the client to the contractor under the supervision of qualified engineers. In accordance with the designs and the layout plans, the construction of the proposed project and associated infrastructure will begin immediately after NEMC approves the project report. The contractor will then be supplied with all the approved documents including the EIA report for the Environmental management during construction phase.

### **2.2.6.1 Construction Activities**

- **Excavations.**

This will involve excavating for the various unit foundation works, access roads and the landscaping. The bulk of the excavated material will be carried away from site by the contractor to approved dumpsite(s) in accordance with the approved waste management plan.

- **Civil works activities.**

- I. **Masonry**, concrete work and related activities
- II. **Superstructure**: Includes construction of support pillars and stone walling
- III. **Structural reinforcement**: Will be done with loop iron at every alternating course.
- IV. **Plumbing and drainage**: Plumbing and drainage will include both underground water mains and drainage systems and above ground internal water service installation. It will also include testing and inspection of the system. Installation of pipe work for water supply and distribution will be carried out within offices and associated facilities. In addition, pipe work will be done to connect tubing to storage tanks, hot water cylinders and sanitation fittings, connect sewage from the premises to the waste water treatment plant, and for drainage of storm water, plumbing activities will include installation of sanitary appliances, construction of manholes, metal and plastic cutting, the use of adhesives, metal grinding and wall drilling.
- V. **Electrical works**: The electrical supply shall be derived from TANESCO. Electrical work during construction of the premises will include wiring, installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets, fluorescent fittings, lamps etc. in addition, there will be other activities involving the use of electricity such as welding and metal cutting. This will also entail street lighting with installation of lighting column, lanterns duct for road crossings, control pillar cabling. It will also include testing and inspection of the system.
- VI. Roofing work
- VII. **Other internal installations**: Includes the doors windows, stairways, ventilations tiling.
- VIII. **Landscaping and recreational zones**: To include beautification both natural (Trees, grasses, flowers and ornamental plants) and artificial (Cabro designs work).
- IX. **Security feature**: This will include construction of gates to manage the sites access, installation of security lighting, emergency response appliance (firefighting appliances, first aid box, inter alia) and a boundary wall.

### **2.2.6.2 Materials, storage and handling**

The materials that will be used for construction of the proposed STI Complex includes cements, sand, aggregates, steel reinforcement bars, timber, bricks, roofing sheets, water and sanitary ware; power and water. Some materials like stone aggregates, sand, water, bricks, cement, and roofing sheets will be locally obtained. Most of construction materials to be used for the proposed project will be sourced within the country. The procurement, transport and storage of construction materials will be as follows.

- **Non-hazardous materials:** The store for non-hazardous materials will be accommodated within the site office. Materials to be stored in this store shall include samples for review / testing by consultants and or inspectors.
- **Hazardous materials:** Hazardous materials shall include paints, oil, grease and vehicle fuel. The store to keep these materials shall have iron sheet walling and roof and a waterproof concrete floor to contain spills. Storage and handling of all hazardous chemicals shall be in accordance with manufacturer's instructions as outlined on the material safety data sheets
- **Bulk construction materials:** The bulk materials to be stored on site include: sand, ballast, stones, cement, quarry chips, steel and timber. It is recommended that the project proponent should plan for material to be delivered in small and manageable quantities in order to avoid any form of deposit, which will impede site activities, induce safety hazards and create a nuisance to the neighborhood.

### 2.2.7 Operation phase

During the operation phase, STI Complex shall be able to accommodate all staff at full capacity and provide Services and supporting activities on Science, Technology and Innovation as well as other associated skills. During this phase there will also be a lot of movements within the area.

- **Management and supervision**

The management and supervision of the building will be done by the COSTECH. This will ensure smooth running of the building activities and adherence to the environmental standards.

- **Monitoring and maintenance**

Monitoring and maintenance of the project facilities will be done by the COSTECH through to ensure that the building runs smoothly. COSTECH will allocate funds for maintenance and repair of project facilities.

#### 2.2.7.1 Water sources and usage

The proposed project site is in the area which is currently supplied with water from DUWASA. Therefore, COSTECH will consult DUWASA to connect her water network to the project area as both the construction activities and core operation of STI complex shall require a lot of water. The total water demand per day during all phases of the project is summarized in table below. To have steady supply of water, three storage tanks of 15,000 liters storage capacity overhead and 10,000 liters storage capacity underground will be installed at the project site for operations and fire-fighting.

**Table 2-2: Water demand**

Phase of the project	Activities	Water Demand Liters per day
Construction phase	Construction activities	40,000
	Sanitary activities	10,000
	Dust suppression	5,000
Operation Phase	Domestic activities	5,000
	Fire hydrant	10,000

Source: Consultant

### 2.2.8 Electricity

The proposed project site is not connected with electricity from TANESCO; however, the line is close to the site and shall be connected during the project implementation. The anticipated electrical power consumption of the entire project at full load is estimated to be about 150,000kWh per month. Electricity will be recirculated to different areas via overhead cable trays to mini-distribution boards throughout the project site. Furthermore, the project site will be installed with standby diesel generator of 100kVA.

### 2.2.9 Sanitary facilities

Sanitary services must be available within the project site; which must include toilets and bathrooms. Pipes carrying wastewater from the ablution facilities must be separate from storm collection channel. Ablution building shall be equipped with 2 compartments for each gender i.e. males and females whereby one toilet will serve an average of 25 people.

### 2.2.10 Firefighting system

The site shall be equipped with firefighting equipment almost in every point where there is high risk of fire, fire buckets, portable fire extinguishers horse reels and hydrant systems expected to be installed within the premises of the project site. Fire detectors especially inside the office must be installed onsite.

## 2.3 Waste Management strategies

The wastes to be generated by the proposed STI project during different project phases and the methods of their disposal are as discussed below.

### 2.3.1 Mobilization Phase

During Mobilization at this stage, we expect significant amount of solid waste will be generated from site clearance works. The management of generated solid waste will be for filling eroded roads and pits at that time and also it will be used as a base for foundation. Poles and logs from site clearance will be used for construction activities while remains will be given freely for anyone who may need them.

### 2.3.2 Construction Phase

Major wastes generation associated with project construction and their treatment/ disposal methods are described in the Table 2-3 below.

**Table 2-3: Waste Generation and treatment during Construction Phase**

Type of waste	Sources	Amount	Disposal / Management procedure
Debris and Rubble (overburden)	Site clearance	480m <sup>3</sup>	-Sale or free give away to whomever in need. -Fill material for road potholes, gullies and old pits
Biodegradable materials mainly domestic waste (food, paper, wood etc.)	Construction crew	6.5m <sup>3</sup> per year	Accessible litter bins within at the site and later dispose to the nearby waste disposal area (engage a private company)
Non-biodegradable materials (plastic, glass)	Construction crew	1.95m <sup>3</sup> per year	Recycling/ reuse



Excreta (domestic) human -Grey water /cleaning	Toilets and floor cleaning	19,500 liters of urine, 1,950 kg of feces, and 585,000 liters of grey water per year	Disposed to the onsite toilet
---	-------------------------------	---	-------------------------------

Source: Consultant, 2024

### 2.3.3 Operational Phase

- **Solid Wastes**

Based on the operations of STI Complex, it is estimated that the facility, with 30 staff members, will generate a substantial amount of non-hazardous solid waste annually. Assuming each staff member produces approximately 1.5 pounds of non-hazardous waste per day (including paper products, cardboard, plastics, and food waste), the total for the year would be around 16,425 pounds (1.5 pounds/day \* 30 staff \* 365 days). Also, hazardous waste, primarily from electronic equipment, batteries, printer cartridges, cleaning supplies, and fluorescent light bulbs, is expected to be much less. Assuming each staff member generates around 2 pounds of hazardous waste per year, the total hazardous waste would be approximately 60 pounds (2 pounds/year \* 30 staff). Therefore, the overall waste production per year is estimated to be around 16,485 pounds, with non-hazardous waste constituting the vast majority of this total. A city authorized collection agency will be commissioned to collect the domestic waste while all the hazardous waste will be taken by service providers for further disposal

- **Liquid waste**

The primary liquid waste anticipated from the operation of the proposed STI complex predominantly comprises wastewater to be generated from the toilets and washrooms, alongside storm water runoff. On average, a person uses about 80-100 gallons (300-380 liters) of water per day for all purposes, with approximately 15-30 gallons (57-114 liters) attributed to toilet use and around 2-5 gallons (7.5-19 liters) for washroom activities such as handwashing and face washing. Assuming that each of the 30 staff members uses an average of 20 gallons (76 liters) per day for washroom and toilet activities, the total daily wastewater production would be around 600 gallons (2,280 liters). Over a month (assuming 22 working days), this would result in approximately 13,200 gallons (50,160 liters) of wastewater.

Given the project site's connection to the municipal sewer network, the wastewater from the washrooms and toilets will be directly linked to this existing infrastructure, ensuring efficient disposal and treatment. Furthermore, to manage storm water effectively, an onsite drainage system will be constructed to collect all runoff from the STI Complex complex premises. This system will channel storm water to the public drainage system adjacent to the nearby drainage system along the tarmac road for proper discharge, minimizing the risk of flooding and environmental impact while adhering to regulatory standards for waste management and sanitation.

### 2.4 Labor Requirements (Construction and Operations)

During the construction phase, both skilled and unskilled temporary employment opportunities will be created. However, it is difficult to specify the actual number of employment opportunities that will be created at this stage. But it is projected that Labour requirements during construction will peak up to approximately 70 labourers per each site over the 24 months maximum construction period. It should however be noted that employment during the construction phase will be

temporary, whilst being long-term during the operational phase. It is recognized that Tanzania has a good people specialized in engineering and architectural studies that have experience in construction and project management. Thus, Effort will be made to recruit qualified local personnel wherever practical to do so. The construction labour will not be accommodated at the site. Also, it is anticipated that the routine operation of the STI complex will be able to accommodate over 300 people both staff and visitors.

## **2.5 Occupational Health and Safety (OHS)**

### **2.5.1 OHS During construction phase**

COSTECH will work hand in hand with the contractor to ensure regular trainings on occupational health and safety are provided to both permanent and casual staff. Further, relevant information on various outbreak and pandemic will be shared including Cholera, COVID-19 and HI/AIDS. During the construction phase, the contractor will provide with adequate protective gears such as helmets, heavy duty gloves, jackets and boots. And also, ensure the right infrastructure is in place e.g., sign boards, first-aid station and also, when necessary, transport in case of emergency evacuation. The speed limit will be set not exceeding 30km/h but within the designated area shall not exceed 10km/h. The contractors shall ensure all their drivers are aware of the set speed limits to ensure safety within the project area and also, both the entrance and exit areas will be identified and labeled. Also, it explains the mitigation measures for hazards and risks associated with health and safety which include the following;

#### ***2.5.1.1 Slips and falls***

- There shall be a clean and organized workplace by promptly cleaning up spills, debris, and clutter.
- Regularly sweep, mop, and vacuum floors to remove dust, dirt, and liquids that can create slip hazards.
- Repair or replace damaged flooring promptly to eliminate tripping hazards.
- Choose flooring materials with appropriate slip resistance for different areas. For example, use non-slip flooring in areas where liquids are commonly present.
- Clearly mark wet floors or areas under maintenance with warning signs and cones to alert workers and visitors.
- Use high-visibility tape or paint to mark steps, ramps, and changes in floor level.
- Ensure adequate lighting in all work areas, including stairwells and hallways, to improve visibility and reduce tripping hazards.
- Provide regular training to employees about slip and fall hazards and the importance of following safety procedures.
- Encourage workers to report hazards promptly so that they can be addressed.
- Maintain walking surfaces, including outdoor walkways and parking lots, to prevent uneven surfaces and tripping hazards.
- Conduct regular workplace inspections to identify and address potential slip and fall hazards promptly.
- Use scaffolds, ladders, and elevated platforms with proper guardrails and fall protection equipment.
- Establish clear evacuation routes and procedures in case of an emergency to prevent panic and rushing that could lead to slips and falls.

#### ***2.5.1.2 Working at height***

- Erect and dismantle scaffolds according to manufacturer guidelines and industry standards.
- Regularly inspect scaffolding for stability and structural integrity.
- Install safety nets where feasible to catch falling workers or objects.
- Regularly inspect equipment, scaffolding, and other structures for damage, wear, or defects.

- Select the right ladder for the job and ensure it's in good condition.
- Place ladders on stable, level surfaces and secure them to prevent slipping.
- Provide workers with appropriate personal protective equipment (PPE) such as helmets, gloves, and footwear designed for working at heights.
- Train workers on the proper use of fall protection equipment, safe work practices, and emergency procedures.
- Assign a competent supervisor to oversee work at heights and ensure safety procedures are followed.
- Establish effective communication methods between workers at different heights and ground level.

#### ***2.5.1.3 Moving machinery***

- Install appropriate guards, barriers, and shields on machinery to prevent workers from coming into contact with moving parts.
- Ensure that guards are properly designed, secured, and in place before starting any machine.
- Provide comprehensive training to operators and maintenance personnel on safe machine operation, maintenance procedures, and hazard recognition.
- Conduct regular inspections of machinery to identify worn-out parts, malfunctioning components, or potential hazards.
- Follow manufacturer recommendations for routine maintenance and ensure that machinery is serviced by qualified technicians.
- Conduct thorough risk assessments before implementing new machinery or making changes to existing processes to identify potential hazards.
- Establish a reporting system for near misses, incidents, and safety concerns related to machinery. Investigate these reports and take corrective actions as needed.
- Provide appropriate PPE such as gloves, goggles, helmets, and hearing protection based on the machinery's hazards.

#### ***2.5.1.4 Diseases prevention***

- Encourage frequent handwashing with soap and water for at least 20 seconds. Provide hand sanitizers in common areas.
- Promote proper respiratory etiquette by covering coughs and sneezes with a tissue or the inside of the elbow.
- Regularly clean and disinfect frequently touched surfaces, such as doorknobs, light switches, shared equipment, and restrooms.
- Maintain good indoor air quality by ensuring proper ventilation and air circulation within the workplace.
- Conduct health screenings, including temperature checks and symptom assessments, for employees and visitors before they enter the workplace.
- Implement safety measures in cafeteria, such as limiting the number of occupants and maintaining physical distancing and good housekeeping.
- Provide education and training to employees about disease prevention, proper hygiene practices, and the importance of adhering to safety protocols.
- Create a comprehensive COVID-19 safety plan tailored to your project, including policies, procedures, and protocols.
- Conduct a thorough risk assessment specific to the construction site.
- Assign a responsible person or team to oversee and enforce COVID-19 safety measures.
- Require all workers to wear appropriate personal protective equipment (PPE), including masks, gloves, and eye protection.
- Set up handwashing stations or hand sanitizing stations at key locations on-site.

- Encourage frequent handwashing and provide hand sanitizer.
- Increase the frequency and thoroughness of cleaning and disinfecting common areas, tools, and equipment.
- Improve ventilation in enclosed spaces to increase air circulation.
- Implement daily health screenings for all workers, subcontractors, and visitors. This may include temperature checks and symptom questionnaires.
- Encourage workers to report symptoms or exposure to COVID-19 immediately.
- Maintain open lines of communication with workers, subcontractors, and stakeholders about COVID-19 developments and safety measures
- Use signage and digital communication methods to remind everyone of safety protocols.

#### ***2.5.1.5 Being struck by objects***

- Regularly inspect the environment to identify potential hazards related to falling objects.
- Assess the risk associated with each hazard, taking into account factors such as object weight, height, and frequency of exposure.
- Use warning signs, cones, and barricades to alert individuals to the presence of falling object hazards.
- Clearly mark exclusion zones in areas where there's a risk of objects falling.
- Use toe boards on scaffolding and elevated platforms to prevent tools and materials from slipping off.
- Conduct regular inspections of equipment, storage areas, and structures to identify and address potential hazards.
- Ensure that any damaged or deteriorating structures are repaired promptly.
- Keep work areas clean and organized to minimize the risk of tripping over objects or inadvertently causing objects to fall.
- Ensure that objects are stored securely when not in use.
- Use appropriate personal protective equipment (PPE) such as hard hats, safety goggles, and steel-toed boots in areas with falling object hazards.
- Ensure that PPE is in good condition and worn consistently.

#### ***2.5.1.6 Over-exertion***

- Conduct ergonomic assessments of workstations and tasks to identify potential over-exertion risks.
- Modify workstations and equipment to minimize physical strain and discomfort
- Contractor should train employees on proper lifting techniques, including bending at the knees, keeping the load close to the body, and using leg muscles instead of back muscles.
- Reduce the weight of materials, tools, or equipment when possible.
- Provide mechanical aids such as lifting devices, conveyor belts, or adjustable height workstations to reduce manual lifting and carrying.
- Design workstations and workflows to minimize the need for repetitive or forceful movements.
- Contractor should make a job rotation or task alternation to reduce the repetitive nature of physically demanding tasks and provide rest periods.
- Employees should ensure to maintain good posture while working, which includes sitting or standing with a straight back and avoiding excessive twisting or bending.

#### ***2.5.1.7 Ergonomics injuries and illness***

- Ensure that workstations are designed with ergonomics in mind, taking into account the user's body size, shape, and tasks.
- Provide adjustable chairs, desks, and computer monitors to accommodate various users and allow for proper positioning.

- Implement stretching and exercise programs tailored to the specific needs of employees to improve flexibility and reduce muscle tension.
- Implement job rotation or task variation to reduce repetitive motions that can lead to overuse injuries.
- Encourage short, frequent breaks to allow employees to rest, stretch, and change positions during the workday.
- Provide ergonomic tools and accessories such as ergonomic keyboards, chairs and footrests to reduce strain on wrists and hands.
- Develop and enforce safe lifting and material handling procedures, including the use of appropriate lifting equipment like dollies or forklifts for heavy objects.
- Conduct regular health screenings and assessments to identify and address ergonomic-related health issues early.
- Offer access to healthcare professionals who can provide guidance on managing and treating ergonomic injuries and illnesses.

### **2.5.2 OHS During operation phase**

All the safety issues will be taken into consideration including the allocation of emergency assemble point; Emergency plans and procedure will be developed to prevent and mitigate the likely consequences of accidents associated with the project (construction). There will be a document that outlined in details the potential accidents/emergencies and how to respond; this document will also explain on how to mitigate environmental hazard. The document will also respond to Occupational Health and Safety hazards related to daily operation e.g., risks of fire explosion. Thus, fire extinguishers of powder foam type and fire horse reel will be place in several strategic point and occasionally serviced.

### **2.6 Disaster Risk Management**

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

### **2.7 Gender analysis and mainstreaming**

The constitution of Tanzania, Act No. 15 of 1984 clearly stipulates equal rights for both men and women and prohibits any form of discrimination based on gender, colour, tribe, religion or station in life. Tanzania has signed and ratified both international and Regional Instruments such as the Elimination of All Forms of Discrimination against Women in 1987; the African Charter on Human and Peoples' Rights on the Rights on Women in Africa in 2005. Currently, Tanzania has achieved gender parity at primary school enrolment rates, this can be attributed by free education policy introduced through the Circular 5 of 2015 which implements the Education and Training Policy of 2014. This circular was responding to strategies of eliminating discrimination based on gender.

In the same context, COSTECH has a deliberate policy to encourage equal employment opportunity for both men and women. The contractor of the project will also align with the policies to ensure equal employment opportunities for both men and women.

## **2.8 Project Boundaries**

Determination of project boundaries refers to an identification of impact zones institutionally, temporal and spatially, within which the project impacts will reach. This process involves determination of the extent impacts that would spread away from the core project site. The following project boundaries have been identified;

### **2.8.1 Institutional boundaries**

Institutional boundaries refer to those institutions and sectors, which interact with the proposed establishment in terms of utilities or concern either direct or indirect. These can be determined from political boundaries, Acts, Regulations and Institutional mandates and administrative organisations. This proposed establishment touches the interest of many institutions and administrative units in relation to several policies, laws and plans in Tanzania and several sector ministries. These institutions include;

- Ministry of Education Science and Technology
- Dodoma City Council
- Fire and Rescue Force
- Occupational Safety and Health Authority (OSHA)
- DUWASA
- TANESCO
- TBA
- AQRB
- Relevant R&Ds Institutions such as TIRDO etc
- Relevant HLIs i.e., UDMS, NM-AIST etc
- Salmin and Tambukareli community

### **2.8.2 Temporal boundaries**

Temporal boundaries refer to the period and reversibility of impacts. Most impacts are short term but others may extend to long-term. For example, impacts such as noises and dusts may be short-lived, but the presence of the facility in the selected area may have implications that stretch far into the future until when decommissioning is undertaken. For instance, the issues of air pollution, waste management and dusts pollution may continue to be a problem unless measures are taken to ensure that acceptable limits are adhered to. In addition, consideration needs to be given to what happens when the project ends, where there is a need for decommissioning of the project and site restoration. Some of the impacts that will occur during construction and decommissioning such as increase in noise and dusts levels to be caused by demolition activities and disappear as soon as construction and decommissioning activities is completed. However, some impacts will remain irreversible even after the closure of the project. The ESIA process have addressed all impacts taking into account their temporal dimensions in various stages of the project.

### **2.8.3 Spatial boundaries**

Spatial boundaries refer to the dispersion effect of the project impacts. The scale of dispersion can be locally, regionally, and nationally or internationally. The proposed establishment in the area will have a wide range of implications that could be felt locally, regionally, nationally or even internationally, thus causing impacts as far as to those areas. Therefore, in determining the spatial dimension of the project, it is important to consider impacts in a form similar to a contour layout. Two zones of impact namely core impact zone and influence impact zone are considered.

- Starting with the core impact area (where the project is located). In this case, the core impact area for the project will be Salmin mtaa and Tambukareli ward (where project will be located) and its nearby areas as where the impact will be felt.

- The second area is the immediate impact area. This is the area surrounding the core area and bears relatively some of the impacts. In case of the proposed project, the immediate impact area will be the neighboring area within Dodoma City Council in general which will benefit from revenues paid by the investor and from different social economic activities.
- The other area is area known as the area of influence. In terms of spatial dimension, this is the outer most area that consists of centers of decision making that can influence the development of proposed project.

### **2.9 Project Cost**

COSTECH has received financial support from the World Bank (WB) through the Government of the United Republic of Tanzania (GoT) under the project named Higher Education for Economic Transformation (HEET) which is about Tanzanian Shillings Seven Billion Three Hundred Sixty Million (TZS 7,360,000,000) as a project investment cost.

## CHAPTER THREE

### 3 POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORK

#### 3.1 Introduction

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

#### 3.2 Policies Relevant to the Project

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

##### 3.2.1 The National Environmental Policy, 2021

The national Environmental Policy of 2021 addresses various environmental problems including air pollution and managements of waste both hazardous waste and none hazardous waste. The Policy states that EIA study is mandatory for all major projects before their commencement of the financing, planning, mobilization and implementation. The policy ensures that environmental concerns received due weight and balance consideration in reconciling urgent development needs and long term environmental sustainability. The Policy sets broad goals committing to sustainable development of its natural resources heritage. The policy provides the framework for the formulation of plans, programmes and guidelines for the achievement of sustainable development. Chapter 4 of the NEP elaborates clearly the importance of EIA in the implementation of the National Environmental Action Plan (NEAP). Paragraph 65 states that “It is in the context of an EIA regime that policy guidance on choices to maximize long-term benefits of development and environmental objectives can be revealed and decided upon. EIA as a planning tool shall be used to integrate environmental considerations in the decision – making process in order to ensure un-necessary damage to the environment is avoided”.

*The proponent has observed one of the requirements of the national environmental policy by putting measures to control and minimizing pollution of the environmental resources that will happen during constructions and operations period.*

##### 3.2.2 The National Land Policy (1997)

The National Land Policy states that, “the overall aim of a National Land Policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad - based social and economic development without upsetting or endangering the ecological balance of the environment”.

The National land Policy is relevant to this project because the project will be required to ensure that land is put to its most productive use to promote rapid social and economic development of the country, modify and streamline the existing land management systems and improve the efficiency of land delivery systems, streamline the institutional arrangements in land administration and land dispute adjudication and also make them more transparent, to promote sound land information management and to protect land resources from degradation for sustainable development.



*The proponent complies with this policy because the proposed building project is located within the area planned for offices and as such it is compatible with the land use in the project area as required by the National Land Policy. The ESIA study has developed environmental management plan to curb the likely environmental hazards out of project implementation.*

### **3.2.3 The Construction Industry Policy (2003)**

Among the major objectives of the policy, which supports a sustainable block development sector, include the promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as blocks, road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health. This project is in-line with this policy as ultra-modern technology shall be used during construction and its operation.

*This project is in-line with this policy as modern technology shall be used during construction and its operation. Implementation of the proposed establishment will as much as possible make use of cost effective and environmentally friendly technologies to minimize wastage of resources especially building materials, water and energy resources.*

### **3.2.4 The National Employment Policy (2008)**

The major aim of this policy is to promote employment mainly of Tanzania Nationals. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and section 10.1 is particularly focusing on industry and trade sectors (ii) 10.6 which deals with employment of special groups i.e., women, youth, persons with disabilities and (iii) 10.8 that deals with tendencies of private industries to employ expatriate even where there are equally competent nationals.

*The proponent shall abide by this policy by employing Tanzanians who have the required qualifications as well as unskilled.*

### **3.2.5 The National Gender Policy (2002)**

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

*This project shall ensure equal opportunities for all to be involved at all levels of project to implementation based on their capacity and qualifications.*

### **3.2.6 National Policy on HIV/AIDS (2001)**

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

targeting the behavior and attitudes of employees and employers alike shall be part of HIV/AIDS intervention in the workplace.

*The proponent will adhere to the policy by availing HIV/AIDS information and voluntary screening services to its workers as well as observing other provisions of the policy.*

### **3.2.7 The National Energy Policy (2015)**

This policy outlines measures to adopt clean technology and minimize energy losses. It states that energy is a prerequisite for the proper functioning of nearly all sub sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of the development endeavors. In the industry sector, a major policy objective on energy end uses is the progressive reduction of dependence on imported energy through the use of demand management to reduce the negative effects of continued dependence on imported petroleum products. Furthermore, the policy calls for efforts to promote switching from petroleum to other environmentally friendly or alternative sources such as natural gas.

*The project is in line with the requirements of the policy as it intends to use electricity from national grid while ensuring proper demand side management through sustainable use of energy to ensure that it does not contribute to the carbon footprints.*

### **3.2.8 The National Water Policy (2002)**

The National water policy recognizes that; there is a growing scarcity, misuse and wastage of water resources in many places of Tanzania which may become a serious threat to sustainable availability of the resource; Existence of uncontrolled abstraction of water resources; Existence of ecological minimum flow levels of surface water flow to sustain ecosystem's flora and fauna; The state of the quality of water resources is not comprehensively known and no regular monitoring is done due to inadequacy of resources and institutional capacity; Water resources are one of the major agents for socio-economic activities. There are various socio-economic water use activities that compete for limited resources particularly during droughts and times of scarcity. A criterion for prioritization of water use at different times of year to address the growing competition for water is lacking, resulting into conflicts among users. The policy, however, states that priority in this circumstance shall be the supply of domestic water and the water needed to maintain ecosystem functioning; inadequate linkage between water and land development thus results in pressures on water resources. With the on-going liberalization there is a need to have co-ordination mechanism to facilitate smooth linkage. Water Rights shall not be tied to any land and they shall not be transferable with land transfer.

*The proposed establishment shall has been designed in such a way that water use is kept to the minimum by, for example, installation plumbing fixtures such as faucets and flushing cisterns, which minimizes use of water. It will also ensure that pollution of water sources is avoided or minimized during the construction and operation phases.*

### **3.2.9 The National Health Policy ( 2008)**

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

The policy is relevant to the project responsible to provide safe environment during project implementation as well as to implement safety measures, regulations and precautions.

*The Proponent shall observe this policy by providing good hygienic condition to the workers and shall continue to be provided with appropriate PPE's based on their working sections.*

### **3.2.10 The National Transportation Policy (2003)**

The policy aims at guiding the development of an efficient, well integrated and coordinated transport infrastructure and operations, which are economically, financially, socially and environmentally sustainable. Relevant section of the policy is: 4.1.1 (vi) on the intention of the policy to facilitate sustainable development by ensuring all aspects of environmental protection and management are given sufficient emphasis at the design and development stages of the transport infrastructure and when providing services.

*Given the fact that there will be transportation of materials to the project site, the project is directly linked to the policy in its activities and shall adhere to the requirements of the policy by ensuring that transportation of raw materials is done accordingly by authorized trucks and does not cause any disturbances to other road users and general community.*

### **3.3 Relevant Legal Framework**

This section addresses the legal conditions that are relevant to the proposed project. This ESIA has been prepared in general compliance with the following legislations.

#### **3.3.1 Environmental Management Act, Cap 191, 2004**

The Environmental Management Act, Cap 191 seeks to provide legal and institutional framework for sustainable management of the environment in the implementation of the National Environmental Policy. The Environmental Management Act provides for continued existence of the National Environmental Management Council (NEMC). Under this Act, NEMC is mandated to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision making, exercise general supervision and coordinating over all matters relating to the environment. Other sections where Proponent should be aware on them are: Environment Management Act Cap 72 that emphasize on land users and occupiers shall be responsible for the protection, improvement and the minister may prescribe nourishment of the land and for using it in an environmentally sustainable manner. EMA Cap 110 (1) say; no person shall discharge any hazardous substance, chemical, oil or mixture containing oil in any water or any other segment of the environment except in accordance with guidelines prescribed under this Act. The HEET project has to conform to all requirements of environmental clearance and safeguards and they include EIA, auditing, monitoring, and implementation of the environmental and social management plans for the project.

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

*All section shall continue to be observed by Proponent in order to protect the environment against any sort of pollution*

#### **3.3.2 Occupational Health and Safety Act NO. 5 of 2003**

The law requires employers to provide a good working environment to workers in order to safeguard their health. The employers need to perform medical examinations to determine fitness before engaging employees. Also, This Act deals with the protection of human health from occupational hazards. It specifically requires the employer to ensure the safety of workers by providing safety gears at the work place.

The Act has relevant to the project because it will involve construction of buildings. Therefore, project is responsible to provide to workers /constructor/ students with a safe environment during

project implementation. In addition, the project construction sites are required to implement safety measures, regulations and precautions and ensure health and welfare of workers and proper handling of hazardous materials and chemicals.

*The proponent will make sure good working environment is provided within the project site, during the construction workers will be provided with appropriate PPE's, there shall be an equitable first aid kit and trained first aiders to provided service incase of emergency .*

### **3.3.3 The Land Act, 1999, [Cap. 113 R.E. 2019]**

The National Land Use Commission was established under this Act as the principal advisory organ of the Government on all matters related to land use. Among other things, the Act recommends measures to ensure that Government policies, including those for development and conservation of land are in harmony. It also takes adequate account of their effects on land use and seeks the advancement of scientific knowledge of changes in land use. It encourages development of technology to prevent, or minimize adverse effects that endanger man's health and his/her welfare. It also specifies standards, norms and criteria for beneficial uses and maintenance of the quality of land.

*Therefore, during project implementation, the Act will be observed by the proponent. As a first step the proponent pays land rent under the act and agreed to conduct the ESIA to guide project operations. The land is owned by the project proponent and title deed (certificate of occupancy) for the proposed establishment land is attached in appendix 5.*

### **3.3.4 The Urban Planning Act (2007)**

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters.

The project will seek planning consent and building permits *from* relevant authorities

### **3.3.5 Employment and Labour Relations Act, R.E 2019**

This Act guarantees fundamental Labor rights and establishes basic employment standards. The Act provides broad protection against discrimination. Specifically, the Act mandates that employers "promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice." It prohibits direct or indirect discrimination by employers, trade unions and employers' associations on a number of grounds, including gender, pregnancy, marital status or family responsibility, disability, HIV/AIDS and age. The Act also requires employers to take "positive steps" to guarantee women and men the right to a safe and healthy environment.

*The Proponent observes and will continue to observe this Act by ensure all labor discrimination at work place should be prohibited during the all the phases of the project, which will bring economic justice to the employees and labor rights to be observed.*

### **3.3.6 The Engineers Registration Act, 2007**

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

*The proponent shall engage registered engineers to observe the provisions of the Act when executing its activities.*

### **3.3.7 The Contractors Registration Act, 1997**

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

*The proponent shall therefore appoint a registered contractor and make sure that the provisions of the Act are adhered to.*

### **3.3.8 The Architects and Quantity Surveyors, Act 2010**

This Act was enacted by the parliament to provide for establishment of a board to regulate the conduct of Architects and Quantity surveyors and architectural and quantity surveying consulting firms in Tanzania. The board is vested with powers to inspect premises or construction sites to verify whether the rules and regulations of carrying out construction projects are adhered by consulting firms. This is aimed at ensuring that appropriate professionals who are registered by the board are involved in undertaking works as required by the law

*Therefore, the proponent shall abide by this Act by carrying out construction by adhered consulting firm.*

### **3.3.9 Public Health Act, 2009**

The Act provide for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other. The Proponent shall observe Part IV of the Act which relates to sanitation, housing and hygiene. The Part also makes provisions for matters relating to nuisance, housing and human settlement, waste management, sewerage and drainage.

This Act is relevant to the project especial through Section 66 of the Act state that: (1) A block or premises shall not be erected without first submitting the plans, sections and specifications of the block site for scrutiny on compliance with public health requirements and approval from the Authority.

*The Proponent will observe this Act by promoting and preserve the public health.*

### **3.3.10 Fire and Rescue Force Act, 2007**

The Act empowers the commissioner general of the force or his agent to enter premises to ascertain any contravention of provisions of the Act and obtain information required for firefighting purposes. A court may issue an order for a closure or prohibit the use of any premises for human habitation or storage in case there is failure to comply with fire prevention regulations. The Act also obliges the owners and managers of the structures to set aside places with free means of escape, and install fire alarm and detection systems, or such other escape and rescue modalities in the event of fire

*The Proponent shall abide to this Act by making sure that the awarded Contractor and their employees undergo fire and rescue training and must have a certificate for compliance. Also,*

*should make sure all the design structure and the site layout plan shall be submitted to Fire and Rescue Force for approve.*

### **3.3.11 Water Resources Management Act, 2009**

The Act provides for the protection of the water resources and the user so that there is a balance between different uses. The provisions of the Act will be adhered to during implementation by ensuring that surface and ground water sources are protected. Furthermore, water to be sourced from a borehole which will be drilled within the project area shall be used wisely at the project site and from the river shall have water use permit. And if the project area has wastewater treatment plant, the proponent shall have discharge permit from responsible authority

*The proponent shall adhere with the act by ensuring the protection of surface and ground water resources.*

### **3.3.12 The Workers Compensation Act, 2015**

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

*The Proponent shall complies with this Act by ensuring that all workers from Contractor shall be compensated accordingly in this manner and registered to WCF.*

### **3.3.13 Prevention and Control of HIV/AIDS Act, 2008**

The Act focus basically on the provision of the prevention, treat, care support and control of HIV and AIDS, for provision of the public health in relation to HIV and AIDS, to provide for an appropriate treatment, care and support using available resources to people living with or at risk of HIV and AIDS and to provide for related matters under this Act. Further, the Act stipulates the following: Section 4(1) gives details of promotion of public awareness on cause, mode of transmission, consequences, prevention and controls of HIV and AIDS. In addition, it describes mode of reduction in spreading, prevalence of STI's in the population and adverse impacts resulting from HIV and AIDS as well as protection right of orphans.

Also, Section 19(2) describes the provision of community-based HIV and AIDS prevention, support and care services. The project may involve construction of a workers' camp site, this may lead to the possible interaction between the workers and the local community members, which may lead to the increased transmission of HIV / AIDS to both the workforce and the local communities

*The Proponent shall operate within the requirements of this legislation in addition to those of the HIV policy.*

### **3.3.14 The Child Act, 2019**

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

schoolwork (Sec.77.3). The Act prohibits the engagement of children and children below 18 in hazardous work, posing a danger to health, safety or morals and in “night work” taking place between 8 pm and 6 am (Sec. 82.2). The Law of the Child (Child Employment) Regulations (G.N. No. 196, 2012), which is used to implement the Law of the Child Act (Act No. 21, 2009), contains list of all hazardous activities in which a child shall not be allowed to work, even on a voluntary basis. Section 82 of the Act also protects children from sexual exploitation. A child shall be protected from sexual exploitation and use in prostitution, inducement or coercion to engage in sexual activity and exposure to obscene materials. *The proponent will ensure that no child under fourteen years is involved as an employee in any kind of work during the project implementation. This can be achieved by setting small rules and regulation to guide the activities within the site.*

### **3.3.15 The Roads and Fuel Toll Act, [Cap.220 R.E.2019]**

This road Act provides for road financing, development, maintenance, management and other related matters. The proponent intends to use roads for access road to site and associated facilities then the important clauses of the Roads Act will be observed in totality. These relevant clauses are included under Parts VI and VIII of the Act covering aspects such as:

- Application to construct roads of access to the project site under section 35.
- Serving notice to holders of land to be affected by access road and matters related to compensation under section 36.
- Regulation on maximum weight speed and dimensions under section 42.

The act also provides for provides for offences, penalties and recovery on destroying bridges causing damage to public roads, obstructions on roads, nuisance on roads, stretching of ropers over public roads.

*The project proponent shall observe relevant section of the Act by ensuring that his project don't affect the roads which is near the project site.*

### **3.3.16 The Road Act, 2007**

Part IX of the Act provides for offences and penalties against the contravention of the provisions of the Act. Furthermore, the Act stipulates that the Road authority shall be compensated in respect of the expenses incurred while repairing the road damaged by any person.

*The project proponent shall observe relevant section of the Act by ensuring that his project will be located outside the road reserve.*

### **3.3.17 Standard Act of 2009**

The Standards Act has established National Environmental Standards Compendium (NESC) which is a collection of various standards prepared at different times and recognized by EMA 2004. TBS comprises of standards that require compulsory compliance. Compulsory standards are categorized as generic or specific. Specific standards cover those industries with peculiar effects to the environment while other industries without a specific standard for Tolerance Limits of Emissions discharge including water quality, discharge of effluent into water, air quality, control of noise and vibration pollution, sub-sonic vibrations, soil quality, control of noxious smells, light pollution, and electromagnetic waves and microwaves. It also has the requisite test methods that should be followed when testing for compliance.

The test methods included are referred to in at least one of the specification standards appearing under Part 1. The proposed project will be adhered to this Act requirement, during the implementation.

*The proponent shall observe this Act and regulatory requirements and implement the mitigation measures proposed in this document to comply with the provisions of these Regulations on*

*abatement of air pollution. Also, the project shall comply with all the procedures that require according to environmental best practice.*

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

This Act establishes urban authorities for the purposes of local government, to provide for the functions of those authorities and for other matters connected with or incidental to those authorities. Section 55 of the Act enumerates basic functions of the urban authorities. The functions that are relevant to proposed project are:

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

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

### **3.3.19 The Persons with Disability Act, 2010**

The basic principles of this Act are to respect for human dignity, individual's freedom to make their own choices and independence of persons with disabilities, non-discrimination, full and effective participation and inclusion of persons with disabilities in all aspects of society, equality of opportunity, accessibility, equality between men and women with disabilities and recognition of their rights and needs, and provide a basic standard of living and social protection. Therefore, the proposed project will fulfil this legal requirement in all project phases, from design, construction and operation.

## **3.4 Relevant Plans, Regulations and Guidelines**

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

The Environmental Management (Environmental Impact Assessment and Audit) Amendment Regulations, 2018 are read as one with the EIA and Audit regulations, 2005 are made under Environmental Management Act No. 20 of 2004. The regulations provide the basis for undertaking Environmental Impact Assessment (EIA) and Environmental Audits for various development projects with significant environmental impacts in the country. These Regulations set out the EIA procedure and regulatory system for carrying out EIA in Tanzania that requires every Developer to follow. This EIA has been carried out in accordance with these Regulations i.e., Registration of the project with NEMC, screening exercise, producing scoping report (including development of ToR), and ESIA report. The ESIA report take into account environmental, social, cultural, economic and legal considerations, identify anticipated impacts, analyses alternative options, propose mitigation measures and develop management plans.

The regulation is relevant to the project and therefore project registration or EIA study is mandatory and should be carried out in accordance with the guidelines stipulated in the Fourth Schedule to the Regulations.

*The Proponent has carried out this ESIA, hence, the requirements of these regulations are observed.*

### **3.4.2 The Registration and Practice of Environmental Experts) Regulations 2021**

The objectives of the regulations are to establish a system for registration of environmental experts; provide for a system of nurturing competence, knowledge, professional conduct, consistency, integrity and ethics in the carrying out of environmental impact studies and environmental audits; ensure that the conduct of environmental impact assessments or



environmental audits is carried out in an independent, professional, objective and impartial manner; and provide for a code of conduct, discipline and control of environmental experts. The NEMC maintain a registry of EA and EIA experts. These regulations also set code of practice of the experts for which the Environmental experts for this project subscribe. Developers are required to use registered experts under the law.

*The proponent has complied with this regulation by employing registered EIA firm of experts with valid practicing licence to carry out the ESIA study.*

### **3.4.3 The Environmental Management (Fees and Charges) Regulations, 2021**

The National Environment Management Council (NEMC) is a body corporate established by Environmental Management Act Cap 191 to undertake enforcement, compliance, and review and monitoring of environmental impact assessments, environmental research, raising awareness, collecting and disseminating environmental information. Sections 99 (1) (b) and 101 (1) of the EMA and Regulations 46 (4) and 57 (1) of the EIA and Audit Regulations, 2005 mandate the Council to monitor operations of any industry, project or undertaking with a view to determining its immediate and long term effects on the environment. In order to enforce this requirement, the Environmental Management (Fees and Charges) Regulations, 2021 stipulates, “annual charges for environmental compliance monitoring and audit”, payable to the Council by all Proponents whose projects have been issued with environmental certificates. Moreover Regulation articulate that the fees payable under these Regulations shall not refundable.

*The proponent is aware of Fees and Charges for Review of Environmental Impact Assessment and Audit, Annual Charges for Environmental Monitoring and Audit, fees for environmental quality standards and will comply with the Regulations as required.*

### **3.4.4 Environmental Management (Air Quality Standards) Regulations, 2007**

The objective of this standard is to set baseline parameters for air quality and emissions within acceptable standards. It enforces minimum air quality standards prescribed by NEMC to industrialists for the purpose of adopting environmentally friendly technologies to ensure protection of human health and environment pollution sources. The proposed project will have to abide to Environmental Management (Air Quality Standards) Regulations 2007, and the current assessment is within the required standards. During project implementation the regulations will be complied with to ensure dust emissions from the project are within the acceptable limits.

*The developer will ensure that all emissions will be within recommended standard level.*

### **3.4.5 Environmental Management (Soil Quality Standards) Regulations, 2007**

The objective of this standard was to set limits for soil contaminants in agriculture and habitat. It enforces minimum soil quality standards prescribed by NEMC to maintain, restore and enhance the sustainable productivity of the soil.

Elevated levels of heavy metals may occur naturally within the soils surrounding. However, any proposed expansion projects will be designed to avoid the release of contaminants, with elevated levels of heavy metals, to the environment.

Also, these Regulations, made by the Minister of State under sections 143, 144 and 230 of the Environmental Management Act, concern soil pollution and soil quality standards and provide with respect to a soil protection permit and compliance system. They also concern measures of enforcement. The object of these Regulations is to;

- I. Set limits for soil contaminants in agriculture and habitat.
- II. Enforce minimum soil quality standards prescribed by the National Environmental Standards Committee.

*The proponent shall adhere to this regulation by ensuring that all trucks and excavator for transportation and loading of raw materials are well serviced to avoid oil spillage. Also, by ensure wastewater from washroom are directed to their specific treatment.*

#### **3.4.6 Environmental Management (Water Quality Standards) Regulations, 2007**

The objective of this standard is to enforce minimum water quality standards prescribed by the NEMC. It ensures all discharges of pollutants take account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned, so as to protect human health and conservation of the environment. The project will take into account all acceptable practices and regulations.

*The proponent will abide to this regulation by ensuring that all liquid waste generated from proposed project are treated properly without harm the environment.*

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

The regulation prohibits a person to make any loud, unreasonable, and unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and of the environment describes the permissible noise levels from different facilities. The provisions of these regulations will guide in ensuring that noise and vibration levels do not exceed the maximum thresholds specified.

*The proponent shall ensure that these regulations are adhered by ensuring noise and vibrations produced during construction period are within acceptable limit.*

#### **3.4.8 The Urban Planning (Use Groups and Use Classes) Regulations, 2018**

These regulations have been made under section 77(1)(i) of the Urban Planning Act (Act No. 8 of 2007). This regulation is made for the purposes of planning and the control of development, all uses of land and buildings are categorized in the use groups and use classes in the First Schedule. For proposed establishment COSTECH title deeds it follows under Use Group G – Educational Buildings and Use Class: (a) for office purposes only.

*The Proponent shall abide to the requirement of the regulations because the lands shall be used solely for Educational purposes and for the other purposes ancillary thereto.*

#### **3.4.9 The Urban Planning (Application for Planning Consent) Regulations, 2018**

These regulations have been made under section 77(1)(o) of the Urban Planning Act (Cap. 355). The regulation state that no person shall carry out any development within the Planning Area without a planning consent granted by the Planning Authority under section 32 of the Act and these Regulations. Also, these regulations declare that where the proposed development involves any building or engineering or mining work in, on, under or over any land or premise

- i. a block plan to a scale of not less than 1:500 sufficient to show the boundaries of the property;
- ii. plans to a scale of 1:100 showing all elevations fronting a street or open space together with a list of external materials to be used, and floor plans showing the proposed use of each floor and internal division where possible;
- iii. a site plan, scale of not less than 1:500, where necessary to identify the site.

*The Proponent will abide to the requirement of the regulations.*

#### **3.4.10 The Urban Planning (Planning Space Standards) Regulations, 2018**

The Urban Planning Space Standards provides guidance on space utilisation in order to achieve harmony and sustainable development. In construction of buildings, this document informed design of the buildings and selection of construction sites. Space standards provide suitable heights for buildings according to their use, guide space to be reserved between one building and another (setbacks), plot coverage and plot ratio. It also guides provision of space to accommodate both motorized and non-motorized transport systems such as roads, parking and footpaths / pedestrian walkways.

*The Proponent has taken into consideration the requirements of urban planning space standards in inception and design of buildings to be constructed, and will continue taking proper utilisation of the project area during its implementation.*

#### **3.4.11 The Urban Planning (Zoning of Land Uses) Regulations, 2018**

The regulations were formulated under section 77(1)(d) of the Urban Planning Act (Cap. 355). For the purposes of these Regulations, uses of land that are permitted and those that may be permitted under special circumstances by the planning authority in different zones of the local planning area shall be as follows: Residential, Commercial (Retail and Wholesale), Industrial (Light, Medium, Heavy & Service), Institutional, Public Utilities, Beach, Open Spaces and Recreational, Transportation, Communication and Microwave towers, Agricultural, Water bodies, Conservation and Economic Development.

Hence for Institutional zone the regulation declare that all central and local government offices, agencies and centre offices, educational, \ including hostel facilities for students, cultural and religious institutions such as church, temple and other places of worship, educational, medical/engineering/ technical and research institutions, (on the sites having minimum 2 hectares with a minimum of 12 metre wide approach road), including libraries, reading rooms and clubs, medical and health institutions, recreational areas, public toilets, parking and cafeteria, cultural institutions like community halls, opera houses, clubs, predominantly non-commercial in nature, utilities and services, water supply installations including disposal works, electric power plants, high tension and low tension transmission lines, sub stations, gas installation and gas works, firefighting stations, banks, and quarters for essential staff and all uses permitted under parks and playgrounds.

*The Proponent will abide to the requirement of the regulations during design and construction period.*

#### **3.4.12 The Industries and Consumer Chemicals [Management and Control] Regulations, 2020**

The Industrial and Consumer Chemicals Act provides for proper management and control of industrial and consumer chemicals in Mainland Tanzania. It requires that any person dealing in industrial chemicals has to register with the Industrial and Consumer Chemicals Management and Control Board. The Third Schedule of the Act provides a long list of chemicals that must be registered. In case the proponent imports chemicals for its activity's compliance with requirement of this law during the importation, storage, use and disposal of those chemicals is of paramount importance.

*The proponent will use chemicals in the laboratories that are already registered in Tanzania. Further, the proponent will not import any chemical but rather will acquire them from large importers available in the country.*

### **3.4.13 The Environmental Management [Control of Ozone Depleting Substances] Regulations, 2007**

The regulations show the products which having ozone depleting potentials which include automobile and truck conditioning units (whether incorporated in vehicles or not). Also, the regulations list domestic and commercial refrigeration and air conditioning or heat pump equipment when containing controlled substances as a refrigerant or insulating material of the product. These include:

- a. Refrigerators
- b. Freezers
- c. Dehumidifiers
- d. Water coolers
- e. Ice machines and
- f. Air conditioning and heat pump units

Some of the components such as air conditioners, refrigerators and vehicles will be found at the proposed establishment. There will be emission of dust during offloading raw materials as well as loading of finished products if there will be improper management. There will be frequency movement of vehicles, workers and visitors especially during construction phase to deliver raw materials for proposed establishment.

*The proponent should adhere to this Act so as not to participate in ozone depleting and pay pollution cost when needed.*

### **3.4.14 The Environmental Management (Solid Waste Management) Regulation, 2009 as amended in 2016**

The regulation has been made under section 114, 115, 116, 117, 118, 119, 120, 121, 122 and 230 of Environmental Management Act, 2004. These regulations apply to all matter pertaining to solid waste management. They aimed among other things at setting standard for permit to operate solid waste disposal sites, permit to transport solid waste, permit to dispose solid waste and license to own or operate solid waste disposal site.

*The proponent will abide by the regulations by ensuring that all solid waste generated during construction and operation phase are handled properly and does not lead pollution to the surrounding environment.*

### **3.4.15 Environmental Management Act (Hazardous Waste Control) Regulations, 2021**

These regulations have been made under Section 110(4) and (5), 128, 133(4), 135 and 230(2) of the Environmental Management Act, 2004. The Regulations state that all individuals residing in Tanzania have an obligation to take responsibility for preserving the environment and protecting it from the negative impacts of hazardous wastes. Furthermore, they are required to notify the appropriate authorities about any hazardous waste-related activities or occurrences that may potentially harm the environment and human well-being.

These regulations apply to all categories of hazardous waste and to generation, storage, disposal and their movement into and out of mainland Tanzania. These regulations require that any person dealing with hazardous waste in Tanzania be guided by the following principles of environment and sustainable development:

- The precautionary principle,
- Polluter pays principle, and
- The producer extended responsibility

*The Proponent will abide to the requirement of the regulations.*

### **3.4.16 The Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations, 2021**

The Regulations apply to all categories of electrical and electronic equipment wastes with respect to generation, collection, storage, transportation, importation, exportation, distribution, selling, purchasing, recycling, refurbishing, assembling, dismantling and disposal of electrical and electronic equipment waste or components, and their movement into or outside Mainland Tanzania. The amount of waste electrical and electronic equipment (widely known as WEEE or e-waste) generated every year in Tanzania is increasing rapidly.

Waste from electrical and electronic equipment includes a large range of devices such as computers, printers, fridges and mobile phones at the end of their life. This type of waste contains a complex mixture of materials, some of which are hazardous. These can cause major environmental and health problems if the discarded devices are not managed properly. These regulations require the separate collection and proper treatment of WEEE and sets targets for their collection as well as for their recovery and recycling.

*The proponent shall ensure compliance with all these requirements during the implementation of the project.*

### **3.5 Relevant National Plans/Strategies**

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

#### **3.5.1 The Tanzania Development Vision 2025**

The Composite Development Goal for the Tanzania Development Vision 2025 foresees the alleviation of poverty through improved socio-economic opportunities, good governance, transparency, and improved public sector performance. These objectives not only deal with economic issues, but also include social challenges such as education, health, the environment and increasing involvement of the people in working for their own development. The thrust of these objectives is to attain a sustainable development of the people. The Vision 2025 seeks to mobilize the people, the private sector, and resources of the nation towards achievement of shared goals and achieving a sustainable middle market economy by 2025. The vision outlines Tanzania plans and strategic goals covering all sectors of the economy and outlines institutional changes that must take place to enable Tanzania to make the progress suggested in the vision. The proposed project will stimulate local economic growth and will contribute towards realisation of the Vision 's objectives.

*COSTECH project will contribute to the attainment of the 2025 Vision through provision of adequate environment for tresearchers and scientist to implementing various plans as far as science technology is concerned.*

#### **3.5.2 The Five Years Development Plan (FYDP) 2021/2022-2025/2026**

FYDP III focuses on stimulating an inclusive and competitive economy, strengthening industrial production capabilities and service delivery, promoting investment and trade, bringing development to the citizens and building huma resource capacity. By investing on this project, COSTECH is promoting the development in Tanzania which is the main focus of the FYDP III.

To facilitate its implementation, this plan has been developed in line with the implementation Strategy which is divided into three implementation plans. First, is the Action Plan which outlines all activities and objectives intended for whole period of implementation. The second is the Financing Strategy (FS) that shows how to avail funding for development projects as well as other strategic steps outlined in the Plan. The latter has prepared a Monitoring and Evaluation Strategy (MES) for monitoring the implementation of projects to know whether the intended results are

being met and prompt corrective measures whenever needed to ensure delivery of the intended results. Through the slogan of the Sixth Phase Government of Kazi lendelee, each of us has a responsibility to fulfill assigned responsibilities effectively in order to achieve effective implementation of this Plan.

### **3.6 Environmental and Social Management Framework (ESMF)**

The World Bank Environmental and Social Policy for Investment Project Financing sets out the requirements that the Bank must follow regarding projects it supports through Investment Project Financing. The Environmental and Social Standards set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and mitigation measures associated with projects supported by the Bank through Investment Project Financing. In that context, the World Bank has set out the E&S standards that must be complied with in the implementation of any project. These standards among others aim to support borrowers in achieving good international practice relating to environmental and social sustainability, assist borrowers in fulfilling their national and international environmental and social obligations, enhance non-discrimination, transparency, participation, accountability and governance; and enhance the sustainable development outcomes of projects through ongoing stakeholder engagement.

This section (Table 3-2) shows how the 10 E&S standards of the World Bank are taken on board on ensuring that the COSTECH project is environmentally and socially sensitive.

**Table 3-1: World Bank Environmental and Social Standards**

Environmental and Social Standards (ESS)	Applicability	Requirements
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	YES	The standard focuses in helping project beneficiaries to manage and reduce both environmental and social risks and enhance project positive impacts. The project at COSTECH will use this requirement in order to strengthen the environmental and social framework for the assessment, development, and implementation of World Bank-financed projects where appropriate.
ESS2: Labor and Working Conditions	YES	The standard focuses on the adoption of standard labor practices that take into account the acceptable working conditions for the people to be employed in the execution of the project activities. It requires the Borrower to prepare and adopt labor management procedures. Among others the standard call for provisions on the treatment of direct, contracted, community, primary supply workers, and government civil servants. It further calls for fair terms and conditions of work, non-discrimination and equal opportunity and workers organisations. Provisions on child labor and forced labor. Requirements on occupational health and safety, in keeping with the World Bank Group’s Environmental, Health, and Safety Guidelines (EHSG).
ESS3: Resource Efficiency and Pollution Prevention and Management	YES	The standard aims at enhancing effective use of resources and control of pollution. It further requires an estimate of gross greenhouse gas emissions resulting from project (unless minor), where technically and financially feasible. Requirements on management of wastes, chemical and hazardous materials, and contains provisions to address historical pollution. ESS3 refers to national law and Good International Industry Practice, in the first instance the World Bank Groups’ EHSGs.
ESS4: Community Health and Safety	YES	The standard aims at protecting local communities against any health risks and ensure their safety against project activities. It requires infrastructure to take into account taking safety and climate change, and applying the concept of universal access which are technically and financially feasible. It requires further on traffic and road safety, including road safety assessments and monitoring. It calls for addressing risks arising from impacts on provisioning and regulating ecosystem service. Measures to avoid or minimize the risk of water-related, communicable, and non- communicable diseases. Requirements to assess risks associated with security personnel, and review and report unlawful and abusive acts to relevant authorities.

<b>Environmental and Social Standards (ESS)</b>	<b>Applicability</b>	<b>Requirements</b>
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	YES	This standard is applicable as it also provide guidance on land related issues to all project participants.
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	NO	The area of the proposed establishment of COSTECH facilities has no sensitive habitat/ species. It is already a developed area within the urban environment
ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	NO	This standard is not applicable in this project because there nothing related to ESS7.
ESS8: Cultural Heritage	YES	This standard is applicable for the proposed project due to chance finds of physical cultural resources during excavation activities for new construction.
ESS9: Financial Intermediaries (FIs)	NO	This standard is not applicable in this project because there is nothing related to ESS9.
ESS10: Stakeholder Engagement and Information Disclosure	YES	The standard aims at making stakeholders part of the project through continuous sharing of information and updates. The standard call for stakeholder engagement throughout the project life cycle, and preparation and implementation of a Stakeholder Engagement Plan (SEP). It requires early identification of stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. Stakeholder engagement to be conducted in a manner proportionate to the nature, scale, risks and impacts of the project, and appropriate to stakeholders' interests.



### **3.7 Relevant International Agreements, Conventions and Treaties**

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

- United Nations Framework Convention on Climate Change (1992)
- Paris Agreement (2015)
- The Convention on Biological Diversity (1992)
- Stockholm Convention (2001)
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification (UNCCD-1994)
- International Labour Convention

#### **3.7.1 United Nations Framework Convention on Climate Change (1992)**

The objective of the United Nations Framework Convention on Climatic Change (UNFCCC) is to stabilize the concentration of greenhouse gas (GHG) in the atmosphere, at a level that allows ecosystems to adapt naturally and protects food production and economic development.

Since Tanzania is a Party to the Convention, she will have to account for all sources of GHG in her future National Communications. Undertaking of this ESIA study will enable the country to identify some of the GHG that will be emitted by the project activities.

The project will abide with the requirements on control and prevention of greenhouse gases by emphasizing use of soft copies as opposed to hard copies in teaching and learning.

#### **3.7.2 Paris Agreement (2015)**

The Paris Agreement aims to hold global temperatures 'well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C' (Art. 2.1.(a)) Since Tanzani is among the parties to the agreement she will make profound changes to its economy to achieve this goal.

The project will abide with the requirements to reduce greenhouse gas emissions, at least to a point where there is a balance *between* emissions and sequestration by discouraging the use of solid biomass fuels and encourage utilisation of clean, sustainable energy fuels including Liquefied Petroleum Gas (LPG), electricity and sustainable biomass.

#### **3.7.3 The Convention on Biological Diversity (1992)**

The Convention on Biological Diversity (1992) has three objectives which are; the Conservation of biological diversity; sustainable use of biodiversity components, and the fair and equitable sharing of the benefits arising from the utilisation of genetic resources.

Tanzania ratified the convention on biological diversity in 1996 and launched the National Biodiversity Strategy and Action Plan with a sectoral approach. The Government has committed to ambitious national targets for biodiversity conservation.

The project will abide with the requirements to safeguard biological diversity by enhancing protection of different plant and animal species around the premises; and take measures for vulnerable ecosystems against climate change.

#### **3.7.4 United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification (UNCCD-1994)**

The objective of the Convention, provided in article 2, is "to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements. Tanzania ratified the UNCCD in 1997 with the obliged to implement the provisions of the Conventions within her respective capacity in support of sustainable development.

*The project will abide with the requirements to combat desertification and mitigate the effects of drought by undertaking different measures to control floods, minimize deforestation, manage water resources and induce water harvesting technologies*

### 3.7.5 Other Relevant convention to the proposed project

In the course of its operations, the proponent will ensure that the plant abides by other relevant International Conventions Ratified by Tanzania include:

ILO Convention: C138 Minimum Age Convention, 1973 (Ratified by Tanzania (United Republic of) on 16:12:1998) which prohibits child Labour. COSTECH shall ensure no child is employed to do any of its activities.

ILO Convention: C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (Ratified by Tanzania (United Republic of) on 30:05:1983) which protects Workers against Occupational Hazards in the Working Environment Due to Air Pollution and heat.

*COSTECH shall ensure workers are protected against occupational hazards.*

### 3.8 Institutional Framework for the Management of Environment

Tanzania is among countries in East Africa with an Act for environmental management legislation. The legislation, Environmental Management Act (EMA) (2004), provides a legal and institution framework that guides the implementation of the environmental management activities. The framework provides a pre-requisite for effective implementation of Environment Policy at all levels (National, Region, Council, and Village/Mtaa/Hamlet). According to the Environmental Management Act (EMA) (2004), there is the Environmental Management Committee established at the Hamlet/Village/Mtaa, Ward, and Council and at National level with the responsibility for the proper management of the environment in respect of the area in which they are established. The functions and responsibility of these committees are well explained in the Act. The proposed project will include all governance levels in the management of environment during HEET execution as shown in Table 3.1 below

**Table 3-2: Key Institutions relevant to the ESIA process**

Level	Institution	Role and responsibility
National Level	Vice Presidents Office (Division of Environment)	<ul style="list-style-type: none"> <li>• Coordinate the implementation of the National Environmental Policy.</li> <li>• Coordinate various environment management activities in Tanzania.</li> <li>• Advise the Government on legislative and other measures for the management of the environment.</li> <li>• Advise the Government on international environmental agreements.</li> <li>• Monitor and assess activities, being carried out by relevant agencies in order to ensure that the environment is not degraded.</li> <li>• Prepare and issue a report on the state of the environment in Tanzania.</li> </ul>
	Vice Presidents Office (NEMC)	<ul style="list-style-type: none"> <li>• Coordinate Environmental Management Policy, Act and EIA guidelines</li> <li>• Approval of ToR, Review of ESIA</li> <li>• Issuing an Environmental Certificate</li> </ul>

Level	Institution	Role and responsibility
		<ul style="list-style-type: none"> <li>• Review and recommend for approval of environment impact statements</li> <li>• Enforce and ensure compliance of the national environmental quality standards</li> <li>• Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur;</li> <li>• Undertake in co-operation with relevant key stakeholders' environmental education and public awareness;</li> </ul>
	Ministry of lands, housing and human settlements development	<ul style="list-style-type: none"> <li>• Authority over the national land including the project area.</li> <li>• Enforce law and regulations in the area of influence of the project.</li> </ul>
	Ministry of Education, Science and Technology (MoEST)	<ul style="list-style-type: none"> <li>• To develop and implement Policies on Education, Research, Library Services, Science, Technology, Innovation, Skills, Training Development and their implementation;</li> <li>• To improve Basic Education Development through Teachers Training Accreditation and Professional Development;</li> <li>• Teachers Professional Standards Development;</li> <li>• Schools Accreditation and Quality Assurance;</li> <li>• Development of Local Experts in Science, Technology and Innovation;</li> <li>• Coordinates roles of Departments, Parastatal Organisations, Agencies, Programmes and Projects under the Ministry.</li> </ul>
	Occupation Safety and Health Authority OSHA	<ul style="list-style-type: none"> <li>• Approval of building plans for the proposed project.</li> <li>• Monitoring Health and Safety of workers in working premises.</li> <li>• Issuing certificates of compliance and oversee occupational safety and health issues.</li> <li>• Designated Authority for occupational safety issues</li> </ul>
	Fire and Rescue Force	<ul style="list-style-type: none"> <li>• To provide professional services in the area of disaster prevention and taming.</li> <li>• Approval of building design for the proposed project.</li> <li>• To enhance community safety, quality of life and confidence by minimizing the impact of hazards and emergency incidents on people, environment and economy of Tanzania.</li> <li>• To work with other government agencies to minimize impacts of bushfires, storms, floods, landslides,</li> </ul>

Level	Institution	Role and responsibility
		<p>building collapses, motor vehicle accidents and other emergencies.</p> <ul style="list-style-type: none"> <li>To run prevention and preparedness programs to prevent emergencies and reduce their impact on the community.</li> </ul>
<b>Project Proponent</b>	COSTECH	<ul style="list-style-type: none"> <li>Project investment and project cycle implementation, monitoring and auditing; Conducting ESIA study and follow-up on ESIA certificate.</li> <li>Land acquisition and payment of compensations.</li> <li>Paying of applicable taxes and charges.</li> <li>Project operation and decommissioning</li> </ul>
<b>Regional Level</b>	Dodoma Region	<ul style="list-style-type: none"> <li>Oversee and advice on implementation of national policies at regional level.</li> <li>Oversee enforcement of laws and regulations.</li> <li>Advice on implementation of development projects and activities at regional level.</li> </ul>
<b>Local Governments Authorities and Communities</b>	Dodoma City Council	<ul style="list-style-type: none"> <li>Oversee and advice on implementation of national policies at District level.</li> <li>Oversee enforcement of laws and regulations.</li> <li>Advice on implementation of development projects and activities at District level</li> </ul>
	Ward Office and Mtaa office	<ul style="list-style-type: none"> <li>Project monitoring (as watchdogs for the environment, ensure the well-being of residents) and participate in project activities.</li> <li>To extend administrative assistance and advice on the implementation of the project.</li> <li>Managing the community's relation</li> </ul>
	Local communities	<ul style="list-style-type: none"> <li>Project monitoring (as watchdogs)</li> <li>Provides assistance and advice on the implementation of the project</li> <li>Part of the project beneficiaries through employment opportunities, income generation and CSR projects.</li> </ul>
Project implementation Consultant	Environmentalist	<ul style="list-style-type: none"> <li>Prepare site specific environmental and social management plan.</li> <li>Develops environmental management plans.</li> <li>Monitors and ensures compliance with environmental regulations.</li> <li>Implements measures to mitigate environmental impacts</li> </ul>
	Safety officer	<ul style="list-style-type: none"> <li>Develops and enforces safety protocols and procedures.</li> <li>Conducts safety training for workers.</li> <li>Inspects the site regularly for safety hazards.</li> </ul>

Level	Institution	Role and responsibility
		<ul style="list-style-type: none"> <li>Investigates accidents and incidents, and implements corrective actions.</li> </ul>
	Sociologist	<ul style="list-style-type: none"> <li>Conducts social impact assessments.</li> <li>Engages with local communities and stakeholders.</li> <li>Facilitates community consultations and meetings.</li> <li>Develops social management plans to address community concerns and enhance project acceptance.</li> </ul>
Project construction contractor	Environmentalist	<ul style="list-style-type: none"> <li>Reviews and approves the contractor's environmental management plans.</li> <li>Provides technical advice on environmental issues.</li> <li>Conducts audits to ensure compliance with environmental standards.</li> <li>Advises on sustainable practices and technologies.</li> <li>Monitoring the compliance of the contractor regarding to environmental aspect</li> <li>Prepare regular progress report</li> </ul>
	Safety officer	<ul style="list-style-type: none"> <li>Reviews and approves the contractor's safety protocols.</li> <li>Conducts independent safety inspections and audits.</li> <li>Provides ongoing safety training and updates.</li> <li>Monitors and reports on safety performance to stakeholders.</li> <li>Monitoring the compliance of the contractor regarding to health and safety aspects</li> <li>Prepare regular progress report</li> </ul>
	Sociologist	<ul style="list-style-type: none"> <li>Reviews and integrates social impact assessments into project planning.</li> <li>Monitors social aspects of the project implementation.</li> <li>Acts as a liaison between the project team and local communities.</li> <li>Assists in resolving social conflicts and promoting community engagement.</li> <li>Monitoring the compliance of the contractor regarding to socio-economic aspects</li> <li>Prepare regular progress report</li> </ul>

**3.8.1 Assessment and Management of Environmental and Social Risks and Impacts(ESS1)**

The proposed establishment of office building and associated facilities will involve clearance of some natural vegetation in the project site. The natural vegetation to be cleared are grasses and bushes within the site. This Environmental and Social Standard is applicable to this project due to potentially adverse environmental risks and impacts on the site and in the areas of influence. These include impacts on natural environment such as air, water, land, human, health

and safety. Thus, the proponent through the commissioned consultant shall analyze project activities and associated environmental and social risks and impacts the during construction phase.

The proponent has prepared an Environmental and Social Impact Assessment (ESIA) and/or Environmental and Social Management Plans (ESMPs). Therefore, the project components have been screened to determine potential adverse impacts and mitigation measures for their planned activities.

According to the social relation between the proponent and the nearby community, the project implementation may cause some disturbances like noise pollution and limited local air quality pollution. Thus, appropriate measures provided in this report should be well implemented to avoid such impacts to the nearby community.

### **3.8.2 Labor and Working Conditions (ESS2)**

The standard recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. ESS2 is applicable to the project given that the project will employ/engage both skilled and non-skilled workers, through contractors/subcontractors, and primary suppliers, to undertake various activities. In order to comply with the provisions of ESS2, the proponent will take workers safety seriously by laying out internal controls and procedures that will protect workers employed or engaged in relation to the project from occupational hazards during all relevant project phases.

All works will be done in compliance with relevant environmental and health and safety standards to minimize impact on workers as well as the local area and citizens. The ESIA contains robust procedures for worker safety, requiring plans for accident prevention as well for health and safety of workers and communities, which are also part of contracts for civil works.

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

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

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

### **3.8.3 Resource Efficiency and Pollution Prevention and Management (ESS3)**

This ESS3 sets out the requirements to address resource efficiency and pollution prevention and management throughout the project lifecycle. In order to ensure the efficient use of resources, the project will source construction materials from government authorized sources and water from throughout the project implementation.

Moreover, the project will utilize the pollution prevention and emergency response plan drafted as part of the ESIA to mitigate any potential source of pollution from the planned activities. The risks identified for strengthening the system for complying with ESS1 are applicable to ESS3.

#### **3.8.4 Community Health and Safety (ESS4)**

The ESS requires beneficiary to avoid or minimize safety and health risks and impacts of the project, with particular attention to people who, because of their particular circumstances, may be vulnerable. Implementation of project components has the health and safety risks and impacts on project-affected communities. These risks and impacts could include increased rates of crime, and social conflict and violence, increases in traffic accidents, increased pressure on local accommodation and rents, increased transmission of HIV/STDS, as well as increases in gender-based violence.

The project will ensure compliance with national law requirements regarding the COVID-19 situation. COSTECH shall work closely with street leaders to communicate to local communities related health and safety risks and preventive measures for accidents associated transportation of materials and other human health issues including covering mitigation measures to GBV risks and prevention of HIV and AIDS during construction.

All works will be done in compliance with relevant environmental and health and safety standards to minimize impact on workers and the local community. During the project's operational phase, waste will be disposed off to landfill.

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

#### **3.8.5 Land Acquisition, Restrictions on land use and involuntary resettlement (ESS5)**

The ESS5 recognizes that Project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons. Experience and research indicate that physical and economic displacement, if unmitigated, may give rise to severe economic, social and environmental risks. ESS5 requires the Project proponent to avoid or minimize involuntary resettlement by exploring project design alternatives, avoid forced eviction, mitigate unavoidable adverse impacts from land acquisition or restrictions on land use through timely compensation for loss of assets at replacement cost and assisting displaced persons in their efforts to improve, or at least. The land designated for construction of COSTECH STI Complex building is unoccupied parcel of land legally owned by COSTECH and without any encumbrance. In this regard there is no potential for restrictions on land use and involuntary resettlement.

#### **3.8.6 Cultural Heritage (ESS8)**

This recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. People identify with cultural heritage as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. In that regard, it echoes out the need to protect cultural heritage from the adverse impacts of project activities and support its preservation. Hence, COSTECH will ensure measures defined in the ESMF and contracts are followed by contractors during excavations (if any) to avoid impacts to cultural heritage and also ensure that chance find procedures will be enforced.

### **3.8.7 Stakeholder Engagement and Information Disclosure (ESS10)**

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

### **3.8.8 World Bank Group ESHS Guidelines**

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

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



## CHAPTER FOUR

### 4 BASELINE CONDITIONS OF THE PROJECT AREA

#### 4.1 Introduction

The term baseline refers to conditions existing before the development of the project against which subsequent changes can be referenced. This chapter presents information on the existing environmental and socioeconomic conditions of the proposed project area. It discusses aspects pertaining to climatic conditions, geology and soil, hydrology, noise level and ambient air quality as well as land use. Further, the chapter presents details about the existing flora and fauna as well as socio-economic environment of Dodoma City. Baseline data has been collected from both primary and secondary sources; Primary data has been collected through site-specific environmental survey while data from secondary sources has been review of other related documents.

##### 4.1.1 Area of Influence

The proposed project shall have direct and indirect influence to communities neighboring the proposed project development site and the whole Municipal. The proposed construction of building will have directly influence socio-economic activities around the proposed project area particularly Tambukareli area. The indirect area of influence includes all communities in Dodoma City who will benefit through supply of building materials, workforce, food as well as provision of bussness opportunities. The proposed project shall also influence the education sector since after its completion researchers and innovators from Dodoma and all over the country will have an opportunity to visit and gain knowledge.

#### 4.2 Physical Characteristics

##### 4.2.1 Topography

The topography of the proposed project area is between 1139-1140 meters above sea level. The project area is generally a flat land but with gentle slopes at some places in the Northern part of the project area. Due to the flat nature of the proposed site minimum land leveling will be required when the construction activities commences hence, hence less disturbance will be caused on the topography, soil and geology.

##### 4.2.2 Climate

The project site is in the area where wet season is overcast, the dry season is windy and mostly clear, and it is warm year-round. Over the course of the year, the temperature typically varies from 58°F to 87°F and is rarely below 55°F or above 92°F. Based on the beach/pool score, the best time of year to visit the area for hot-weather activities is from late August to early December.

It is **subtropical**, tempered by altitude, with a warmer period from October to March and a cooler period from June to August. The rains are concentrated from December to April, while there is a long dry season from May to October. The area is in the capital city of Tanzania and is located in the center of the country, at 1,100 meters (3,600 feet) above sea level.

- **Precipitation**

The area receives an average **Precipitation** amounts to 605 millimeters (23.8 inches) per year: so, it is at an intermediate level. It ranges from 0 mm (0 in) in the driest months (June, July, August, September) to 145 mm (5.7 in) in the wettest one (February). During these months, the average rainfall is over 100 millimeters (3.94 inches). The dry season is from May to October, with the driest months being June, July, and August. The amount of rainfall can vary from year to year. During the rainy season, air quality tends to improve due to the precipitation helping to wash away pollutants from the atmosphere. The rain effectively clears the air of dust, particulate matter,

and other airborne pollutants, resulting in better visibility and overall improved air quality at the proposed project area. However, during the dry season, particularly in arid or semi-arid regions, air quality can deteriorate. The lack of rainfall leads to the accumulation of dust and particulate matter in the air, exacerbated by factors such as increased vehicular traffic and industrial activities. These conditions can result in reduced air quality at proposed project areas, potentially leading to visibility issues and health concerns for passengers and proposed project area personnel. Therefore, proposed project area authorities often implement measures such as air quality monitoring and pollution control strategies to mitigate the effects of poor air quality during the dry season, ensuring the safety and comfort of everyone within the proposed project area environment.

- **Temperature**

The area experiences warm temperatures year-round, with average highs ranging from 27°C to 32°C. The hottest months are April, May, September, October, and November, while July is the coolest month. The rainy season occurs from October to May, with the wettest months being March, April, and November. The months with the fewest rainy days are June, July, and August, with no rainy days on average. During the low-temperature season, which often coincides with winter in many regions, air quality can be affected by temperature inversions. Inversions occur when a layer of warm air traps cooler air near the ground, leading to the accumulation of pollutants and reducing air quality. Additionally, cold temperatures can increase the use of heating systems and vehicles, contributing to emissions of pollutants such as carbon monoxide and particulate matter. Conversely, during the high-temperature season, such as summer, air quality may be impacted by factors like increased ozone formation. High temperatures can accelerate the chemical reactions that produce ground-level ozone, a key component of smog, leading to poorer air quality. Furthermore, elevated temperatures can exacerbate the effects of vehicle emissions and industrial activities on air quality. To address these challenges, proposed project area can implement measures such as emission controls, vehicle restrictions, and air quality monitoring to ensure that air quality remains at acceptable levels regardless of temperature fluctuations throughout the year.

- **Wind**

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Proposed STI complex experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 7.1 months, from May 3 to December 6, with average wind speeds of more than 10.0 miles per hour. The windiest month of the year is October, with an average hourly wind speed of 13.4 miles per hour. The calmer time of year lasts for 4.9 months, from December 6 to May 3. The calmest month of the year in Proposed STI complex is February, with an average hourly wind speed of 6.5 miles per hour. During periods of high winds, particularly in regions prone to dust storms or sandstorms, air quality can deteriorate rapidly. Wind carries dust and particulate matter over vast distances, leading to reduced visibility and potential health hazards for passengers and proposed project area personnel. Additionally, strong winds can stir up pollutants from industrial areas or urban centers, further impacting air quality around the proposed project area. Conversely, during periods of low wind or calm conditions, air quality may improve as pollutants are less dispersed and more likely to settle or be dispersed through other means such as ventilation systems or natural processes. However, stagnant air during calm conditions can also lead to the

accumulation of pollutants, especially in areas with high vehicular traffic or industrial activities. To manage air quality during varying wind conditions, proposed project areas often employ strategies such as dust suppression measures, regular monitoring, and coordination with local environmental agencies to mitigate the impact of wind-related air quality fluctuations.

- **Windrose**

The Windrose below represents the directions of the which the wind blew from during the sampling period of the year. During January to April, most of the wind tends to blow from east south east directions with dominant winds of >3.6m/s blow more than 6% to 14% of time. The least wind comes from the west north west direction with wind blow less than 4% of the sampling time. Also, from the wind class it shows that the wind with speed 3.6-5.7m/s and 5.7-8.80 m/s blow in a total of 73.7 % of time. The more significant winds are the one blowing from the east-south-eastern direction, which will also tend to affect the downwind air quality characteristics. Therefore, the project should be monitored to minimize the pollutant such as dust to be carried by such winds.

During May to August sampling period, most of the wind tend blow from east south east directions with dominant winds of >3.6m/s blow more than 6% to 26% of time. These are more significant winds blows from the east south eastern direction, which will also tend to affect the downwind air quality characteristics. Therefore, the project should be monitored to minimize the pollutant such as dust, to be carried by such winds.

During September to December, the most of the wind tends to blow from East south east directions with dominant winds of >3.6m/s blow more than 5% to 22% of time, where from the wind class shows the wind speed of 3.6-5.7m/s dominates 40.4% of time, determine how quick the pollutant can be carried away from the source to the receptors. These more significant winds blowing from the east south east direction, which will also tend to affect the downwind air quality characteristics. Therefore, the project should be monitored to minimize the pollutant such as dust, to be carried by such winds.

#### **4.2.3 Soil, Geology and Hydrology characteristics**

- **Soil**

Soils in the area are typically well-drained mainly reddish sandy clays, to sandy-loams. The topsoil is most often sandy. These soils have developed from a granite or gneiss base and, depending on the clay content, can be weak to moderately strong in structure. Soils in this area can be generally described as “ferric soil”, with low natural fertility, susceptible to slaking/crusting, compaction and erosion in sloping lands. The underneath clay soil usually have low water permeability that enables Dodoma residents to dig hand well and store water for irrigation during rainy season. As per secondary data, the project site there is no major soil/land risk that is likely to affect the project implementation.

- **Geology**

As explained in the sub section above “**Soil**” the project area soil has developed from a granite or gneiss base that is ferric in nature. Granitic rocks are believed to be of late Precambrian age however their actual age, mode of emplacement and exhaustive distribution are to this point unknown.

- **Hydrology**

Groundwater was observed in some pits which ranges from 0.20m to 0.70 m other pits were dry and all boreholes were dry during and after drilling. Storm water

drainage is one of the major causes of urban environmental degradation. As the project area is not yet developed (bare land) currently rainwater drains haphazardly without any drainage channels. As water always flows from high altitude to low altitude, water will flow from south to north of the project area. When Construction works start, the project developer will have to establish proper drainage system (Channels) in order to avoid or reduce the risk that can be caused by uncontrolled water spread after erection of buildings that can accelerate soil erosion and other negative environmental impacts. The proposed site is at low erosion potential risks but need

careful during construction to control the raising water table, which could occur during the rains. The drainage system of the whole site should be well designed because the soils can be erodible, drains water away and percolate water, during rainfall

#### **4.2.4 Air quality monitoring results**

##### **✚ Particulate matter result summary**

The provided **Figure 4-1** depicts the average concentrations of particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>) measured at three monitoring stations (MS-1, MS-2, and MS-3) during a baseline air quality study. The concentrations, expressed in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), reveal significant variations across the different locations. PM<sub>2.5</sub> levels were recorded at  $10.9 \mu\text{g}/\text{m}^3$  for MS-1,  $7.9 \mu\text{g}/\text{m}^3$  for MS-2, and a notably higher  $29.9 \mu\text{g}/\text{m}^3$  for MS-3. Similarly, PM<sub>10</sub> concentrations were measured at  $17.7 \mu\text{g}/\text{m}^3$  for MS-1,  $13.0 \mu\text{g}/\text{m}^3$  for MS-2, and  $49.3 \mu\text{g}/\text{m}^3$  for MS-3.

When comparing these results with the Tanzania Bureau of Standards (TBS) and World Health Organization (WHO) guidelines for 24-hour exposure, certain patterns emerge. The WHO standards stipulate that the 24-hour mean concentration for PM<sub>2.5</sub> should not exceed  $15 \mu\text{g}/\text{m}^3$ , and for PM<sub>10</sub>, the limit is set at  $50 \mu\text{g}/\text{m}^3$ . These benchmarks are designed to minimize health risks associated with prolonged exposure to particulate matter, which can include respiratory and cardiovascular diseases.

At monitoring station MS-1, the recorded PM<sub>2.5</sub> concentration of  $10.9 \mu\text{g}/\text{m}^3$  falls within the WHO guideline, suggesting that the air quality is relatively safe regarding fine particulate matter. The PM<sub>10</sub> level at this station is  $17.7 \mu\text{g}/\text{m}^3$ , which is also well within the acceptable range defined by WHO standards.

Monitoring station MS-2 also shows compliance with both TBS and WHO standards, with PM<sub>2.5</sub> levels at  $7.9 \mu\text{g}/\text{m}^3$  and PM<sub>10</sub> levels at  $13.0 \mu\text{g}/\text{m}^3$ . These figures are comfortably below the respective thresholds of  $15 \mu\text{g}/\text{m}^3$  for PM<sub>2.5</sub> and  $50 \mu\text{g}/\text{m}^3$  for PM<sub>10</sub>.

However, the situation at MS-3 is markedly different. The PM<sub>2.5</sub> concentration at this station is  $29.9 \mu\text{g}/\text{m}^3$ , which significantly exceeds the WHO 24-hour guideline of  $15 \mu\text{g}/\text{m}^3$  due to smoke produced by nearby cooking area and dispersion of dust from construction activities. Additionally, the PM<sub>10</sub> concentration at MS-3 is  $49.3 \mu\text{g}/\text{m}^3$ , below the WHO limit of  $50 \mu\text{g}/\text{m}^3$ .

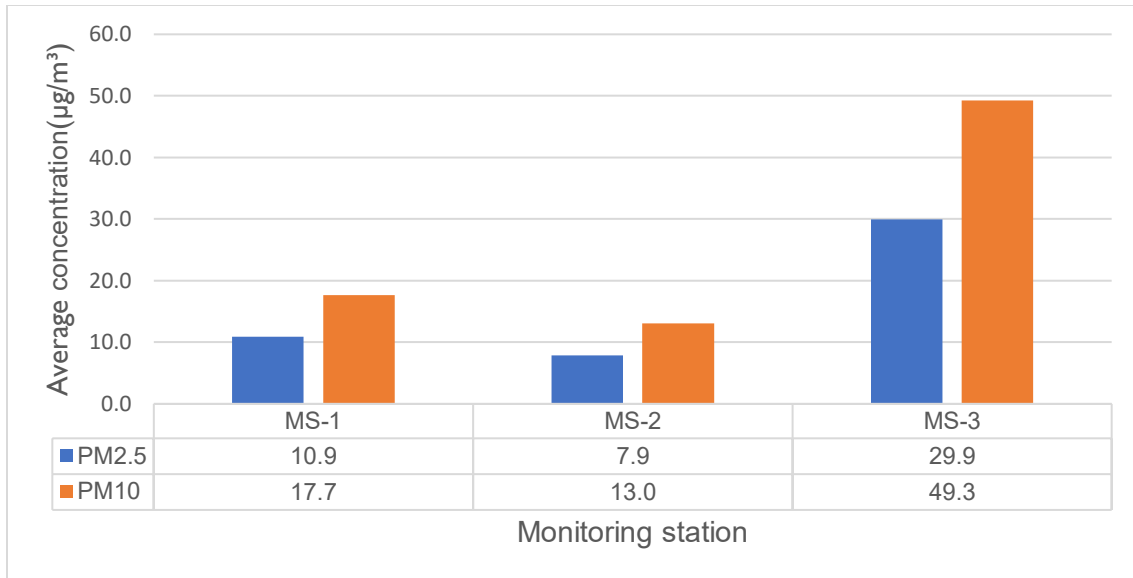


Figure 4-1:Particulate matter monitoring results

#### ✚ Gass results summary

**Table 4-1** displays the results obtained from the average data of monitoring locations, which represents the baseline of the project area:Each gas is analysed as follows

##### ○ Sulfur Dioxide (SO<sub>2</sub>)

The concentrations of sulfur dioxide (SO<sub>2</sub>) at the three monitoring stations are 3.2 µg/m<sup>3</sup> at MS-1, 3.0 µg/m<sup>3</sup> at MS-2, and 3.1 µg/m<sup>3</sup> at MS-3. These levels are significantly lower than the Tanzania Bureau of Standards (TBS) and World Health Organization (WHO) guidelines, which set the safe limit at 200 µg/m<sup>3</sup>. The relatively low concentrations indicate that sulfur dioxide pollution is minimal at all three monitoring sites. This is beneficial for public health, as higher levels of SO<sub>2</sub> can cause respiratory problems and aggravate existing cardiovascular diseases.

##### ○ Nitrogen Dioxide (NO<sub>2</sub>)

The average concentrations of nitrogen dioxide (NO<sub>2</sub>) are 5.4 µg/m<sup>3</sup> at MS-1, 5.0 µg/m<sup>3</sup> at MS-2, and 5.3 µg/m<sup>3</sup> at MS-3. These values are well below the 500 µg/m<sup>3</sup> limit set by both TBS and WHO standards. This indicates that the levels of NO<sub>2</sub>, a common air pollutant primarily produced from sources of emissions such as vehicles emissions, are within safe limits. Low NO<sub>2</sub> concentrations are important because high levels can lead to respiratory issues, particularly in children and individuals with asthma.

##### ○ Volatile Organic Compounds (VOC)

The measured levels of volatile organic compounds (VOC) are 15.2 µg/m<sup>3</sup> at MS-1, 14.6 µg/m<sup>3</sup> at MS-2, and 14.9 µg/m<sup>3</sup> at MS-3. Compared to the TBS standard of 6000 µg/m<sup>3</sup>, the observed concentrations are extremely low. VOCs are significant because they can contribute to the formation of ground-level ozone and secondary organic aerosols, which are harmful to health and the environment. The low levels found in this study suggest minimal risk from VOCs at the monitored sites.

##### ○ Hydrogen Sulfide (H<sub>2</sub>S)

Hydrogen sulfide (H<sub>2</sub>S) concentrations are reported as 0.0 µg/m<sup>3</sup> across all three monitoring stations, indicating no detectable presence of this gas. H<sub>2</sub>S is typically associated with industrial activities such as petroleum refining and natural gas extraction. Its absence in the air quality

measurements suggests that there are no significant sources of H<sub>2</sub>S emissions near the monitoring sites, which is positive given that H<sub>2</sub>S can cause respiratory and neurological effects at higher concentrations.

- **Ozone (O<sub>3</sub>)**

Ozone (O<sub>3</sub>) levels are recorded at 10.5 µg/m<sup>3</sup> for MS-1, 11.0 µg/m<sup>3</sup> for MS-2, and 10.9 µg/m<sup>3</sup> for MS-3. These values are well below the 100 µg/m<sup>3</sup> limit set by TBS and WHO standards. Ground-level ozone is a critical air pollutant that can cause respiratory problems and other health issues. The low ozone levels in this study suggest that the areas around the monitoring stations have good air quality with respect to ozone, reducing the risk of adverse health effects from this pollutant.

- **Carbon Monoxide (CO)**

The concentrations of carbon monoxide (CO) are uniform across all three stations at 0.03 mg/m<sup>3</sup>. This is significantly below the 1 mg/m<sup>3</sup> standard set by TBS and WHO. Carbon monoxide is a colorless, odorless gas that can be harmful when inhaled in large amounts, as it interferes with the blood's ability to carry oxygen. The low levels detected indicate that CO pollution is not a concern in the monitored areas, ensuring the safety and well-being of the residents.

- **Carbon Dioxide (CO<sub>2</sub>)**

The levels of carbon dioxide (CO<sub>2</sub>) are 423.1 ppm at MS-1, 419.8 ppm at MS-2, and 426.4 ppm at MS-3. While TBS and WHO do not provide specific standards for ambient CO<sub>2</sub> concentrations in this context, these values are consistent with typical atmospheric levels, which are usually around 400 ppm. The observed concentrations do not indicate any significant pollution or health risks. Elevated CO<sub>2</sub> levels are generally more of a concern indoors or in poorly ventilated areas, rather than in ambient outdoor air.

Table 4-1: Gas monitoring results

Monitoring Station	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	VOC (µg/m <sup>3</sup> )	H <sub>2</sub> S (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	CO <sub>2</sub> (ppm)
MS-1	3.2	5.4	15.2	0.0	10.5	0.03	423.1
MS-2	3.0	5.0	14.6	0.0	11.0	0.03	419.8
MS-3	3.1	5.3	14.9	0.0	10.9	0.03	426.4
<b>TBS Standard</b>	<b>200</b>	<b>500</b>	<b>6000</b>	-	<b>100</b>	<b>1</b>	-
<b>WHO Standard</b>	<b>200</b>	<b>500</b>	-	-	<b>100</b>	<b>1</b>	-

Source: Field Measurements

#### 4.2.5 Noise

##### 4.2.5.1 Noise result summary

The noise monitoring conducted along the Proposed STI complex provides valuable insights into the current noise levels. These measurements taken, allow for a comprehensive analysis of the noise pollution scenario as shown in **Table 4-2**.

Table 4-2: Noise Monitoring results

Monitoring location	Leq(dBA)	Max	Min	L10	L90
MS-1	56.1	61.9	39.7	56.44	43.86
MS-2	60.7	70.1	39.8	65.8	43.67

Monitoring location	Leq(dBA)	Max	Min	L10	L90
MS-3	53.3	67.4	39.1	54.6	40.65
<b>Tanzania Environmental Management Regulation of Noise , 2015</b>	<b>55</b>	-	-	-	-
<b>IFC/WHO guidelines</b>	<b>55</b>	-	-	-	-

Source: Field Measurements

The monitoring was conducted at three locations (MS-1, MS-2, and MS-3) and the results were evaluated against the Tanzania Environmental Management Regulation of Noise (2015) and the IFC/WHO guidelines, both of which set an equivalent continuous noise level (Leq) limit of 55 dBA.

At monitoring location MS-1, the Leq is 56.1 dBA, with a maximum noise level recorded at 61.9 dBA and a minimum at 39.7 dBA. The noise level exceeded 10% of the time (L10) is 56.44 dBA, and the noise level exceeded 90% of the time (L90) is 43.86 dBA. These results indicate that the Leq at MS-1 slightly exceeds both the Tanzanian regulatory limit and the IFC/WHO guidelines by 1.1 dBA, suggesting that the noise levels at this location are marginally above the recommended limits.

At monitoring location MS-2, the Leq is recorded at 60.7 dBA, the highest among the three locations. The maximum noise level reached 70.1 dBA, while the minimum was 39.8 dBA. The L10 value is 65.8 dBA, and the L90 value is 43.67 dBA. The Leq at MS-2 significantly exceeds the regulatory and guideline limit by 5.7 dBA. This indicates a higher overall noise level at MS-2, with frequent instances of noise peaks, reflecting more variability and potentially more noise sources or activities contributing to the sound environment.

At monitoring location MS-3, the Leq is 53.3 dBA, the lowest among the three sites. The maximum noise level is 67.4 dBA, and the minimum is 39.1 dBA. The L10 value is 54.6 dBA, and the L90 value is 40.65 dBA. These measurements suggest that MS-3 has a relatively quieter environment compared to MS-1 and MS-2, with lower average noise levels and less variation in noise intensity. The Leq at MS-3 is within both the Tanzanian regulatory limit and the IFC/WHO guidelines, indicating compliance with the recommended noise levels.

## 4.2.6 Vibration

### 4.2.6.1 Results on vibration measurement

This Section presents the results and discussion of the vibration measurements conducted for the Proposed STI complex operations. The chapter focuses on comparing the obtained vibration data with relevant standards, including ISO 4866 and Tanzania's environmental management noise and vibration standards. The discussion highlights the potential impacts of vibrations on structures and human health and proposes mitigation measures to ensure compliance with Tanzania's standards. The findings provide valuable insights for the Proposed STI complex construction and emphasize the importance of minimizing the adverse effects of vibrations on the surrounding environment and communities

**Table 4-3:Vibration measurement results**

Vibration monitoring location	MS-1	MS-2	MS-3
Min(mm/s)	0.1	0.1	0.1
Max(mm/s)	0.18	0.10	0.11

Tanzania Environmental Management Noise and Vibration Standards: Tanzania's environmental management noise and vibration standards set a permissible maximum limit of 5 mm/s for vibration measurements. Comparing the provided data with this standard:

Vibration monitoring location	MS-1	MS-2	MS-3
Max (mm/s)	0.18	0.10	0.11

Source: Field Measurements

From the results, we can see that the maximum measured vibrations at MS-1 to MS-4 monitoring locations are lower than the permissible limit of 5 mm/s set by Tanzania's environmental.

#### **4.2.6.2 Discussion**

Based on the vibration measurement results obtained from the monitoring locations (MS-1 to MS-3) for the Proposed STI complex, it can be concluded that the recorded vibrations are lower than the acceptable limits during measurement period, according Tanzania's environmental management noise and vibration standards of 2015. As this vibration occurs intermittently only during measurement period, which pose no potential impacts of vibrations on structures and human health.

### **4.3 Biological Characteristics**

Nestled within the heart of Tanzania, Dodoma Region boasts a unique and diverse ecosystem characterized by its semi-arid climate and rich biodiversity. Spanning across approximately 2669 square kilometers, this region serves as a vital ecological hub, supporting a mosaic of habitats and species uniquely adapted to its challenging environmental conditions.

The landscape of Dodoma Region is defined by vast expanses of savannah woodlands, interspersed with scrublands, seasonal wetlands, and rocky outcrops. Despite its arid climate, the region harbors a surprising abundance of life, showcasing the resilience and adaptability of its flora and fauna to survive in such harsh conditions. Flora within the Dodoma ecosystem comprises a variety of drought-resistant plant species, including acacias, commiphora species, and other xerophytic vegetation. These plants have evolved intricate mechanisms to conserve water and thrive in low-nutrient soils, contributing to the unique character of the region's vegetation. The fauna of Dodoma Region is equally diverse, with a wealth of wildlife species adapted to the semi-arid environment. Iconic mammalian species roam the savannahs, while a plethora of bird species, reptiles, and invertebrates inhabit the skies, land, and waterways.

The ecosystem services provided by Dodoma's natural environment are invaluable, sustaining local communities and wildlife alike. From regulating water flows and supporting agricultural productivity to providing cultural and recreational amenities, the ecosystem of Dodoma region plays a vital role in the well-being and livelihoods of its inhabitants and those that pass by from neighboring ecosystems such as Ruaha-Rungwa. However, this delicate balance faces increasing pressures from human activities, including urbanization, agriculture, and resource extraction. In recent years the government made a move to reallocate all government proceedings from main city Dar es Salaam to its capital Dodoma. This turn around has prompted inevitable development activities that at large have encroached upon natural habitats to accommodate buildings, roads networks and necessary social-economic infrastructures. Hence the high alert and a cautious approach from all environmental stakeholders towards sustainable utilization and development of Dodoma region with regards to its ecosystem health. By understanding and appreciating the intricate web of life within Dodoma Region, we can work towards ensuring the long-term health and resilience of this unique ecosystem. Through collaborative efforts and sound



environmental stewardship, we can strive to bring about social-economic development to the region and the country at large while at the same time be able to preserve the ecological integrity and biodiversity of Dodoma for future generations to enjoy and benefit from our efforts.

### 1. Site Area Analyses:

The project site is situated amongst newly developed areas and is not designated as a wildlife corridor or conservation site. On the southern side of the proposed site is the SGR Railway project, the eastern side the building is neighbored by another government building as well as on the western side and the northern. The purpose of this assessment is to evaluate the biological aspects present within and around the construction site so as to meet the standard requirements by law as well as facilitate a smooth decision-making processes for obtaining construction permits.

### 2. Site area observation and data collection:

The assessment was conducted through a combination of field surveys and secondary data search. Field surveys were carried out by a team of biodiversity experts who conducted visual inspections and biological data sampling within the proposed project site and its immediate surroundings. Secondary data acquisition involved reviewing existing literature and databases to gather information on the biodiversity history of the area in question. Down below are several lists of findings gathered throughout the site survey proceedings.

### 3. Biodiversity Findings:

#### a) *Plant Diversity:*

- The vegetation within the project site primarily consists of hardy, drought-resistant species adapted to semi-arid conditions.
- Common plant species observed and recorded include;

Index	family	category	Scientific name	Common name/local names
i	convolvulaceae	Herb/vine	Ipomoea pandurata	Wild sweet potato/viazi poli
ii	Hibiscus	shrub	Hibiscus calyphyllus	Hibiscus
iii	Acanthaceae	Shrub and perennials	Hypoestes aristata	Ribbon bush
iv	commelinaceae	Perennial herb	Commelina benghalensis	Wandering jew
vi	apocynaceae	Tree/shrub	Calotropis procera	French cotton/apple of sodom
vii	Combretaceae	Tree/ shrub	combretum	Tooth-brush combretum
viii	cucurbitaceae	vine	Cucumis anguria	Tango poli

Source: Field Assessment

- The surrounding area also supports similar vegetation, with sparse shrubs and grasses dominating the landscape.

index	Family	Category	Scientific name	Common name
I	<i>Poaceae</i>	Grass	<i>Sorghum leiocladum</i>	Wild sorghum/mtama poli
ii	<i>Poaceae</i>	Grass	<i>Dactyloctenium aegyptium</i>	Giant crowfoot
iii	<i>Poaceae</i>	Grass	<i>Panicum</i>	Panic grass
iv	<i>Poaceae</i>	Grass	<i>Eragrostis amabilis</i>	Love grass/ cane grass

Source: Field Assessment

**b) Avian Diversity:**

- Avifauna observed in the vicinity of the project site predominantly comprises species adapted to arid environments including both resident birds and seasonal migrants from inter-regions and the globe at large passing by Dodoma. Sighted bird species include;

index	Bird name ( some in family/group names)	Status
i	Common bulbul	common
ii	Ground birds i.e. spur-fowls	common
iii	Red billed Quelea	common
iv	Laughing dove	common
v	Golden weaver	common
vi	Rattling cisticola	common
vii	Waxbills and finches	common
viii	sunbirds	common
ix	Cattle egrets	common
xi	Bishops and widow birds	common
xiii	Hammer cop	common

Source: Field Assessment

- While bird diversity is relatively low since it's a high populated area (urban), occasional sightings of migratory species may occur during certain seasons.

**c) Insect Diversity:**

Insect diversity within the construction site and its surroundings is moderate, with species adapted to arid conditions. Various arthropods were observed at the site area,

- i. bees
- ii. Butterflies play a crucial role in maintaining local plant diversity.

Index	Insect ID	Status
i	East African lowland honey bee	Stable and sufficient
ii	Matebele ants	Stable and sufficient

Index	Insect ID	Status
iii	Coconut crab	Stable and sufficient
iv	Scimitar-horn kite spider	Stable and sufficient
v	Giant devil's flower mantis	Stable and sufficient
vi	Plain tiger butterfly	Stable and sufficient
vii	Common grass yellow	Stable and sufficient
viii	Tanzania red clawed scorpion	Stable and sufficient
ix	Boehm's burrowing scorpion	Stable and sufficient
x	Swallowtail butterflies	Stable and sufficient
xi	Dragonflies	Stable and sufficient
xii	Northern harvester termite	Stable and sufficient

Source: Field Assessment

- No significant presence of threatened or endemic insect species was observed during the field observation.

**d) Mammalian Diversity:**

- General mammalian diversity in Dodoma region is limited due to the semi-arid nature of the landscape and high human settlement. Never the less there is a significant evidence of intra-urban wild species such as, *Genets, Rodents, Civets, Wild Cats*, etc. a scan around the site area did not provide evidence of markings or tracks and we believe this may be due to the current rains that may easy wash way tracks.
- Common mammal species include small rodents like the African grass rat and occasional sightings of larger mammals such as the African scrub hare.
- No evidence of large carnivores or endangered mammal species was found within the vicinity of the project site.

**e) Reptilian Diversity:**

- Dodoma is a perfect habitat for reptilian life, the area is characterized by dry semi-arid conditions that are necessary for general welfare of warm blooded species
- The site area hosts a number of reptiles as it was evident with the presence of droppings, trails and markings.
- With reference to several literature works on reptiles of Dodoma, here is a list of species in and around the site area.

Index	Species Identification
i.	Dodoma Rock Agama
ii.	Puff Adder
iii.	Eastern Rufous Beaked Snake
iv.	Nile monitor
v.	Long tailed lizard
vi.	Flap necked chameleon
vii.	African striped skink
viii.	Egg eating snake

**f) Reptilian Diversity:**

- Species listed above are all non-threatened species and their populations are stable.

The area in question is already a government based facilities location in that there are already several construction sites in progress but also newly established facilities both governmental based and non-government institutions. With this in mind it is fair to say with current rules and regulations that different environmental regulating institutions of the Tanzania government have put forth as minimum requirements to obtain permits, biodiversity survey been one of them, this site area in question has no limitations, concerns or immediate negative impact with regards to its biological richness or potential. Both flora and fauna found and observed are not threatened or endangered but also the construction of the building will have very minimal impact to its habitat in general. Rather we call for;

1. Implementing conscious measures to minimize habitat disturbance during construction, particularly in areas with high vegetation cover, i.e. limitation of pollutants and dumping of construction materials should be done neatly.
2. Incorporate green infrastructure elements such as native plant landscaping to enhance habitat quality and support local biodiversity.
3. Establish a monitoring program to track changes in biodiversity over time and assess the effectiveness of mitigation measures.
4. Raise awareness among construction workers regarding the importance of biodiversity conservation and the need to minimize impacts on local flora and fauna.

By adhering to these recommendations, the construction project can proceed in a manner that minimizes its ecological footprint and contributes to the sustainable development of the region. The biodiversity assessment conducted for the proposed area indicates a moderate level of biodiversity, characterized by species adapted to semi-arid conditions. While the site does not serve as a designated wildlife corridor or conservation area, it supports a range of plant and animal life typical of the region. Based on the findings of this assessment, appropriate mitigation measures can be implemented to minimize the potential impacts of construction activities on local biodiversity.

**4.4 Socio economic conditions and infrastructure**

**4.4.1 Population**

According to 2022 Census, Dodoma Region was found to have a population of 3,085,625 with average annual Intercensal Population Growth Rate of 4.1 Based on the population census reports of 2022 Dodoma City Council had a total population of 765,179 with Average Household Size of 3.6. Table 10 below shows the population of Dodoma City Council by Sex, Average Household Size and Sex Ratio.

**Table 4-4: Population of Dodoma Municipal Council**

Location	Total	Males	Females	Average Household size	Sex Ratio
Dodoma Region	3,085,625	1,512,760	1,572,865	4.1	0.96
Dodoma City	765,179	373,440	391,739	3.6	0.95
Tambukareli ward	1,756	5,405	5,351	3.2	1.01

Source: National Population Census, 2022

#### **4.4.2 Cultural Heritage, Aspirations and Traditions**

The City is traditionally inhabited by Wagogo and Warangi, however currently there are now a quite good number of mixed tribes from all over the country; this is due to shift of government offices, trade and cultural relationships in the area

#### **4.4.3 Economic Activities**

This section is intended to provide baseline information on economic activities in the project area. These activities may not have direct impact to the project, but they are provided herein below to give a general picture of a larger project area.

#### **4.4.4 Agriculture**

Agricultural activities in the Dodoma city particularly include cultivation of grapes, which are sold for fresh market and others are processed by small and medium wineries such as CETAWICO, ALKO, and BIHAWANA MISSION. Cultivation of oil seed crops such as groundnuts, sunflower and simsim. Cultivation of drought tolerant crops such as sorghum, pear millet, and cassava. Cultivation of horticultural crops such as tomatoes, leafy vegetables, hot pepper, and egg plants.

#### **4.4.5 Livestock keeping**

Livestock keeping just like farming is an important economic endeavour of the people of Zuzu Ward. Most cattle, sheep and goats as well as poultry are kept in the rural areas of the ward and a few mainly dairy cattle and poultry are found in the urban areas kept under zero grazing. The Dodoma City boasts of a stock of over 103,000 cattle, 53,000 goats, 13,000 sheep and over 94,000 chickens. There are also about 2500 of diary cattle

#### **4.4.6 Industrial Development**

The industry sector in the City to date is still improvising due to the fact that there is no major industrial investment that may term the council areas as industrial one. The contribution of industries to the Dodoma City economy to date is low due to little industrial investment owing to the slowing down of the capital transfer. So far, the City has had little industrial development despite the official government shift to Dodoma. Current Industries within Dodoma City include new wine factory, mattress factory, food and water processing, modern abattoir, concrete and ceramic industries, bakeries, grain milling, garages, motor vehicle spare parts manufacturing, farm implement manufacturing and carpentry workshops.

#### **4.4.7 Economic Infrastructure**

##### **4.4.7.1 Roads**

The project area is well connected by road networks and therefore accessible throughout the year. This well-developed transport network within the area allows smooth movements of people, goods and services to and from the City center and neighboring areas. The area is well connected with roads passable throughout the year which will be easier for the project implementation.

##### **4.4.7.2 Railway service**

The City is traversed by Central Rail Line of the Tanzania Railways Corporation. The railway transportation in the area is important as a mover of goods, services and passengers with the advent, the railway line from Dar es Salaam to upcountry via Dodoma is still crucial to the movement of goods such as; tobacco, livestock, cotton etc. A new standard gauge railway is being built from Dar es Salaam through Dodoma to Mwanza and Kigoma regions. Given the central location of Dodoma, the Standard Gauge Railway which passes close to the project area will be a major railway station, second to Dar es Salaam.

##### **4.4.7.3 Communication Networks**

The city has a well-defined communication networks. The companies which provide communication network in the area include TTCL (Tanzania Telecommunication Company

Limited). Mobile telephone vendor such as services such as Vodacom, Airtel, Halotel and Tigo are also available at the project site. Other services such as Fax, Television, Internet services and Radio Broadcasts are vastly available in the area.

#### **4.4.7.4 Air services**

Dodoma City has one airport which is among the 58 airports that are managed, maintained and operated by Tanzania Airports Authority (TAA). Moreover, the Dodoma airport accommodates international flights as an entry and exit airport to Tanzania. The Dodoma Airport administration also oversees the operations of airstrips in and around Dodoma (Kondoa, Mpwapwa, Kongwa, and Mvumi) as well as the airstrips located in Singida (Singida, Kirondatal and Manyoni airstrips). This is of level 3C (Code 3C) and level 5 of fire emergencies and rescue (Fire Category-CAT 5). However, the government is construction a new airport namely Msalato International Airport Construction, This Project is part of Tanzania's Five Year Development Plan, in line with Tanzania Development Vision (TDV) 2025. It has been designed because of the limited Dodoma airport infrastructure, which hampers not only the development of markets, businesses and the industrial sector, but also job creation. The proposed intervention is likely to contribute to economic growth, which is equally important for the sustainability of the services that the Tanzanian government provides to its citizens. The project involves the construction of a brand new international airport with a passenger terminal, runway, air navigational aids and related operational services - specifically a fuel distribution company, water supply systems, electrical distribution stations and fire-fighting equipment.

## CHAPTER FIVE

### 5 STAKEHOLDER ENGAGEMENT PLAN AND AND GRIEVANCES REDRESS MECHANISM

#### 5.1 Introduction

The Engagement activities associated with the Environmental and Social Impact Assessment (ESIA) offer an opportunity for all individuals who are interested in or affected by the project to express their opinions and concerns regarding the projects impacts and mitigation measures. The project will consider and respond to these inputs during ESIA process. Furthermore, the engagement activities enable the relevant authorities to ensure that concerns and comments from various stakeholders are taken into account while developing Environmental and Social Management Plan (ESMP) and an Environmental Monitoring Plan..

#### 5.2 Stakeholders Identification and Analysis

The consulted stakeholders for COSTECH STI Complex project are found at Regional, City and local levels. At district levels consultant meet with City Environment Management Officer. At the ward level, Ward Executive Officer (WEO), Mtaa officials were consulted. In addition, interviews were held with the health and safety inspectors at Occupation Health and Safety Authority (OSHA), Fire and Rescue Force office and Dodoma Water Supply and Sanitation Authority (DUWASA).

**Table 5-1: List of Stakeholders identified, their roles and the rate of interest in the Project**

Level of consultation	Institution	Role of Stakeholders	Rate of Interest
NATIONAL LEVEL	Occupational Safety and Health Authority (OSHA)- Dodoma office	It plays a critical role in ensuring workplace safety and health across the country. It establishes and enforces regulations to prevent work-related injuries, illnesses, and fatalities. The OSHA office conducts inspections, investigates complaints, and provides training, outreach, education, and assistance to employers and employees. By setting standards and enforcing compliance, the OSHA office helps to create safer working environments, thereby protecting the workforce and promoting overall public health and safety.	HIGH
	Fire and Rescue Force-Dodoma Office	They are responsible for fire prevention through inspections, education, and enforcement of fire codes. They also conduct training and preparedness programs to equip communities and personnel with the skills needed to respond effectively to various emergencies	LOW

Level of consultation	Institution	Role of Stakeholders	Rate of Interest
CITY LEVEL	<ul style="list-style-type: none"> <li>City Environmental officer</li> <li>DUWASA</li> </ul>	<ul style="list-style-type: none"> <li>To ensure environmental sustainability and regulatory compliance</li> <li>Water supply and sanitary waste water disposal</li> </ul>	HIGH
WARD LEVEL	Ward officials	These officials are responsible for overseeing the day-to-day operations and services within their designated areas, such as managing public infrastructure, addressing citizen concerns, enforcing local regulations, and fostering community engagement	HIGH
MTAA LEVEL	Mtaa Development Committee	They act as liaisons between residents and higher levels of government, ensuring that local needs are communicated and addressed effectively. Officials often serve as representatives of their communities in decision-making processes, advocating for the interests and welfare of their constituents. Through their close interactions with residents, they help maintain order, promote civic participation, and contribute to the overall well-being of the neighborhoods they serve.	HIGH

**5.3 Stakeholders Engagement and Disclosure Methodologies**

Various communication techniques are employed during stakeholder engagement. Essentially, community meetings serve as the primary methods for involving the public, other method are focus group discussion and interview. These methods are utilized to generate initial awareness, encourage participation, and facilitate long-term information sharing. However, the selection of specific methods depends on the level and purpose of engagement, as well as the specific stakeholder group being targeted. In the ESIA process, the ESIA Consultants employed the following methods to engage the public.

**5.3.1 Community Meetings**

Community meetings were organized to disseminate information to individuals who could potentially be impacted by the project, as well as to gather their comments and address any queries they may have. These meetings involved a presentation followed by a session for questions and answers. The main goals were to clarify the project details and seek opinions regarding both positive and negative impacts of the project.

**5.3.2 Formal Meetings**

Formal meetings with elected officials and government functionaries were held to provide information about the project to agency representatives, and to solicit their comments and questions. The meetings consisted of a short formal presentation followed by a question-and-answer period.

**5.3.3 One on one interviews**

The interviews aimed to give chance to individuals to air concerns on project and will involve Project Affected Persons (PAP) and Other Interested Parties (OIPs) depending on the issues to be addressed.



#### **5.3.4 Site visits**

These visits are focused to identify and discuss stakeholder concerns and to disclose project information within communities.

#### **5.3.5 Disclosure**

- COSTECH will make accessibility of ESIA report, along with other pertinent project documents to the public.
- The complete set of documents will be physically accessible in local offices and project offices. Electronically copies will be available on the COSTECH website.
- Summary information will also be provided at Ward and Mtaa office situated in the project area.

#### **5.4 Stakeholders Concerns**

Generally, all government all consulted stakeholders consulted had no objections regarding the proposed project and appeared to be content with its objectives leading to its initiation. They all urged the proponent to abide by the relevant rules and regulations guiding her project operations. All raised issues from consulted stakeholders are pointed and noted as explained on Table 5.3

**Table 5-2: Details of Stakeholders concerns**

Level	Institution/ Group	Views and Concerns of Stakeholders
National Level	Occupational Safety and Health Authority	<p>The Consultants met with OSHA Inspector regarding the proposed development of building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• The proponent should register the workplace with OSHA</li> <li>• The proponent should make sure all statutory inspections are conducted by OSHA</li> <li>• The proponent should prepare OSH policy</li> <li>• The project site must have address of Chief Inspector of OSHA in all conspicuous points</li> <li>• There must be a designated Emergency assembly point within the site</li> <li>• Proponent should conduct workplace risk assessment</li> <li>• Workers should be provided with appropriate Personal Protective equipment (PPEs)</li> <li>• There should be adequate firefighting equipment</li> <li>• Workers should be provided with all necessary trainings</li> <li>• First aid kits should be placed under the responsibility of the trained first aider</li> <li>• Well-equipped first aid kit should be available with all necessary contents, clearly marked and accessible.</li> <li>• There should be available trained first aider and all its particulars and address or contacts should be posted</li> <li>• All rooms should have good air circulation and acceptable light intensity.</li> <li>• Workers should be supplied with clean and safe drinking water</li> <li>• There should be separate male and female toilets</li> <li>• There should be separate changing rooms</li> <li>• Accident register or illness reporting books should be placed in the project site</li> <li>• There should be established OSH committee</li> <li>• All accident reports should be reported to the OSHA Chief Inspector within 24 hours.</li> </ul>
	NIMR	<p>The Consultants met with NIMRI officer regarding the proposed development of building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• There must be hand washing facilities</li> <li>• Appropriate and enough fire fighting facilities must be installed and well monitored</li> <li>• The STI complex must be installed with appropriate safety and warning sign in all dangerous areas</li> <li>• Emergency stairs must be provided</li> <li>• If there shall be hazardous waste from the laboratory that will be provided within the building then incinerator must be installed</li> </ul>

Level	Institution/ Group	Views and Concerns of Stakeholders
	AQRB	<p>The Consultants met with AQRB regarding the proposed development of STI building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• COSTECH should engage the architects in implementation of the project</li> <li>• Also quantity surveyors should be engaged to get the real cost of the project implementation</li> <li>• Lastly both architects and Quantity surveyors to be involved must be registered by AQRB</li> </ul>
	VETA	<p>The Consultants met with VETA officer regarding the proposed development of STI building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• The project implementation will provide opportunity for scientist and innovators in Dodoma and the whole country at large to use the STI building as far as research and innovation is concerned</li> <li>• COSTECH should take initiatives to make sure the STI building is provided with appropriate facilities that will motivate researchers, scientist and innovators to visit complex frequently</li> </ul>
	TBA	<p>The Consultants met with TBA officer regarding the proposed development of STI building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• Put enough waste bins</li> <li>• Installation of appropriate fire fighting equipments</li> <li>• Employ safety officer to oversee safety issues during the construction</li> <li>• Toilets and Changing rooms must be provided for male and female</li> <li>• Provision of appropriate PPE to workers</li> <li>• Provision of training on EHS issues to workers</li> <li>• Put warning sign in all dangerous areas</li> <li>• All drawings should be certified by relevant authority</li> </ul>
	ARU	<p>The Consultants met with ARU officer regarding the proposed development of STI building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• Design of the building should incorporate the seismic design as Dodoma in the seismic zone</li> <li>• All hazardous waste like expired chemicals must be collected by registered collectors</li> <li>• The project site is located nearby the sewer system network, hence it must be connected with it to manage the sewage</li> </ul>

Level	Institution/ Group	Views and Concerns of Stakeholders
	TIRDO	<p>The Consultants met with TIRDO officer regarding the proposed development of STI building. He had the following recommendations.</p> <ul style="list-style-type: none"> <li>• This project will be of helpful to expand COSTECH activities within the country with regards that the central government has officially shifted to Dodoma</li> <li>• The project implementation should consider installation of high tech facilities that will enable scientistis and innovators to do their work effectivery</li> <li>• The building should consider facilities for the disabled people</li> </ul>
	Fire and Rescue Force	<p>The consultant held a discussion with the Fire Insp. from Dodoma Fire officer and she had the following recommendation;</p> <ul style="list-style-type: none"> <li>• Before project commencement the project developer should prepare and submit the site layout plan, architectural drawings, cabling diagrams and Fire Protection plan to fire office for approval</li> <li>• The proposed site should have firefighting systems and other important safety requirement as per attached fire and rescue Force letter.</li> <li>• The building should be installed with sprinkler system if the building occupies more than 2000sqm and have a height of 10m-60m</li> <li>• Proponent is not allowed to start construction activities without approval from Fire and Rescue Force</li> </ul> <p><i>(See the attached Fire and Rescue force letter in list of appendices)</i></p>
District level	Dodoma City Council Office Governor's Office	<p>During the study, the consultant meets an Environmental Management Officer at Dodoma city Council. Regarding the proposed development she had the following comments:</p> <ul style="list-style-type: none"> <li>• The Proponent should be careful on liquid waste management by constructing proper drainage system and emptying septic tank once it becomes full and not to discharge into open environment.</li> <li>• Ensure Proper disposal of solid waste at appropriate disposal points.</li> <li>• Proponent should acquire all relevant and important permits before commencing the construction.</li> <li>• Adherence to environmental and safety regulations</li> <li>• Payment of government levies promptly</li> <li>• During construction, Appropriate PPE's and firefighting equipment's should be provided to workers and they must be trained and enforced to use them.</li> <li>• Regularly service and test should be done in all fire extinguishers to ensure its functioning.</li> </ul>

Level	Institution/ Group	Views and Concerns of Stakeholders
	Dodoma Urban Water Supply Authority (DUWASA)	<p>The Consultant had discussion with an Operation Engineer from DUWASA who had the following comments:</p> <ul style="list-style-type: none"> <li>• Water supply networks are good in the project site</li> <li>• Water is available in rationing basis hence the Proponent is advised to have water storage tanks to store water enough to serve all the operations in all phases</li> <li>• Proponent should ensure that all DUWASA infrastructures are well secured.</li> </ul>
Ward and Mtaa Offices	Salmini Mtaa and Tambukare li Ward	<p>The Consultant held a meeting with Mtaa executive Committee under Mtaa Chairperson, Ward Executive officer aiming to discuss the project implementation at the area and collect the committee views regarding the proposed project. During discussion, the committee had no objections regarding the project implementation and they had the following comments;</p> <ul style="list-style-type: none"> <li>• Proponent should construct a security fence in their project site</li> <li>• The proponent should provide employment opportunities to the local people during construction</li> <li>• The Proponent should ensure health and safety of the workers and the community around the project area are well protected</li> <li>• There should be good waste management practices in the project site</li> <li>• Contractor should communicate or report to the Ward and Mtaa office before commencement of the project implementation</li> <li>• The Proponent should have a good cooperation with the Mtaa and Ward Office</li> <li>• Contactor and Project proponent should participate in helping development projects in the mtaa</li> </ul>

**Table 5.3: Stakeholders Comment response table**

CONCERNS/ISSUES	RESPONSE TO STAKEHOLDERS CONCERNS
OSHA comments	Sect 6.3 C page 108
FIRE comments	Sect 6.4 B page 117
Dodoma City Council	Sect 6.3 C page 107-109 and sect 6.4 C page 117 - 118
Local officials	Sect 6.3 A & B page 100-102
DUWASA	Sect 6.3 C page 100 and page 6.4 C page 107
Ardhi University	Sect 6.3 C page 107-109 and sect 6.4 C page 117 - 118
TBA	Sect 6.3 C page 108
Tirdo	Sect 6.3 C page 107-109 and sect 6.4 C page 117 - 118

<b>CONCERNS/ISSUES</b>	<b>RESPONSE TO STAKEHOLDERS CONCERNS</b>
NIMRI	Sect 6.3 C page 108-109
Architects and Quantity Surveyors Registration Board	Sect 11.2 page 169

#### **5.4 Grievance Redress Mechanism**

A Grievance Redress Mechanism (GRM) is a formal system established to address and resolve complaints or grievances raised by stakeholders or affected groups. This is designed to provide an avenue for stakeholders or affected groups to engage with the project on issues of concern or unaddressed impacts. In order to make this aim a reality, COSTECH will develop a grievance handling mechanisms and procedures to address grievances associated with the construction of her facility.

Grievances are any complaints or suggestions about the way a project is being implemented, and they may take the form of specific complaints for damages/injury, concerns around resettlement and compensation, concerns about routine project activities, or perceived incidents or impacts

Stakeholder engagement operates as a bi-directional procedure. Thus, it is crucial to establish a feedback mechanism that allows stakeholders who are impacted by or have an interest in the proposed project to express their input (like opinions, requests, suggestions, and grievances) for review and, if necessary, seek resolution. It is important to acknowledge that not all grievances may be considered valid or applicable to the proposed project context. Nonetheless, the feedback mechanism should operate in a non-judgmental manner and document all received feedback.

The Grievance Mechanism will be communicated to the relevant parties during the project implementation. The Grievance Handling Officer (GHO) will be appointed by COSTECH for the responsibility of handling all types of grievances arising from implementation the project including work related grievances and managing the Grievance Register. Complaints shall be submitted in written or verbal form either directly by the complaint or through COSTECH staff, Contractor, City council or any other relevant government organ.

##### **5.4.1 Purpose**

A Grievance Redress Mechanism (GRM) is necessary for addressing the legitimate concerns of the project affected persons. Grievance handling mechanisms provide a formal avenue for affected groups or stakeholders to engage with the project on issues of concern or unaddressed impacts. Grievances are any complaints or suggestions about the way a project is being implemented, and they may take the form of specific complaints for damages/injury, concerns around resettlement and compensation, concerns about routine project activities, or perceived incidents or impacts.

The stakeholder engagement process will ensure that the PAPs are adequately informed of the procedure. The GRM is designed with the objective of solving disputes at the earliest possible time, which will be in the interest of all parties concerned and therefore, it implicitly discourages referring such matters to a tribunal/court for resolution.

The aim of a Grievance Mechanism document is to effectively handle complaints and grievances raised by communities and local stakeholders in equitable, fair, timely and transparent manner. Also, it fosters mutual confidence and trust by providing a platform to address stakeholder concerns, gather information about their issues, and serve as an early warning system to tackle problems before they potentially becoming more challenging and costly to resolve. It is crucial to address these grievances in a timely manner to ensure the smooth execution of the project.

### **5.4.2 Scope**

The grievance mechanism will be utilized to address complaints and grievances from stakeholders whether they perceived or actual, that are connected to the actions of the proponent and its contractors in regards to the planned construction of the office building and other associated infrastructure. A complaint or grievance refers to any matter, concern or problem (Whether they perceived or actual) that an individual stakeholder or community group has regarding of the project implementation.

### **5.4.3 Features of Grievance Redress Mechanism**

#### **a)General Grievances**

In conformity to HEET SEP, the GRM for COSTECH project has been developed entailing the following features:

- The GRM that is easily accessible to all stakeholders, including community members, project-affected people, and others who may have concerns about the project.
- The process for lodging a grievance and the steps that will be taken to address it should be clear and transparent. Stakeholders should know how their grievances will be handled, the timeline for response, and how they will be informed of the outcome.
- The GRM that shall operate fairly and impartially, ensuring that all grievances are addressed without bias.
- The GRM that ensures that all grievances are handled confidentially to protect the privacy of individuals who lodge complaints, especially in sensitive cases such as GBV/SH/SEA.
- Establishing a clear timelines for acknowledging receipt of grievances, investigating them, and providing feedback to the complainant.
- Keeping detailed records of all grievances received, the actions taken to resolve them, and the final outcomes. Regularly reporting on grievance trends and resolutions to project stakeholders as per the HEET SEP requirements.

#### **b)Workers' Grievances**

In conformity to HEET SLMP, the GRM for COSTECH project has been developed entailing the following features:

- The GRM that provide specific grievance channels for workers that are separate from those for general grievances. This could include an internal hotline, a worker representative, or a dedicated HR grievance officer.
- It clearly communicate that workers can file grievances without fear of retaliation. The LMP will likely emphasize this to encourage workers to speak out about issues such as working conditions, pay disputes, or workplace harassment.
- Outlines the steps for escalating grievances if they cannot be resolved at the initial level. This could involve moving the grievance up to higher management or seeking third-party arbitration.
- Ensuring that all workers are informed about the GRM, including how to access it, what kinds of grievances can be filed, and what the process entails. Training sessions or informational meetings can be effective.

- Making sure that the GRM complies with local labor laws and international labor standards, as likely emphasized in the HEET LMP.

#### **5.4.4 Grievance Mechanism Process or Procedures**

The responsibility of managing the grievance redress mechanism at the proposed project will rest with Project proponent, who will allocate resources to the Grievance Handling Officer for handling correspondence, facilitating internal resolutions, maintaining a record of grievances, and providing reports both internally and externally. The Grievance Handling Officer will collaborate, assist, and cooperate with other work groups to develop appropriate solutions and responses. It is crucial to follow the approval process for external communication and reporting to ensure consistency with relevant policies. The following are procedures that should be followed throughout the entire process to ensure complete resolutions of a grievance;

##### ***5.4.4.1 Receive and Register/Logging Grievance***

Every grievance will be registered using the Grievance Receipt and Resolution Form for HEET Project Affected Person (PAPs). PAPs shall file the grievance through a special e-mail established for receiving grievances, suggestion boxes, meetings or directly to the GHO who will record grievances/complaints receipt and resolution form and MoEST GHO. The GHO is responsible for reading and explaining the recorded information to the complaint to ensure accurate representation of the complaint or grievance. If a grievance is reported to someone other than the GHO, all forms must be promptly transferred to the GHO within 24 hours of receipt or as soon as practically possible.

In situations where the grievance is of an urgent nature and demands immediate action, it is important to guide the complaint to the GHO and promptly inform the Project Coordinator. Such urgent matters may include environmental concerns, safety issues, or complaints regarding human rights violations related to security. Each grievance will be assigned a unique case number, and all communication and consultations related to the grievance will be documented and securely stored. Regular monitoring of the database will enable the identification of recurring grievances, facilitating the development of suitable measures for addressing them effectively.

##### ***5.4.4.2 Acknowledging Receipt of a Grievance***

The GHO will promptly acknowledge receipt of any complaint or grievance, ensuring that is done within a maximum of 5 day from the submission date. The complaint will be informed of the expected timeframe for receiving a response. The Grievance Acknowledge the resolution form should contain a unique reference number and contact information, such as a phone number or alternative method for reaching the COSTECH. Additionally, the project commits to providing a response within a specified period which is about 2 weeks after the grievance is logged. The acknowledgement will include a summary of the grievance, details of how the proponent intends to address it, and an estimated timeframe for delivering the final response. Also, the response will either accept or refute responsibility for the grievance and next step will be the investigation and resolution or immediate actions to be taken.

##### ***5.4.4.3 Screening***

Upon receiving a grievance, it will undergo a screening process ranging from level 1 to 3, as defined in table below, to ascertain the suitable course of action. The GHO will be in charge of assigning a grievance owner who will be responsible for engaging with the external stakeholder and finding a resolution. The screening of grievances will depend on their level of severity, determining the appropriate grievance owner and approach for addressing the grievance. The grievance redress mechanisms will involve three levels which are described below;



**Table 5.4: Grievance Screening**

Level	Issue Description	Management Approach
Level 1	A grievance that is limited in scope, occurring as a single occurrence and primarily affecting a specific location and involving one person filing the complaint. Please not those certain isolated grievances, despite being singular in nature, may be deemed substantial enough to be classified as level 1 grievances, such as instances where a violation of national or international law has taken place.	Grievance Handling Officer will notify the management of COSTECH and subsequently employ authorized solutions to address and manage the response.
Level 2	A grievance that arises repeatedly within the local community or region, and is deemed to have the potential to disrupt project implementation or generate unfavourable attention from local information or other stakeholders.	Develop a plan for addressing grievances and create a response to be reviewed and approved by proponent and other relevant management.
Level 3	A grievance that is extensive and recurring, causing long-lasting harm and/or receiving unfavourable attention from local media, or is perceived to have the possibility of generating negative media on implementation and comments from local stakeholders.	Give priority to issues management, legislative and regulatory advocacy process, and establish a suitable management strategy.

**5.4.4.4 Assess and Investigating a Grievance**

The Grievance Handling Officer will conduct a thorough investigation of all submitted grievances, engaging other departments, contractor and COSTECH management as necessary to fully comprehend the circumstances that give rise to the grievance. The GHOs aims at completing investigation within two (2) weeks of the grievance first being logged and will involve the aggrieved person or people in this investigation to ensure their views are incorporated. Also, the GHO is responsible for keeping the complainant informed about the progress the progress of the review. If additional time is required to examine the grievance, the complainant will be notified in writing, along with an indication of when a resolution will be provided.

**5.4.4.5 Grievance Resolution**

Based on the findings from the investigation, the GHO will attempt to resolve the grievance through dialogue, negotiation or other appropriate means. The objective is to find a satisfactory solution that addresses the concerns raised. However, if complainant is satisfied, the GHO should seek their sign off and determine if any follow up is needed to monitor resolution implementation. Once the measures have been implemented the grievance should be closed. Also, if the grievance still stands then the GHO will initiate further investigation and determine the steps for future action. And If the PAP is not satisfied with decision of GHOs, the grievance is referred to the Grievance Redress Integrity Committee (GRIC) responds within 2 weeks' time from the submission.

**5.4.4.6 Third party appeal**

If the complainant is dissatisfied with the solution proposed by the Grievance Redress Integrity Committee (GRIC) and requires broader consultation, grievances will be referred to an impartial third party for review and final decision. The Chairman of the GRIC, in consultation with the project

coordinator, will forward the issue to the next level (third party). This third party should be neutral, respected, and agreed upon by both COSTECH and the affected parties. Potential third-party reviewers may include public defenders, District Commissioners, Regional Commissioners, Legal Advisors, local or international NGOs, or technical experts.

The third party will assess the case and determine if further reasonable actions can be taken. If all reasonable and justifiable corrective actions have been exhausted, a written notice will be provided to the complainant, formally closing their grievance. The notice may include supporting documents such as paid invoices, written agreements, photographs, emails, etc., as evidence of the resolution actions taken and adherence to the Grievance Mechanism Procedure. In cases where the complainant's address is unavailable, they may be notified by telephone or in person.

#### ***5.4.4.7 Follow up and Close Out***

Once resolutions have been approved and agreed upon by the complainant, it is the responsibility of the GHOs to promptly initiate the administrative process to redress the grievance. The details of the resolution, including the action plan, and the target timeframe for closure must be updated in the Complaint/Grievance Register. The case is considered "resolved" only when the agreed resolution has been implemented, and it then transitions to a "closed" status.

To acknowledge the receipt of the resolution, the GHOs must request the complainant to sign the form in three designated places. The complainant's signature signifies their acknowledgment of the receipt, satisfaction with the outcome (or notification of alternative escalation mechanisms if unsatisfied, with a maximum activation timeframe of 30 days), and confirmation that they have been respectfully informed about the outcome of the reviews without objections.

In situations where complainants are hesitant to sign any forms or when no forms are used, the GHOs verbally seeks feedback on the satisfaction with the process and outcome. For example, they may ask if there are any suggestions for process improvement or if the complainant is content with how the process was handled. With the consent of all parties present, this interaction can be recorded on a voice recorder.

#### ***5.4.4.8 Monitoring and Reporting***

It is important to consistently monitor and evaluate the performance of the grievance mechanism throughout the duration of the project. This monitoring aims to enhance both the system itself and the overall project. All reported grievances should be promptly recorded in the designated system, along with the corresponding target resolution dates. COSTECH will routinely monitor grievances as part of their broader project management responsibilities, maintaining comprehensive records of raised complaints throughout the project's lifecycle. Upon receiving grievances, electronic notifications must be distributed to the management team. Grievance records should be accessible to management at all times. The GHOs will compile monthly internal reports, which will be shared with the management team. These reports will include the following information:

- The number of grievances logged in the previous period, categorized by level and type.
- The number of stakeholders who have expressed dissatisfaction with the resolution after 30 days.
- The number of grievances that remain unresolved after 60 days, categorized by level and type.
- The number of grievances resolved directly between the GHOs and the complainant, without the involvement of legal or third-party mediators, categorized by level and type.
- The number of grievances concerning the same or similar issues.
- The Grievance Officer's responses to the concerns raised by various stakeholders.
- The actions taken to incorporate these responses into the project's design and implementation.

These reports, along with other relevant records, will be available for external review if necessary. A suitable grievance report should be included in COSTECH annual reporting, which will be accessible to the public. A hard copy of the report will be kept at the COSTECH office, and an electronic version will be made available online.

**5.4.4.9 Storing of Grievance**

COSTECH will securely file all records, such as grievance forms, investigation notes, interview records, and meeting minutes, to uphold the privacy and confidentiality of all parties involved.

## CHAPTER SIX

### 6 IMPACTS ASSESSMENT, MITIGATION MEASURES AND PROJECT ALTERNATIVE

#### 6.1 Introduction

Assessment of environmental, social and economic impacts in this report are conducted to help determine the acceptability of the project, and to make sure that adverse impacts are properly addressed and mitigated accordingly. The assessment process during mobilisation, construction, demobilisation, operation and decommissioning phase involves looking at:

- The environmental baseline features.
- Uniqueness of the project and project design features.
- Potential vulnerabilities and the nature.
- Location of the project, and
- Duration of activities.

Chapter seven details the suggested steps for mitigation, which COSTECH shall be implementing. The objective is to avoid or minimize the adverse effects identified. This study aims to ensure that the investments funded by this project adhere to both the World Bank Environmental Standards (ESSs) and the Government of Tanzania (GoT) legislations in an environmentally and socially responsible.

- The assessment of environmental risks and impacts encompassed several aspects: (i) adhering to the Environmental Health and Safety Guidelines (EHSs) outlined by the WB; (ii) evaluating risks concerning community safety; (iii) addressing issues linked to climate change; (iv) considering any potential threats to the preservation, conservation, maintenance, and restoration of natural habitats and biodiversity; and (v) examining the impacts on ecosystem services and the utilisation of living natural resources.
- The assessment of social risks and impacts involved: (i) identifying potential threats to human security, such as crime or violence; (ii) analyzing risks that could disproportionately affect specific individuals or groups due to their unique circumstances, making them more disadvantaged or vulnerable; and (iii) evaluating negative economic and social consequences related to the involuntary acquisition of land or restrictions on land use.

The following aspects were considered when determining the significance of identified impacts:

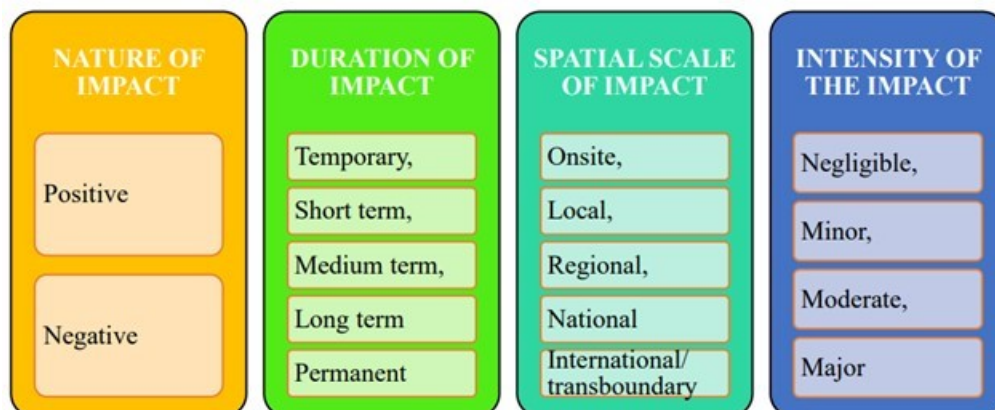


Figure 6-1: Impacts Identification (Source: Assess Consultant, 2024)

#### 6.1.1 Nature of Impact

There are two basic natures of impacts; impacts that tends to be beneficial or useful to the environment or social-economic aspects are termed as Positive Impacts and those which tends

to affect the environment or social-economic aspects in a negative way are termed as Negative Impacts.

### 6.1.2 Duration of Impact

The duration of impacts defines the timeframe by which the impact will be felt or the time by which the positive or negative impacts related to the project will continue to occur. In other writings, they are termed as temporal scale. This duration can either be short term, medium term, long Term or permanent.

## 6.2 Environmental Impact Rating Scale

In order to guarantee a fair and accurate comparison among different studies conducted by ESIA teams, a uniform assessment approach was employed to evaluate the significance of the identified impacts. The assessment of impact significance, which refers to the importance of the impact within the larger context of the affected system, was based on specific criteria.

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

The impact assessment involves analyzing of the overall effect within the surrounding environment to determine the significant of the impact. This assessment considers various factors such as social, cultural, historical, economic, political and ecological aspects. As a result, the severity or benefit of an impact is initially assessed within a specific field of expertise before evaluating its significance on a larger scale. This requires two separate rating scales, one to determine the severity or benefit and another to determine the environmental significance.

### 6.2.1 Severity/Benefit

The severity of impacts is determined by experts who use their professional judgement to assess the degree of change that negative impact would have on the existing conditions, or the level of benefits that positive impacts would bring to a specific affected system or specific affected group (Table 6.1).

**Table 6-1: Severity rating scale**

Negative Impacts	Positive Impacts
<p><b>Very severe</b> An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example, change in topography.</p>	<p><b>Very Beneficial</b> A permanent and very substantial benefit to the affected system(s) or party (ies), with no alternative to achieve this benefit. For example, the creation of a large number of long-term jobs.</p>
<p><b>Severe</b> Long-term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.</p>	<p><b>Beneficial</b> A long-term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example, an increase in the local economy.</p>
<p><b>Moderately severe</b></p>	<p><b>Moderately beneficial</b></p>

Negative Impacts	Positive Impacts
Medium- to long-term impact on the affected system(s) or party(ies), that could be mitigated. For example, constructing a narrow road with an area with low conservation value.	A medium- to long-term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising are equally difficult, expensive and time consuming (or a combination of these), as achieving them in this way.
<b>Slight</b> Medium- to short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	<b>Slightly beneficial</b> A short- to medium-term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
<b>No effect</b> The system(s) or party(ies) is not affected by the proposed development.	<b>Don't know/Can't know</b> In certain cases, it may not be possible to determine the severity of the impact.

The extent of the impacts can be assessed both with and without measures to minimize them in order to illustrate the gravity of the impact if no action is taken. The term mitigation encompasses more than just compensation and encompasses concepts of control and remedy. When it comes to positive effects, optimisation refers to any approach that can enhance those benefit. Both mitigation and optimisation should be realistic, technically feasible and economically viable.

**6.2.2 Spatial scale**

The Spatial scale defines the extent or area over which the impact will take place. Environmental Impacts due to the proposed underground transmission cables can affect the environment or social-economic aspects at Household level, Localized, at a study area, City, Regional, National or International Level. See Table 6.2.

**Table 6-2: Spatial scale**

Individual	Individuals in the area that could be affected
Households	Households in the area could be affected
Localized	A few hectares in extent (from the site). The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	Includes the entire project area.
City	Includes areas around the project includes Salmin mtaa, Tambukareli ward and nearby surroundings
Regional	The impacts will be of such a nature that it may affect the Dodoma Region.
National	The impacts will be of such a nature that it may affect the entire Tanzania.
International	The impact would affect resources and processes outside the borders of Tanzania.

**6.2.3 Temporal scale**

The temporal scale defines the times over which the impacts would continue to occur (Table 6.3).

**Table 6-3: Temporal scale Bottom of Form**

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

#### 6.2.4 Criteria and Significance Rating

The significance of the impact, considering all the assessment criteria mentioned earlier, serve as an indication of its overall importance (Table 6.4). The assessment of significance was conducted within the appropriate context, recognizing that an impact can be relevant to either the ecological environment, the social-economic environment. This can be achieved by ensuring that all ESIA team followed the mentioned objective criteria, subjectivity was minimized to the greatest extent possible. Nevertheless, it is important to acknowledge that there will always be an element of judgement involved that cannot be entirely eliminated from the assessment of significance.

The importance of an impact does not always correlate directly with its severity, even though one would anticipate a direct relationship, meaning that a severe impact would typically be considered highly significant. However, this is not always true. For instance, alterations to the geology could be significant in terms of their severity, but their significance is perceived as low because society does not consider the environmental changes to be important.

**Table 6-4: Significance of an Impacts**

Significance	Explanation
High	These impacts will usually result in long-term effects on the natural and/or social environment that will only be mitigated over very long periods of time. At times, this is not possible and it is up to the government to decide if this is acceptable when considering the benefits of the Project.
Moderate	These impacts will usually result in medium to long term effects on the natural and/or social environment. These impacts do exist but not substantial, and usually result in moderately severe effects or moderately beneficial effects. The emphasis for moderate impact is on signifying that the impact has been reduced to a level that is as low and reasonably practicable
Minor	These impacts will usually result in medium to short term effects on the natural and/or social environment. The environmental and/or social conditions will be affected, but the impact is small enough that it is unlikely to be a concern to the government, communities and organisations.
Negligible	There are no primary or secondary effects at all that are significant to scientists or the public. Also, this means that the existing environmental and social conditions will not be affected or the effect is not detectable. A negligible impact is likely to be of no concern to the government, communities and organisations.

## 6.3 Possible Potential Impacts during Mobilization and Construction Phase

### A. POSITIVE SOCIAL IMPACTS

#### ✚ Job Creation and employment opportunities

The proposed office building will significantly enhance employment opportunities for the local community through both direct and indirect job creation. During the construction phase, the project will require a range of skilled and unskilled labor, including architects, engineers, construction workers, electricians, and plumbers, thereby offering immediate employment to hundreds of individuals.

It intends to recruit a qualified contractor who will employ about 50 to 70 unskilled and semiskilled laborers from the project region and about 15 skilled laborers from outside the project area. This illustrates an indirect impact when unskilled and semiskilled labor are obtained locally, whereas skilled labor may come from a regional or even international pool. The project offers temporary employment possibilities that run the course of the mobilisation phase.

#### ✚ Enhancement measures

- Contractor should give priority to the local people in the project areas for available jobs.
- The local people should be obtained through local officials for the sustainability and security of the project.
- The contractor should provide employment based on the idea that everyone should have equal access to opportunities.
- Conduct fair and transparent recruitment processes to ensure equal opportunities for all interested individuals, promoting inclusivity and diversity. Local communities shall be encouraged to produce quality goods and services for the project.
- Implement training programs to enhance the skills of the local workforce, ensuring they acquire the necessary qualifications for available job opportunities.
- Ensure strict adherence to labor standards and regulations, providing a safe and supportive working environment for all employees.
- Both professional and unskilled laborers hired for the project should receive fair remuneration.

#### ✚ Stimulate economic growth

The construction phase of a proposed office building will significantly stimulate trade and business opportunities in several ways. Firstly, it generates immediate employment for a wide range of workers. This surge in employment increases disposable income among workers, leading to higher consumer spending in the local economy. Also, local suppliers of construction materials, tools, and equipment see a boost in demand, which can lead to expanded operations and increased orders. Ancillary businesses, such as food trucks, cafes, and convenience stores near the construction site, also benefit from the influx of workers who require meals and other services. Furthermore, the construction project will attract attention from other businesses and investors who perceive the area as developing and invest in complementary projects like retail spaces, residential developments, and infrastructure improvements. This cumulative effect not only drives short-term economic growth but also lays the groundwork for a more robust and dynamic local business environment post-construction.

#### ✚ Enhancement measures

- Purchasing materials from authorized local suppliers
- Actively involve and engage local suppliers for construction materials needed during the establishment phase.



- Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand
- Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate in supplying materials and services for the project
- Integrate environmentally sustainable practices in construction to minimize negative impacts on the local environment, ensuring long-term benefits for the community.
- Maintain open and transparent communication with local suppliers and service providers to address any concerns and ensure that they are well-informed about project developments.

#### **Increased skills and impart knowledge to local communities**

During the construction phase of the proposed office building, significant opportunities for skill enhancement and knowledge transfer to local communities will be realized. The project will engage a diverse workforce, including local laborers, contractors, and apprentices, facilitating on-the-job training and practical experience in various trades such as carpentry, plumbing, electrical work, and masonry. Construction firms often collaborate with local vocational schools and training programs, offering internships and workshops that align with the building's development needs. This hands-on experience not only enhances their technical skills but also improves their employability in future projects. Community outreach programs and site tours for students and residents will further disseminate knowledge about sustainable construction practices, safety standards, and the importance of infrastructure development, fostering a culture of continuous learning and community engagement

#### **Enhancement measures**

- Develop and implement structured training programs for both skilled and non-skilled laborers in the local communities.
- Contractor shall provide on job skills and training.
- Actively engage the local workforce in construction activities, providing hands-on experience with new equipment and technologies
- Implement capacity building initiatives to equip individuals with essential skills required for their roles in the construction process
- Establish a system for continuous monitoring and evaluation of the training programs to ensure their effectiveness
- Involve local communities in the planning and execution of skill development initiatives to ensure relevance and sustainability.
- Implement a monitoring and evaluation system to track the effectiveness of the skills transfer programs.
- Regularly assess the impact on individuals and the community to make necessary adjustments for continuous improvement.

## **B. NEGATIVE SOCIAL IMPACTS**

### **Increased traffic and congestion**

The construction of a proposed office building will increase traffic and congestion in the surrounding area due to several factors. Firstly, the influx of construction vehicles, including trucks delivering materials, heavy machinery, and worker transport, will create additional demand on local roads. These vehicles often operate during peak hours, exacerbating existing traffic issues. Secondly, road closures and lane reductions necessary for construction activities can bottleneck traffic flow, leading to delays and rerouting. Also, the presence of construction workers commuting to and from the site daily adds to the vehicular load. Furthermore, construction sites typically

require temporary parking and staging areas, which shall reduce available public parking and hinder normal traffic patterns. The combined effect of these elements disrupts the regular traffic equilibrium, leading to heightened congestion and longer travels times for other road users.

### **Mitigation measures**

- Develop a comprehensive traffic management plan in collaboration with local authorities. This plan should include designated routes for construction vehicles to avoid peak traffic times and minimize disruption to main thoroughfares.
- Transportation of construction materials during off-peak hours to reduce the overlap with regular commuter traffic. Early morning, evening, and weekend work can be considered to lessen the impact on daily traffic flow
- The contractor should install temporary traffic signals and clear signage to guide motorists and pedestrians safely around the construction site. This can help in managing the altered traffic patterns and prevent confusion
- The contractor should Work closely with local traffic enforcement to monitor and manage traffic conditions, ensuring that any arising issues are promptly addressed.

### **Community Disruption**

The construction of a proposed office building is likely to cause significant community disruption and alter local dynamics in various ways. During the construction phase, noise pollution from machinery and construction activities shall disturb the peace, affecting nearby people which is the commission of ethics staff where their building is very close to the project site. The influx of construction workers and heavy vehicles will lead to increased traffic congestion, potentially causing delays and inconvenience for daily commuters. The dust and debris that will be generated shall pose health risks and affect air quality, particularly for vulnerable populations like elderly due to the nature of the project site. The overall aesthetic and usability of the area will be temporarily compromised, affecting the community's daily routines and overall quality of life

### **Mitigation measures**

- Utilizing quieter machinery, scheduling construction activities during less disruptive hours, and installing noise barriers around the site to reduce the impact on nearby community
- Developing a comprehensive traffic management plan that includes clear signage, implementing off-peak deliveries and staggered work schedules can also help minimize congestion.
- Employing dust suppression techniques such as water spraying, covering construction materials, and installing dust screens around the site
- Establish a clear and consistent communication channel with the community mostly neighbors
- Ensuring the construction site is well-maintained, with clear signage and barriers to prevent accidents. Regularly clean surrounding areas to minimize debris and maintain a tidy appearance.

### **Conflicts and grievances**

Conflicts and grievances that may emerge may be because of construction workers persuading married women, students and school children, and others may be construction related like, dust, flying stones among others. This will be between construction workers against the community/local people. Lack of proper channels to handle grievances from the different

stakeholders may cause delays to project activities and thus increase the cost of the project. This impact is considered to be local, negative, short-term, and of minor significance.

### **Mitigation measures**

- Conduct workshops and awareness programs for construction workers on cultural norms and local sensitivities, emphasizing respectful behavior towards married women and school children.
- Implement a structured grievance resolution mechanism that allows local community members to express concerns related to construction activities. This mechanism should ensure prompt and fair resolution of issues
- Organize regular meetings between construction project representatives and the local community to discuss ongoing activities, address concerns, and foster open communication
- Appoint a dedicated community liaison officer who serves as a point of contact between the construction team and the local community, facilitating communication and addressing grievances promptly.
- Ensure timely and transparent communication about the construction schedule, potential disruptions, and any necessary adjustments to minimize surprises and conflicts
- Implement regular monitoring of construction activities to ensure adherence to guidelines and regulations, with penalties for non-compliance, thereby promoting responsible conduct among construction workers.

### **✚ Impact on gender during employment**

Women and girls available locally from the project area are the main target who are more likely to bear then direct cost of gender inequalities during employment opportunities. They are likely to be lowly favored in employment opportunities, likelihood of sexual harassments especially from male supervisors and decision makers. Acts of sexual assault harassment may include unwelcome sexual touching, sexually suggestive or degrading remarks and sexually explicit or abusive language, rape or defilement among others. This kind of behavior may cause psychological torture to the victims that may lead to permanent damage to their self-esteem. In addition, it may lead to early pregnancies for young girls, increased school dropouts and sexually transmitted diseases. This impact is considered to be local, negative, long-term, and of major significance.

### **Mitigation measures**

- Conduct awareness programs for all project stakeholders, including workers, community members, and decision-makers, emphasizing the importance of gender equality and discouraging discriminatory practices.
- This project will ensure that there is involvement of women in project activities.
- Provide specific training sessions for project staff on recognizing and addressing gender biases. This includes promoting fair treatment and equal opportunities for both men and women.
- Implement transparent and inclusive hiring practices that ensure equal opportunities for men and women in employment and project-related activities.

### **✚ Spread of diseases**

During the construction several factors shall contribute to the spread of diseases. A large number of workers, subcontractors, and vendors coming into close contact with one another, shall create opportunities for the transmission of pathogens. Workers may not always adhere strictly to hygiene protocols due to the physically demanding nature of their work and the lack of convenient facilities. Also, construction activities such as excavation, demolition, and drilling can

generate dust, aerosols, and particulate matter that may contain harmful microorganisms or irritants. These airborne particles can easily spread throughout the site and beyond, potentially affecting nearby communities. Shared tools, equipment, and facilities like portable toilets and eating areas increase the likelihood of surface transmission of pathogens among workers. Overall, the dynamic and densely populated environment of a construction site, coupled with the lack of proper sanitation measures, makes it conducive to the spread of diseases during the construction phase of an office building.

If there's a lack of education and awareness about HIV/AIDS prevention among the workforce, the risk of transmission can further increase

### **Mitigation measures**

- Several enhancement measures can be implemented to mitigate the spread of diseases, including HIV/AIDS, during the construction phase of an office building. A strict adherence to safety protocols, including the use of personal protective equipment (PPE) such as gloves and safety glasses, can minimize the risk of accidental injuries and exposure to contaminated materials.
- Providing comprehensive training on infection control and proper handling of hazardous materials is crucial to ensure that workers are aware of the risks and know how to protect themselves. Moreover, ensuring adequate access to clean water, sanitation facilities, and hygiene resources on construction sites can promote good hygiene practices and reduce the risk of disease transmission.
- Implementing regular health screenings and access to healthcare services for workers can help detect and manage infections early, preventing their spread. Also, promoting education and awareness campaigns on HIV/AIDS prevention, including safe sex practices and the importance of regular testing, can empower workers to make informed decisions about their health.
- Collaborating with local healthcare providers and organizations specializing in public health can also provide valuable support in implementing these measures effectively. By prioritizing the health and safety of workers and implementing comprehensive prevention strategies, the construction phase of an office building can be conducted in a way that minimizes the risk of disease transmission, including HIV/AIDS.

### **🚧 Insecurity and theft**

It is expected that there will be insecurity and theft situations that are anticipated from the influx of new people and even locals that comes with all sorts of vices including stealing project materials and equipment. Theft in the long run may compromise the quality of work or delay the project or increase in project cost. This impact will be felt at the project site and even at the area. This impact is considered to be local, negative, short-term, and of major significance.

### **Mitigation measures**

- Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security.
- Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents
- Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site.
- Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft.

- Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft.
- Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use.
- Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure.

#### **Child labor**

There is a risk that some project-related activities could involve employment of children in project activities hence depriving them of their childhood and that is mentally, physically, socially or morally dangerous and harmful. The Labour Management Plan should be adhered to, whereas it prohibit engagement of children under the age of 18 in project activities.. This impact is minor, localized and will be short term.

#### **Mitigation measures**

- Ensuring strict implementation of existing child labor laws and regulations. Introduce more stringent penalties for violations
- Increase the frequency and rigor of inspections at construction site to detect and deter child labor practices
- Mandate that construction contractor adhere to child labor regulations as part of their contract requirements.
- Provide training for workers on child labor laws and the importance of protecting children's rights

#### **Gender Based Violence, Sexual Harassment and Sexual Exploitation & Abuse due to Labour Influx**

Influx of workers at the project area might increase the risk of GBV, SH, and SEA in the project area. This could affect local communities, especially women and children. This impact will be felt at the project site and even at the area. This impact is considered to be local, negative, short-term, and of major significance

#### **Mitigation measures**

- Ensuring all workers sign a code of conduct that prohibits GBV, SH, and SEA. This code should be enforced strictly, with clear consequences for violations.
- Providing mandatory training on GBV/SH/SEA for all workers and management staff. This should include understanding what constitutes GBV/SH/SEA, reporting mechanisms, and the importance of respecting local cultures.
- Establishing confidential and accessible reporting systems for victims of GBV/SH/SEA. Ensure that these systems are well-publicized within the community and among workers.
- Engaging local communities in discussions about the risks of GBV/SH/SEA and the measures being taken to protect them. This could include community meetings, workshops, and distributing informational materials.
- Regularly monitoring GBV/SH/SEA risks and the effectiveness of mitigation measures. Include GBV/SH/SEA considerations in the project's grievance redress mechanism.
- Collaborating with local NGOs or community organizations that specialize in GBV/SH/SEA prevention and response. They can offer additional support and resources.

### **C. NEGATIVE ENVIRONMENTAL IMPACTS DURING CONSTRUCTION PHASE**

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

#### **✚ Impairment of air quality due to dust and ambient pollutant gases emission**

Several construction activities shall contribute to the pollution of ambient air quality, both through the release of dust and pollutant gases. Excavation and earthmoving activities disturb the soil, releasing fine particles into the air which can remain suspended for extended periods. Construction machinery such as bulldozers, diesel generator, excavators, and trucks emit exhaust fumes containing pollutants like nitrogen oxides (NOx) and particulate matter (PM), which contributes to smog formation and respiratory issues. Also, the use of construction materials such as concrete, paints, adhesives, and sealants emits volatile organic compounds (VOCs) and other harmful chemicals during application and curing processes. Without adequate dust control measures and emission mitigation strategies, these activities collectively degrade ambient air quality, posing health risks to both construction workers and nearby community. This impact is moderate, localized and will be short term.

#### **Mitigation measures**

- Implementing measures such as water spraying, dust screens, and barriers shall help to suppress dust emissions from activities like excavation and earthmoving.
- Utilizing construction equipment with advanced emission control systems, such as diesel particulate filters and selective catalytic reduction technology, can significantly reduce the release of pollutants from machinery exhaust
- Ensuring proper handling and disposal of construction waste are crucial to prevent their release into the air. Segregating and recycling materials wherever possible shall reduce the need for new resource extraction and associated pollution.
- Exploring alternative materials with lower emissions profiles, such as low-VOC paints, eco-friendly adhesives, and sustainable construction materials like recycled steel shall help minimize the emission of harmful pollutants
- Ensuring regular maintenance of construction machinery and equipment can optimize their performance and reduce emissions. Also conducting periodic inspections for leaks and proper functioning of emission control systems is essential for compliance with environmental regulations.
- Keeping nearby community informed about construction activities, potential air quality impacts, and mitigation measures shall foster understanding and cooperation. Establishing channels for community feedback can also help address concerns promptly.
- Establish a monitoring system to regularly assess air quality during construction, ensuring that concentrations of PM2.5 and PM10 remain within acceptable limits.

#### **✚ Increased Noise level**

Measurements done in different locations around the proposed project sites and the nearby community area indicated that the permissible within WHO limits and Tanzania Standard limits (TSS) guidelines. However, during construction works, Several factors inherent to the construction process. Initially, site preparation activities, such as land clearing and excavation, will involve the use of heavy machinery like bulldozers, excavators, and dump trucks, all of which generate significant noise. As construction progresses, the use of pneumatic tools, cranes, and concrete mixers adds to the noise pollution. There will be continuous movement of construction vehicles

transporting materials to and from the site, contributing to increased traffic noise. Construction activities such as steel framework erection, interior work with power tools, and installation of mechanical systems also produce high decibel levels. These noises shall be occurring over extended hours and spanning many months, will disrupt the daily life of nearby community, potentially affecting communication, productivity, and overall well-being due to the consistent and intrusive auditory disturbances. The impact of the project on noise level generation short-term, local and moderate.

### **Mitigation measures**

- Ensuring that all construction equipment's are well-maintained and fitted with noise-reducing features such as mufflers and silencers can lower the noise output. Using newer, quieter models of machinery can also contribute to noise reduction.
- Regular noise monitoring shall help keep track of noise levels and ensure they remain within acceptable limits. This allows for timely adjustments to construction practices if noise levels exceed regulatory standards.
- Keeping the neighbors informed about the construction schedule, expected noise levels, and duration of noisy activities will help manage expectations and reduce frustration. Providing a point of contact for noise complaints shall also facilitate better community relations.
- Training construction workers on noise control measures and the importance of minimizing noise shall ensure that best practices are followed consistently on the site.
- Provision of appropriate PPE's to all workers working in high noisy areas

### **✚ Increased runoff due to the removal of vegetation and soil disturbance.**

The proposed construction will significantly increase runoff due to the removal of vegetation and the disturbance of soil within the project area. Vegetation plays a crucial role in absorbing rainwater and reducing surface runoff. The onsite shrubs and grasses intercept precipitation, promote infiltration, and anchor the soil, which helps to retain water and reduce its flow over the surface. When these plants are removed, the soil will be exposed and loses its natural structure, leading to compaction and decreased permeability. This compaction prevents water from infiltrating into the ground, resulting in more surface runoff. Also, the construction activities will often involve grading and leveling of the land, further disrupting the soil and its ability to absorb water. The disturbed soil will loose and without vegetative cover, is more prone to erosion, which can clog nearby waterways with sediment and exacerbate flooding issues. Collectively, these changes contribute to an increased volume and speed of runoff, heightening the risk of flooding and the potential for water pollution downstream.

### **Mitigation measures**

- Developing and implementing a comprehensive storm water management plan that includes these and other best management practices it will help ensures that runoff is effectively controlled throughout the construction and post-construction phases. Regular maintenance and monitoring of these systems are essential to ensure their long-term effectiveness.
- During construction, using silt fences, erosion control mats, and sediment basins will minimize soil erosion and prevent sediment-laden runoff from reaching nearby waterways. These measures will help to stabilize exposed soil and reduce the impact of construction activities on the surrounding environment
- Using permeable or porous paving materials for parking lots and walkways will allow water to infiltrate through the surface, reducing runoff and promoting natural groundwater recharge.

- After construction, revegetating disturbed areas with native plants and trees shall help to restore the site's natural ability to manage storm water. This will help to re-establish the ecological functions of the area, reducing runoff and improving soil stability.

### **Generations of Solid Wastes**

The proposed construction of an office building will lead to the generation of both hazardous and non-hazardous solid waste within the project area. Non-hazardous waste, such as concrete debris, wood scraps, metal cuttings, and packaging materials as well as food waste, will accumulate from the various stages of construction activities. Hazardous waste will include substances like solvents, adhesives, paints, and chemical cleaners. If these wastes are not effectively managed, they can significantly impact the environment. Non-hazardous waste can clog drainage systems, leading to localized flooding, and can disrupt local ecosystems when debris encroaches on natural habitats. Hazardous waste poses even more severe risks; chemicals can leach into the soil and groundwater, causing contamination that affects both human health and wildlife. Improper disposal of such materials can result in the release of toxic fumes and contribute to air pollution. This impact is considered to be local, negative, short term and high significance.

#### **Mitigation measures**

- Contractor shall provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site.
- Implement a comprehensive waste segregation system to separate recyclable materials from hazardous and non-biodegradable waste.
- Adhere to proper disposal methods for hazardous substances and materials, following established guidelines and regulations.
- Employ certified waste disposal services to ensure safe handling of hazardous waste
- A special focus on waste minimization will be made in order to cut down on the amount of solid waste generated during site preparation and construction.
- Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.
- Develop a detailed waste management plan that outlines proper disposal methods, recycling procedures, and strategies for reducing waste generation.
- Ensure adherence to the waste management plan throughout the construction and operational phases
- Conduct training sessions for construction and operational staff on proper waste handling, segregation, and disposal practices.
- Unusable construction trash, including broken pipes, formwork, and other building supplies, will be disposed at a designated area.
- Ensuring no waste is discharged to the open/natural environment

### **Generations of Liquid Wastes**

The proposed construction of an office building will generate significant liquid waste, including both hazardous and non-hazardous types. Hazardous liquid waste, such as waste oils from construction machinery, hydraulic fluids, and other chemical solvents, can seep into the soil and contaminate groundwater if not properly contained and disposed of. Non-hazardous liquid waste, primarily sewage from temporary sanitation facilities for construction workers, poses risks of bacterial contamination and nutrient loading in nearby water bodies. Improper management of these wastes, such as insufficient containment systems or leaks from storage tanks, can lead to the infiltration of pollutants into the soil and waterways. This pollution may disrupt local



ecosystems, harm wildlife, and pose health risks to nearby communities through the contamination of drinking water sources and the spread of waterborne diseases.

### **Mitigation measures**

- Enforce and adhere to best practices in waste management to ensure that all liquid wastes are handled and disposed of in an environmentally responsible manner, minimizing health risks and pollution
- Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.
- Establish a monitoring system to regularly assess the effectiveness of waste management practices during construction. Enforce strict compliance measures to ensure that all generated liquid wastes are treated and disposed of according to established standards.
- Develop and implement an emergency response plan to address any unforeseen incidents or spills during the construction phase, minimizing the potential for long-term environmental damage.
- Regular maintenances of machinery to avoid leaks and spillages
- Provision of appropriate mobile toilets or temporary toilets
- Ensuring no waste is discharged to the open/natural environment.

### **Occupational health hazards**

The proposed construction of an office building shall significantly increase the risk of occupational health hazards for workers if proper safety measures will not be implemented. During the construction phase, workers shall be exposed to various hazards, such as falls from heights, which remain the leading cause of fatalities in the construction industry. Inadequate scaffolding, unguarded edges, and unsecured ladders exacerbate this risk. Workers may encounter hazardous materials which shall lead to serious respiratory issues and long-term health problems such as silicosis or lung cancer. Without the proper use of personal protective equipment (PPE) and effective dust control measures, these risks are heightened. Noise pollution from heavy machinery shall result in hearing loss if ear protection is not provided. Electrocution risks also loom largely due to potential contact with live wires if electrical systems are not appropriately managed and isolated. Furthermore, ergonomic hazards from repetitive motion, heavy lifting, and awkward postures can lead to musculoskeletal disorders.

### **Mitigation measures**

- Installing guardrails, safety nets, and personal fall arrest systems. Ensuring scaffolding is properly erected and inspected regularly. Use ladders safely and secure them to prevent slips.
- Identifying and managing hazardous materials through proper labeling, storage, and disposal procedures. Implement dust control methods such as wet cutting and local exhaust ventilation. Providing workers with appropriate PPE like respirators and protective clothing.
- Supply and enforce the use of PPE, including hard hats, safety glasses, gloves, ear protection, and high-visibility clothing. Regularly inspect and replace damaged PPE.
- Implement noise control measures such as using quieter machinery, maintaining equipment to reduce noise levels, and providing ear protection. Conduct regular noise assessments to ensure compliance with permissible exposure limits.
- Ensure that all electrical systems are installed and maintained according to standards. Use ground fault circuit interrupters (GFCIs) and ensure that electrical tools and equipment are properly grounded. Train workers on electrical safety practices.

- Educate workers on proper lifting techniques and provide mechanical aids like hoists and dollies to reduce strain. Design workstations to promote neutral postures and minimize repetitive motion.
  - Conduct comprehensive training programs on recognizing and avoiding job site hazards. Provide regular refresher courses and updates on new safety protocols and equipment.
  - Implement regular health screenings and medical check-ups to identify and address health issues early. Monitor workers for signs of overexposure to hazardous substances.
  - Develop and enforce a comprehensive site safety plan, including emergency response procedures. Assign safety officers to monitor compliance and address hazards promptly.
  - Foster open communication between workers and management regarding safety concerns. Use clear signage and warnings to indicate hazards and ensure that all workers understand the safety protocols
- **Risk of surface and ground water pollution/contamination**

During the construction phase, activities such as land clearing, excavation, and the movement of heavy machinery shall lead to soil erosion and sediment runoff, which might carry pollutants like oils, heavy metals, and construction debris into nearby water bodies. The use of hazardous substances such as paints, solvents, and concrete additives may leach into the ground and contaminate groundwater sources. Improper waste disposal and inadequate management of construction materials can exacerbate this issue, leading to an increased concentration of harmful chemicals in both surface water and groundwater. If stormwater management systems are not effectively designed and maintained, rainwater can wash these pollutants into storm drains and natural waterways, further spreading contamination. Consequently, without stringent erosion control measures, proper waste management, and effective stormwater management practices, the construction project could result in significant environmental degradation, affecting water quality and potentially harming aquatic ecosystems and human health.

### **Mitigation measures**

- Utilize silt fences, sediment basins, and erosion control blankets to minimize soil erosion and capture sediment before it can enter water bodies. Stabilize exposed soil surfaces with vegetation, mulch, or geotextiles to reduce erosion.
- Design and install effective stormwater management systems to control runoff and promote infiltration. Implementing rain gardens and permeable pavements can also help manage stormwater and reduce pollutant loads.
- Store and handle hazardous materials such as fuels, paints, and solvents in designated areas with secondary containment to prevent spills and leaks. Ensure proper labeling, storage, and disposal of hazardous materials in compliance with local regulations.
- Establish a comprehensive waste management plan that includes the segregation, recycling, and proper disposal of construction waste. Provide designated waste disposal areas and regularly remove waste to prevent accumulation and potential contamination.
- Immediately stabilize disturbed areas with vegetation or other ground cover materials as soon as construction activities allow. This reduces the risk of erosion and sediment transport.
- Develop and implement a spill prevention and response plan, including training for construction personnel. Equip the site with spill kits and ensure that workers know how to respond promptly to contain and clean up spills.

- Conduct regular water quality monitoring of nearby surface water and groundwater to detect any signs of contamination early. This allows for timely implementation of corrective measures if pollution is detected.

#### **Loss of vegetation**

Even in urban environments, construction projects can significantly impact local biodiversity if adequate precautions aren't taken. The proposed construction of an office building, while seemingly contained within an urban area, still poses risks to nearby ecosystems. Excavation and clearing of the construction site will disturb the onsite vegetations and soil and disrupt habitats, potentially displacing or harming local flora and fauna. Also, the use of heavy machinery, construction materials, and chemicals will introduce pollutants into the surrounding environment, affecting air and water quality. Even minor disturbances can disrupt the delicate balance of urban ecosystems, leading to the decline or displacement of species that depend on them for survival. Without appropriate measures such as habitat restoration, green building practices, and sustainable construction techniques, the project could contribute to the loss of biodiversity in the area, undermining the ecological integrity of the urban landscape.

#### **Mitigation measures**

- Identify and protect any existing habitats, within or adjacent to the construction site. Implement measures to restore any disturbed habitats after construction is complete.
- Incorporate green building techniques into the design and construction of the office building, such as using sustainable materials, maximizing energy efficiency, and installing green roofs or walls to provide additional habitat for wildlife.
- Implement measures to minimize soil disturbance, erosion, and sedimentation during construction activities. Use silt fences, erosion control blankets, and sediment traps to prevent soil runoff into nearby water bodies.
- Utilize native plant species in landscaping around the office building to create wildlife-friendly habitats and support local biodiversity. Native plants are adapted to the local climate and soil conditions, making them more resilient and beneficial to local wildlife.
- Minimize light pollution and noise disturbance from construction activities, as these can disrupt the behavior and habitats of nocturnal species such as bats and certain bird species.
- Implement stormwater management practices, such as permeable pavement, rain gardens, and retention ponds, to reduce runoff and filter pollutants before they enter local waterways.
- Conduct regular environmental monitoring before, during, and after construction to assess the impact on local biodiversity and adjust mitigation measures as needed.

#### **Impact on natural resource (Increased energy and water consumption)**

The project construction and operation will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability as discussed in number of impacts at this section, price and sustainability. In this regard, there will be need to use electricity sparingly since high consumption of electricity influences negative effects to natural resources and their sustainability. This impact is therefore considered to be negative, cumulative and of short-term duration and of moderate significance.

The construction activities will require a large amount of water per day from DUWASA. Water will mainly be used for concrete mixing, curing sanitary and washing purposes. Excessive water use may have negative impact on water sources and their sustainability. This impact considered negative, cumulative and of short-term duration and of minor significance.

### **Mitigation measures**

- Firstly, for the use of fossil fuels, efforts should focus on minimizing consumption through the use of energy-efficient transport vehicles and construction machinery. Where feasible, alternative fuels such as electric-powered equipment should be considered to reduce reliance on diesel.
- Implementing a strict monitoring and maintenance regime can optimize fuel efficiency.
- To address electricity consumption, measures such as utilizing energy-efficient lighting and equipment, implementing smart building technologies for automated energy management, and promoting awareness among workers to minimize wastage can significantly reduce electricity use.
- Regarding water usage, implementing water-saving technologies and practices such as recycling water for non-potable uses, optimizing concrete mixing processes to reduce water demand, and ensuring proper wastewater management can mitigate the project's impact on water resources.
- Regular monitoring and reporting on fuel and water usage can also aid in identifying areas for further improvement throughout the project lifecycle.

### **Impact on climate change**

Construction activities will lead to emissions emanated from fuel powered equipment i.e., vehicles engines and construction equipment etc. Exhaust contains pollutants notably carbon dioxide (CO<sub>2</sub>) plus small quantities of noxious gases such as nitrogen oxides (NO<sub>x</sub>), sulphur dioxides (SO<sub>x</sub>), hydrocarbons and particulate matters (PM). These Green House Gases (GHGs) are known to interfere with temperature system and cause climate change effects. The impact is considered to be local, negative, short-term duration and of minor significance.

### **Mitigation measures**

- Implement the use of renewable and cleaner energy sources for construction equipment to minimize the emission of greenhouse gases. This could involve using electric or hybrid machinery powered by sustainable energy.
- Install and enforce the use of emission control technologies on fuel-powered equipment to reduce the release of carbon dioxide and noxious gases into the atmosphere during construction activities.
- Optimize construction practices to minimize the overall carbon footprint, such as efficient waste management, recycling of materials, and reducing energy-intensive processes where possible
- Adhere to green building standards and certifications that promote environmentally friendly construction practices. This includes designing and constructing buildings that are energy-efficient and have minimal environmental impact.
- Implement a robust monitoring system to track and report greenhouse gas emissions during construction. This will help in identifying areas for improvement and ensuring compliance with emission reduction measures.
- Ensure strict adherence to local environmental regulations and standards governing construction activities. Regular inspections and enforcement measures can help prevent excessive emissions and promote responsible construction practices.

- Plan for post-construction rehabilitation efforts to offset any environmental impact caused during the construction phase. This could involve planting trees, restoring natural habitats, or other measures to enhance the local environment.

#### **Increased vibration**

Construction activity can result in varying degrees of ground vibration, depending on equipment and Method Employed. Vibration will be produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual construction work. The Construction activities that typically generate the most severe vibrations are blasting and impact pile driving for foundation. Due to an increase in activities and number of operational vehicles, the impacts vibration will cause disturbance to neighbours and physical damage to properties near the construction site. This impact is moderate, localized and will be short term.

#### **Mitigation measures**

- Explore and implement advanced construction techniques that minimize vibrations. This may include the use of specialized equipment designed to reduce ground vibrations during activities like blasting and impact pile driving.
- Establish effective communication channels with the local community to provide timely information about construction schedules and activities that may cause vibrations. This helps residents to take necessary precautions and prepares them for potential disruptions.
- Install vibration monitoring devices in key locations to continuously monitor ground vibrations during construction. This real-time data can be used to assess the impact and adjust construction methods accordingly to stay within acceptable limits
- Modify construction methods to minimize vibration generation. For example, consider alternative pile driving techniques or adjust blasting procedures to reduce the intensity of vibrations.
- Foster an open dialogue with the local community to address concerns and gather feedback. This engagement can help in refining mitigation measures based on community input and building a collaborative approach to managing the impact.

#### **Loss of Visual Aesthetics**

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

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

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

#### **Mitigation measures**

- All structures should adhere to set standards in terms of quality, shapes, height, color etc.
- Integrate landscaping initiatives and create green spaces within and around the project site. Planting trees and maintaining natural elements will help preserve the visual appeal and soften the urbanized look.

- Implement visual barriers such as construction fences, temporary screens, or artistic panels to shield construction activities from direct view. This will minimize the visual intrusion experienced by residents.
- Enforce strict construction schedules to limit noisy and visually disruptive activities to specific hours, reducing the impact on the community during peak times.
- Foster open communication with the local community to gather feedback and address concerns related to visual changes. This involvement can help tailor mitigation efforts to meet community expectations.
- If nighttime construction is necessary, use low-impact lighting to minimize light pollution. Shielding and directing lights away from residential areas will preserve the night sky's visual quality.
- Develop comprehensive plans for the post-construction period, including the restoration of altered landscapes. This may involve replanting native vegetation and restoring natural features to enhance the visual aesthetics.

#### 6.4 Possible Potential Impacts during Operations Phase

During operation phase there are number of effects, these impacts will affect the natural environment of the vicinity as described below:

##### A. POSITIVE SOCIAL IMPACT

###### ✚ Employment Opportunities:

The presence of the STI Complex will create job opportunities directly within the institution and indirectly through associated services like maintenance, catering, and security and cleanliness.

###### ✚ Enhancement measures

- Give priority to locals on non technical jobs
- Develop good communication with local officials

###### ✚ Regional economic boost

The presence of STI Complex shall attract professionals and researchers from other regions, stimulating local businesses such as restaurants, hotels, and retail shops.

###### ✚ Knowledge Exchange:

Collaboration between the COSTECH, HLI, R&Ds Institutions and industries shall foster knowledge exchange, innovation, and technology transfer, leading to advancements in various fields.

###### ✚ Enhancement measures

- Implement skill development programs and training initiatives
- Foster partnerships with HLI, R&Ds Institutions and industries

###### ✚ Community Engagement:

COSTECH is organizing public events, lectures, and workshops, promoting education and awareness in scientific fields and engaging the community in research and innovation activities.

###### ✚ Enhancement measures

- Offer training programs and workshops to to enhance their skills and make them more employable in the growing market.
- Collaborate with training institutions to provide specialized training in areas related to the services and goods in demand

###### ✚ Government Revenue Collection and Economic Growth

Different governmental regulatory authorities such as National Environmental Management Committee (NEMC), Tanzania Electricity Supply Company (TANESCO), FIRE and Rescue Force, and OSHA will benefit from the collection of revenues from the proposed project. The collected amount of money is used to develop the national economy and improving the living standard of people.

#### **Enhancement measures**

- The project will allocate a portion of its generated revenue to various governmental regulatory authorities such as the NEMC, DUWASA, TANESCO, FIRE and Rescue Force, and OSHA. This financial support will enable these authorities to carry out their functions effectively and contribute to overall regional development.
- Local authorities should identify the new sources of revenue in the area.
- Strengthening revenue collection mechanisms.
- Awareness creation for the people in the area on the importance of paying revenues.

### **B. NEGATIVE SOCIAL IMPACTS**

#### **Increased incidences of diseases and ill health**

The existence of an office building at the area may contribute to an increase in diseases, including HIV/AIDS, through several indirect mechanisms. First, the influx of workers into the area shall lead to increase of greater risky behavior such as unprotected sex or substance abuse, which can facilitate the spread of HIV/AIDS. Moreover, the issue of inadequate sanitation shall led to diseases, exacerbating existing health challenges within the community. This impact is medium, local and will be long term.

#### **Mitigation measures**

- Implement public health education campaigns should be implemented to raise awareness about the transmission routes and prevention methods of HIV/AIDS and other infectious diseases.
  - Ensure proper ventilation systems are in place to circulate fresh air throughout the building, reducing the concentration of airborne contaminants and preventing the spread of airborne diseases.
  - Implement strict cleaning protocols to maintain cleanliness and hygiene within the building, including regular disinfection of frequently touched surfaces such as doorknobs, desks, and bathrooms.
  - Develop and enforce health and safety policies that promote personal hygiene practices such as handwashing, respiratory etiquette (covering coughs and sneezes), and staying home when sick.
  - Implement measures to reduce overcrowding within the building, such as staggered work schedules, telecommuting options, or rotating shifts, to minimize the risk of disease transmission in crowded areas.
  - Consider implementing health screenings for employees and visitors entering the building, including temperature checks and symptom screenings, to identify and prevent the spread of contagious illnesses.
  - Promotion of Vaccination: Encourage vaccination among employees to protect against vaccine-preventable diseases such as influenza, measles, and COVID-19, if applicable.
  - Ensure proper waste management practices are in place to prevent the accumulation of waste materials that could harbor disease-causing organisms and attract pests.
  - Provide education and training to employees on disease prevention measures, recognizing symptoms of common illnesses, and the importance of seeking medical attention when necessary.

- Ensure employees have access to healthcare services and encourage them to seek medical attention promptly if they develop symptoms of illness.
- Increased pressure on social services and utilities

#### **Increased demand for utilities**

The project will increase the demand for essential utilities such as water and electricity due to various operational needs. The building will typically accommodate numerous staff members and equipment, including computers, lighting, and HVAC systems, leading to heightened electricity consumption. The increased human presence necessitates water for sanitation facilities, drinking, and potentially landscaping purposes. Consequently, the concentration of activities within the office building may strain local infrastructure, prompting authorities to enhance utility provisions to meet the heightened demand, or potentially prompting upgrades to existing infrastructure to accommodate the increased usage. This impact is high, local and will be medium term.

#### **Mitigation measures**

- Implementing energy-efficient technologies within the building, such as LED lighting and energy-efficient appliances, can reduce electricity demand.
- Water-saving fixtures and practices, such as low-flow toilets and faucets, can help conserve water usage.
- Conducting regular audits to identify areas of inefficiency and implementing conservation measures can further reduce resource consumption.
- Collaborating with local utility providers to assess and potentially upgrade infrastructure capacity can ensure sufficient water and electricity supply to meet the building's needs.
- Promoting employee awareness and engagement through education and training on sustainable practices can foster a culture of conservation within the office.

#### **Disruption of traffic flow**

The existence of a government office building in a specific area can contribute to traffic congestion due to increased vehicular movement from employees, visitors, and service vehicles especially during peak hours as people commute to work or visit the office for various purposes

#### **Mitigation measures**

- Constructing designated parking spaces with adequate capacity that can accommodate vehicles efficiently and avoid on-street parking, which often exacerbates traffic congestion

#### **Health and safety risks due to fire hazards**

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

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

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



**Table 6.7: Health and Safety Hazards and associated risks**

Category	Type of Hazard	Associated risk
Physical Hazard	Fire and electrical	Loss of properties, injuries and death
	Noise and Vibration	Loss of hearing and body discomfort
	Moving parts/Mechanical	Injuries and death
	Slippery	Injuries and death
Chemical Hazard	Liquid, vapor and solvents	<ul style="list-style-type: none"> <li>○ Respiratory diseases</li> <li>○ Damage of lungs</li> <li>○ Injuries and death</li> </ul>
	Fumes and gases	
	Acids	
Biological Hazard	Microorganisms	<ul style="list-style-type: none"> <li>○ Skin irritations</li> <li>○ Allergies</li> <li>○ Infections</li> </ul>
	Virus, Fungus and bacteria	
	Insects and parasites	
Ergonomic Hazard	Manual Handling	<ul style="list-style-type: none"> <li>○ Awkward postures</li> <li>○ Back pain</li> <li>○ Eye strain</li> <li>○ Fatigue and stress</li> </ul>
	Repetitive movements	
	Lifting	
	Sitting Positions	
Psychological Hazard	Overwork and tiredness	Health effect on human body
	Abuse and Harassments	Mental illness
	Discrimination	Mental illness

**Mitigation measures**

- Ensuring the STI Complex is registered with Fire and Rescue Force Authority, inspection is done and registration certificate provided
- Adequate number of appropriate fire fighting equipments like portable fire extinguishers and hydrant should be available onsite and serviced ontime
- Regular undertakes fire and other disaster drills and awareness training shall be conducted.
- Fire detectors and sprinkler systems should be installed in the buildings.
- Workers should be sensitized on appropriate fire prevention measures
- Good housekeeping should be maintained at all sites to reduce the fire risk.
- The design of the has strictly adhered to the Fire Safety Standards.

**C. NEGATIVE ENVIRONMENTAL IMPACTS**

 Energy Consumption and Greenhouse Gas Emissions:

The operation of the office building will lead to high energy consumption, primarily from electricity and heating/cooling systems, resulting in increased greenhouse gas emissions. This impact is moderate, local and will be medium term.

**Mitigation measures**

- Implement energy-efficient technologies such as LED lighting, motion sensors, and programmable thermostats to reduce energy consumption.
- If possible Install renewable energy sources such as solar panels to offset electricity usage.

- Encourage staff to adopt energy-saving practices like turning off lights and equipment when not in use.

#### **Storm water generation and overflow**

Due to the establishments of this proposed facility, storm water will be generated due to presence pavements, concrete surfaces and building roofs. The structures will tend to compromise the infiltration capacity of the land surface hence rendering water free to the environment. The storm water generated might have impacts on structures downstream as well as being a factor for soil erosion and poor water quality.

#### **Mitigation measures**

- The storm water will be designed accordingly
- The design shall provide sufficient greenery area for facilitating soil infiltration.
- Creating rainwater management systems can help prevent runoff and promote infiltration. This may include the use of rainwater harvesting tanks, drainage systems, and water retention areas for collecting and distributing rainwater
- Installing permeable pavements to promote infiltration and reduce runoff.
- Utilizing green roofs on buildings to absorb and slow stormwater runoff, reducing the volume and velocity of water entering the drainage system.

#### **Impact from poor hygienic condition**

Poor cleanliness of supporting facilities such as toilets and washrooms may invite flies that are agent of diseases like cholera and diarrhoea. Bad odour and bad visual is the outcome of poor hygienic condition that may impact human health condition. This impact is localized, negative, short-term and of moderate significance.

#### **Mitigation measures**

- Provision of adequate toilets for workers and visitors.
- Sensitisation of workers on understanding of potential health and safety issues related to poor hygienic condition.
- Regular Inspection and maintenance of the waste water system network
- Improve dust suppression mechanisms within the building premises

#### **Generation of solid and hazardous wastes**

The office building will generate various types of waste including paper, plastic, food waste, and electronic waste, contributing to landfill accumulation. Whether the impact is reversible or irreversible depends on how waste management is implemented during and after the operation phase improve effectively.

#### **Mitigation measures**

- Provision of dust bins or rubbish pits for the wastes produced.
- Ensure that the scrap metals and other hazardous wastes are well managed stored and dispersed off via licensed scrap metal dealers.
- Encourage staff to reduce paper usage through digital documentation and double-sided printing.
- Partner with waste management companies to ensure proper disposal and recycling of waste materials.
- Prohibit open burning since will increase pollutant gases to the atmosphere.

- Implement a comprehensive waste segregation system to categorize different types of waste materials.
- Implement a waste segregation system that separates waste into different categories such as recyclables (paper, plastic, glass, metal), organic waste (food scraps, yard waste), and non-recyclables. Provide clearly labeled bins for each category in easily accessible areas.

#### **Generation of liquid waste**

The establishment of new building in the area is expected to generate liquid waste from different sources such as rainwater runoff, sanitation systems, and laboratory water usage. This liquid waste is foreseen to have a negative impact, persisting over an extended period. Despite its longevity, the overall significance of this impact is projected to be relatively low. It is emphasized to implement plans for managing and reducing this impact during the development phase. This impact it is expected to be direct, short term, local and potentially reversible.

#### **Mitigation measures**

- Ensure that the project site is connected with DUWASA sewer network which passes nearby the project site for sewage management
- Optimize sanitation systems to minimize liquid waste production. This may involve the installation of water-efficient fixtures, regular maintenance to address leaks, and the use of technologies that reduce water usage in sanitation facilities.
- Implement strategies to control and manage rainwater runoff to prevent contamination. This could involve the installation of permeable surfaces, green infrastructure, and drainage systems designed to capture and treat runoff before it enters water bodies.
- Promote water-efficient practices in laboratories to reduce water consumption. This may include the use of advanced equipment that minimizes water usage, recycling systems for laboratory water, and the adoption of best practices in water conservation.
- Establish monitoring programs to regularly assess liquid waste generation and ensure compliance with environmental regulations. This involves conducting regular inspections, implementing corrective actions when necessary, and maintaining records to track the effectiveness of mitigation measures
- Conduct training programs for staff involved in construction and operation to raise awareness about the importance of liquid waste management. Promote a culture of environmental responsibility and provide guidelines for responsible waste disposal.
- Develop and implement emergency response plans to address unforeseen spills or incidents related to liquid waste. This includes having the necessary equipment and trained personnel to respond promptly to minimize the impact on the environment.

#### **6.5 Possible Potential Impacts during Decommissioning Phase**

No decommissioning will occur near future after the construction, as this building will be used throughout the operation phase. However due to the compliance and requirement the building is designed for a lifespan of several years' (over 50 years) subject to effective maintenance. During a certain period, it is possible that infrastructure facilities will be retrofitted at the sites, so major structural changes and expansions may be necessary. At the end of the project life, a scheduled project will be necessary to remove the site component, a process referred to as decommissioning.

## **A. POSITIVE IMPACTS**

### **✚ Improved biodiversity**

After the useful life of the project, the protected flora and fauna would have developed. The project shall commit in retaining this growth for conservation and biodiversity and its abandonment should conform to the requirements of government agencies. This impact is therefore considered to be positive, long-term duration and of minor positive significance.

### **✚ Enhancement measures**

- Develop and implement a comprehensive biodiversity conservation plan that outlines specific measures to protect the flora and fauna in the area during and after decommissioning.
- Implement habitat restoration programs to rehabilitate any areas disturbed during decommissioning phases.
- Conduct environmental education programs for the local community, emphasizing the importance of biodiversity conservation and the role of the academic institution in promoting sustainable practices.
- Collaborate with local farmers, beekeepers, and other community members to integrate sustainable practices into their activities, ensuring a harmonious coexistence with the protected biodiversity.
- Work closely with relevant government agencies to ensure that the abandonment and decommissioning process adheres to all regulatory requirements for biodiversity conservation.

## **B. NEGATIVE SOCIAL IMPACT**

### **✚ Loss of employment and business opportunities**

Some people mainly those not employed by government like housekeepers, security and gardeners will lose their jobs. This will have significant impact on these people and their families. Other dependents of the project, such as suppliers of various services (e.g., security and cleaning companies) and goods (such as food stuff and stationaries) will lose the business opportunities. This impact is considered negative, long term and of moderate significance. This impact is high, local and will be moderate term.

### **Mitigation measures**

- Seminars shall be conducted on alternative means of livelihood after termination of job.
- Implement comprehensive employment transition programs for affected workers, including skill development and retraining initiatives to enhance their employability in alternative sectors.
- Establish a support mechanism for local businesses affected by the decommissioning, providing training, and resources to adapt to new market conditions
- Conduct regular and transparent communication with stakeholders, including affected communities, to keep them informed about the decommissioning process, potential impacts, and mitigation measures.
- Work closely with local government authorities to identify and implement measures to offset the negative impact on the affected persons, such as creating alternative employment opportunities or initiating community development projects.

### **Loss of revenue and business opportunities**

Ending the project means losing revenues to some of government agencies such as TANESCO, DUWASA, OSHA, FIRE and NEMC. As discussed above both local and central government are receiving revenue/annual fees from the project. In case of the decommissioning of the project, revenue generated will cease. This impact is negative, short-term and of minor significance.

#### **Mitigation measures**

- Explore alternative revenue streams to compensate for the loss incurred from the discontinued project.
- Identify and develop new projects or initiatives that can generate income for both institutions and the government
- Implement economic development programs in project area to stimulate local economic opportunities.
- Encourage entrepreneurship and job creation to offset the negative economic impact on residents.
- Engage with the affected communities to understand their needs and concerns.
- Implement social support programs or initiatives to assist individuals and businesses impacted by the loss of economic opportunities.

### **C. NEGATIVE ENVIRONMENTAL IMPACT**

#### **Loss of aesthetic value due to haphazard disposal of demolished waste**

In the event of future rehabilitations and upgrading, the buildings may need to be demolished necessitating disposal of demolish wastes. Haphazard disposal may cause contamination of soil and water bodies. This impact is moderate, local and will be medium term. This impact is moderate, local and will be long term.

#### **Mitigation measures**

- Formulate a comprehensive waste management plan specifically tailored for the decommissioning phase. And, clearly outline procedures for the segregation, collection, transportation, and disposal of demolished waste.
- Implement demolition techniques that minimize the generation of waste and reduce environmental impact.
- Opt for methods that allow for the salvage and reuse of materials, thereby decreasing the amount of waste generated.
- Conduct a thorough site characterization and assessment to identify potential environmental sensitivities and vulnerabilities. This will aid in determining appropriate disposal methods and areas, preventing contamination of soil and water bodies.
- Identify and designate specific areas for waste disposal, ensuring they are environmentally suitable and comply with regulations.
- Implement measures to prevent leachate from entering soil and water bodies.
- Establish a monitoring and inspection program to assess the effectiveness of waste disposal measures.
- Regularly inspect the disposal areas to identify and address any issues promptly.
- Engage with the local community to raise awareness about the importance of proper waste disposal during decommissioning. Also, encourage community participation in waste management initiatives.

### **Dust and noise pollution from demolishing works**

In the event of future rehabilitations and upgrading, the building needs to be demolished necessitating disposal of demolition waste. The noise pollution and air quality will be most affected during the demolition work with the emission of dust particles from machinery like excavators, electric grinders and mixer. The impact receptors are likely to include site workers and residents in the neighboring areas. The substances which will most significantly contribute to air pollution will be particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). PM<sub>10</sub> and PM<sub>2.5</sub> may cause health hazards when inhaled in significant amounts and can also reduce the visibility. This impact is moderate, local and will be short term.

#### **Mitigation measures**

- Restrict demolition activities to specific time periods during the day when noise impact is likely to be less disruptive, such as during normal working hours. This can help minimize the disturbance to both site workers and residents
- Inform and engage with residents and workers in the surrounding areas about the timing and nature of the demolition work. Providing regular updates and addressing concerns can contribute to better community understanding and cooperation.
- Implement a comprehensive air quality monitoring system to track the emission of dust particles during demolition. This can help identify any exceedances of air quality standards and trigger immediate corrective actions.
- Dust suppression techniques, such as water spraying or misting systems, to control the release of dust particles into the air. This can help mitigate the impact on air quality and reduce potential health hazards.
- Provide site workers with appropriate PPE, such as masks or respirators, to minimize their exposure to airborne particulate matter and protect their health during the demolition activities.
- Ensure strict adherence to local regulations and standards related to noise and air quality during demolition. This includes obtaining necessary permits and approvals, as well as complying with established limits for noise and air pollutant emissions.

### **Healthy hazards to workers from demolishing work**

Demolishing works will include activities that may generate substantial amounts of dust and may also pose workers to risks of accidents. Pulling down a structure, engineered foundations, and other structures will all lead to generation of dust, noise and may cause accidents to operators. This impact is considered as negative, short-term, adverse, reversible and of moderate significance.

#### **Mitigation measures**

- Personal protective equipment (PPE), e.g., helmets, boots, goggles, earplugs, gloves and others will be provided and their use enforced to all workers involved in demolishing of structures during closure.
- Contractor shall have registered and qualified HSE personnel to ensure health and safety of workers within the project area.
- All workers involved in the demolishing work will be provided with training on health and safety matters
- In case of injuries, a well-equipped first aid kit will be onsite and injured workers will be provided first aid service by a trained first aider
- Hygienic conditions within the working areas will be maintained and enforced

## **6.6 Cumulative impacts**

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

### **✚ Cumulative Socio-Economic Impacts**

#### **a. Positive Cumulative Socio-Economic Impacts**

The laboratories will enhance learning and teaching environmental, and hence more capacitated professional.

#### **b. Negative Cumulative Socio-Economic Impacts**

The proposed project will definitely increase the population at the area. These are researchers, students, vendors, and staff from different social backgrounds. The increased number of people will cumulatively increase the impacts of social interactions between students/ staff/vendors and visitors at the premises. Such impacts may include cumulative increase in communicable diseases (HIV, AIDS and other STDs as well as COVID 19 outbreak) and cumulative increase in theft, crimes and other security issues.

#### **c. Cumulative impacts of Bio- physical environment**

##### **✚ Cumulative impacts of liquid and solid waste**

The project activities will generate significant solid and liquid wastes. The increased number of people at the area will result to cumulative increase to generation of both liquid and solid waste at the premises. This will increase deterioration of soil and water bodies.

##### **✚ Incremental noise and air pollution**

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

##### **✚ Greenhouse Gas Emissions and Climate Change**

Greenhouse gas emissions has a major influence on climate. Naturally occurring greenhouse gases such as Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O) and Ozone (O<sub>3</sub>) play a key role in trapping the sun's heat, thereby maintaining the earth's temperature range necessary for life. Project implementation activities contribute to greenhouse gas emissions through the use of equipment, plants and vehicles during the construction phase. Also, the electricity use is associated with greenhouse gas emissions. On the other hand, the increasing vegetation clearance during construction and operation phase reduce Carbon sequestration potential, hence reducing efforts towards climate change mitigation.

## **6.7 Project Alternatives**

The project alternatives are a part of the ESIA process to select the best among all possible project options. The alternatives of a project are defined as the options that can help to meet the objectives of a project by different means including an alternative project site, technology or

material, design or inputs. The key criteria when identifying alternatives is that they should be feasible and reasonable.

### **Factors Considered**

a) Environmental Impact:

The potential impacts of each alternative on the environment, including air quality, water resources, soil, wildlife, and ecosystems. Consider factors such as habitat destruction, pollution, and greenhouse gas emissions.

b) Social Impacts:

The social implications of each alternative, including effects on local communities, cultural heritage, public health, and quality of life. Considering factors such as displacement of communities, changes in access to resources, and impacts on cultural sites.

c) Economic Viability:

The economic feasibility of each alternative, including initial costs, long-term operational expenses, and potential economic benefits. Considering factors such as construction costs, employment opportunities, and revenue generation.

d) Technical Feasibility:

The technical feasibility of each alternative, considering factors such as available technology, infrastructure requirements, and resource availability. Evaluating whether each alternative can be realistically implemented given current technological capabilities and limitations.

e) Regulatory Compliance:

Ensuring that the selected alternative complies with relevant laws, regulations, and permitting requirements at the local, national, and international levels. Consider factors such as environmental regulations, land use zoning, and permitting processes.

f) Risk Assessment:

The risks associated with each alternative, including potential hazards, safety concerns, and uncertainties. Considering factors such as natural disasters, accidents, and unexpected events that could impact the project's success or pose threats to human health and the environment.

g) Stakeholder Input:

Solicit input from stakeholders, including local communities, governmental agencies, non-governmental organizations, and other interested parties. Considering their perspectives, concerns, and preferences when evaluating project alternatives.

h) Long-Term Sustainability:

By considering the long-term sustainability of each alternative, including its potential to meet current needs without compromising the ability of future generations to meet their own needs. Evaluate factors such as resource depletion, environmental degradation, and resilience to climate change.

### **No Project Alternative**

The no project alternative entails retaining the current status quo (No establishment of the proposed COSTECH office building. Adopting this option would mean avoiding most of the



negative effects associated with the presence of the project and missing all the positive benefits such as fostering proximity to local talent pools, universities, and research institutions, facilitating collaboration and knowledge exchange. This geographical presence shall catalyze partnerships with local businesses and startups, nurturing innovation ecosystems and driving economic growth, development of market and local businesses, Creation of employment opportunities etc. The proposed project has many potential benefits as compared to negative ones that can be easily mitigated

- **Alternative Site**

The Alternative site option means the relocation of the current proposed site to another site. Currently, COSTECH has no alternative site for the proposed project. Just in case the current project site is not desirable then COSTECH has to look for another alternative site, the process may take longer given the fact that this is a government institution and the proposed project site is in area designated for offices use. Also, there is no guarantee on the availability of alternative site and COSTECH will face the following consequences if opting for this alternative;

- ❖ Introduction of new cost and total loss for the previous incurred cost.
- ❖ Loss of the project fund which is a funded fund by World Bank and has a time limit.

In consideration of the above concerns and assessment of the current proposed site, *relocation is not a viable option* against the current proposed option.

- **Alternative Construction Technologies**

Within the construction sector, various options exist for selecting building materials. The decision regarding building materials can significantly influence factors such as longevity and aesthetic appeal of structures, construction costs, and environmental impact. In this context two alternatives were evaluated; the utilisation of burnt bricks and concrete bricks.

- **Use of burnt bricks**

In Tanzania, use of burnt bricks is cheap because they are locally made and can be close to the project sites. The traditional fired/burnt bricks are made from soil that is mixed with water, dried in the sun there after baked using wood fuel.

**Advantages of burnt bricks**

- a) Bricks are strong and durable;
- b) They require low maintenance cost;
- c) Have excellent thermal mass i.e., in winter they keep the buildings warmer while in summer they keep the buildings cooler; and
- d) They are fire resistant.

**Disadvantage of burnt bricks**

For large projects, large amounts of firewood and soil will be required to produce adequate number of bricks. This can lead to destruction of natural forests and land degradation due to formation of borrow pits.

**Use of Concrete blocks**

Concrete blocks are made from a mixture of quarry dust and cement to which water has been added. Then the mixture is compacted using a manual machine to ensure strength and quality.

**Advantages of Concrete blocks**

- a) Concrete blocks allow users to produce uniform blocks of greater strength;
- b) Concrete blocks can be made on site so transportation costs are minimized; and
- c) Because Concrete blocks are cured in the sun, there is no fuel needed thereby helping to curb deforestation as such they are environmentally friendly;
- d) Concrete blocks are strong and durable; and Concrete blocks are fire resistant

#### **Disadvantage of concrete blocks**

- a) The bricks are usually expensive due to increased costs of cement.

- **Water supply Alternative**

#### **Water Supply (tap water) from DUWASA**

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

- **Groundwater Extraction (Boreholes)**

Ground water is another alternative option for water supply and can supplement the water supply at the project site at such times of water shortage and scarcity.

It has to be noted that before establishing the groundwater as sources of water supply, an investigation in terms of groundwater quantity and quality has to be thoroughly carried out and ascertained. Ground water investigation and well drilling have cost implications on the project. Further, based on presence of DUWASA network nearby the project site, utilisation of ground water will necessitate investing on water treatment plant/equipment.

- **Rainwater Harvesting**

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

**Conclusion:** *COSTECH opted to use DUWASA tap water.*

- **Alternative Energy Sources**

The main source of energy for the COSTECH is Electricity, supplied by the national grid. For the proposed infrastructure, the proponent considered four alternative sources of energy namely; electricity, diesel power generators, and solar energy.

- **Alternative one - Electricity:** As it is the case in most of developing countries, supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern.
- **Alternative two - Diesel generators:** These utilize fossil fuels, which tend to emit greenhouse gases especially when operated for a long time. As such, diesel generators are used as standby power supply during outages.
- **Alternative three - Solar energy:** the last alternative considered was the installation of solar panels to harvest solar energy. It is intended that the solar energy be used for lighting within the buildings. It is also intended to install solar lights in various locations along the streets.

**Conclusions:** an evaluation of the three alternatives based on capital costs, availability of adequate supply, reliability, and environmental protection revealed that at least three options could be used together. Therefore, it is planned to connect the proposed infrastructure to electricity from the National grid as a basic power supply and backup generator. Provisions will be made for installing solar panels in the future. Hence, contractor during design period of the proposed establishment should consider space for installation of solar panel in the future. However number of solar panel to be installed is not estimated.

- **Alternative of liquid waste management**

During the operational phase, it is anticipated that the daily wastewater about 7.2m<sup>3</sup> will be produced if the population projection regarding the number of workers and visitors. The estimation is based on the assumption that an average individual generates approximately 80% of wastewater per day. Therefore, it is crucial to address the appropriate management and disposal of this wastewater volume. Although the area is connected public sewerage system for this wastewater treatment, alternative options such as utilisation of septic tanks and soakage pits have been considered and will be discussed as follows;

- **Connection to public sewer system**

Connecting to the public sewer system the preferred option for the project site is often preferable to installing onsite septic and soak away pits for several reasons. Firstly, public sewer systems typically offer more reliable and efficient wastewater treatment and disposal, ensuring better protection of public health and the environment. They are managed by trained professionals who can promptly address any issues that arise, minimizing the risk of contamination or system failures. Additionally, public sewer systems eliminate the need for property owners to regularly maintain septic tanks and handle wastewater disposal themselves, providing convenience and peace of mind. Furthermore, connecting to a public sewer system often increases property value and can be more cost-effective in the long run, as it eliminates the need for periodic septic tank pumping and potential repairs associated with onsite systems

- **Use of septic tanks**

Use of septic tanks to manage wastewater were also considered due to the following advantages

- Septic tanks are easier to operate and do not require personnel to manage its operations except when there are blockages;
- Septic tanks do not generate odor as they are usually under cover;
- Septic tanks do not require a lot of space; and

The main disadvantage of using septic tanks is that they need periodic emptying, and this could raise the operation cost over time. With the large volume of effluents that will be discharged from the project during operation, the septic tanks will need to be emptied time and again making the alternative not viable.

## **Solid Waste Management Alternatives**

The proposed establishment will generate a considerable large amount of solid waste from hostels, stationeries, workshops, laboratories, restaurants and offices. It considered three alternatives namely;

- Construction of composting facility for biodegradable waste like food remains.
- Collected by the Council Collection agents.

**Conclusion:** Analysis of the two alternatives showed that alternative II is the most favourable because it will involve authorized waste collectors to collect waste and dispose accordingly.

- **Alternatives building materials**

- ✚ It is estimated that building materials account for more than 70% to 75% of the total building cost, therefore, the selection of affordable building materials is critical important.
- ✚ COSTECH shall consider all these and look into a variety of building materials for different aspects of the proposed buildings. Architects consulted with structural engineers on the load-bearing capabilities of available materials. Five common materials namely *concrete, steel, wood, masonry and stone* were considered as briefly described hereunder:
  - ✚ **Concrete:** Concrete is a composite material made from fine and coarse aggregates, bonded together with cement. Its versatility, cost and strength make it the ideal material for building foundations. It is most preferred since it can carry heavy load and withstand harsh environmental conditions its
  - ✚ **Steel:** Steel is a metal alloy of iron and carbon and often-other alloying material in its composition to make it stronger and more fracture-resistant than iron. Because it is so strong compared to its weight and size, structural engineers use it for the structural framework of tall modern buildings and large industrial facilities
  - ✚ **Wood:** Among the oldest, or perhaps *the* oldest, of building materials, wood has been used for thousands of years and has properties that make it an ideal building material—even in the days of engineered and synthetic materials.
  - ✚ **Stones:** The longest lasting building material available is the one that's been here for thousands of years: stone. In fact, the most ancient of buildings still in existence in the world are made of stone.
  - ✚ **Brick/masonry:** Masonry construction uses individual units (such as bricks) to build structures that are usually bound together by some kind of mortar. The strongest and most commonly used masonry unit is a concrete block, which may be reinforced with steel. Glass, brick, and stone can all be used in a masonry structure.

**Conclusion:** A team of Architects and Engineers evaluates these based on criteria such as *strength, weight and durability*, which would make it right for various uses; compatibility with National standards and testing methods that govern the use of building materials in the construction industry; consideration for structural integrity and cost and aesthetics. The proponent opted a combination of two of the construction materials i.e., concrete (for foundations, floors and columns) and Brick/masonry for walling.

### **Alternatives roofing materials**

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

Conclusion: Although roofing tiles will score more points in terms of whether resistance, longevity and resistance to corrosion, they were found to be more expensive that aluminum roofing (i.e., per square meter). Aluminum roofing sheets scored more point on capital costs, flexibility and less labor-intensive during installation. Therefore, the proponent opted to use corrugates aluminum sheets for roofing.

## CHAPTER SEVEN

### 7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

#### 7.1 Introduction

Mitigation measures are presented in the following ESMP (Table 7.1) that is to be implemented by COSTECH and during construction, operation and decommissioning phases, and Contractor during construction phase. Plans for the implementation of mitigation measures for the proposed establishment of office building are provided in this Chapter. The Plans indicate institutional responsibilities, time to take the action, monitoring frequency and estimated costs. The proposed costs are only indicative may change over time.

#### 7.2 Purpose of the ESMP

The purpose of the ESMP is to describe the measures that should be implemented by COSTECH during the implementation of the project to eliminate or reduce to acceptable levels key potential impacts, social and health impacts related to project activities. The specific measures set out in the ESMP must be fully adhered to by all the project parties. In particular, the project must strive to avoid significant impacts on the bio-physical, socioeconomic or health aspects during implementation. Avoidance through good detailed design of site-specific works and through preparation of the detailed site specific ESMP will be key to success in this area. Where impacts cannot be avoided, they must be mitigated against using appropriate measures. The ESMP has been developed:

- To bring the project to comply with ESS1 and Government of Tanzania applicable national environmental and social legal requirements social policies and procedures;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.
- To provide an operational reference and tool for environmental management during project rehabilitation and operation activities.

#### 7.3 ESMP Implementation Responsibility

The environmental and social mitigation measures incorporated in the detailed engineering design shall be handed over to the contractor during construction period. The contractor shall take stock of the contents of the Environmental and Social Management Plan of the Project. COSTECH holds the ultimate responsibility for meeting the requirements outlined in EMA 2004, Tanzania's Environmental Legislation. The primary obligation for executing these requirements rests with the contractor, who will appoint HSE specialists overseen by a contractor resident engineer. COSTECH will ensure the presence of adequate resources, skills, training, capacity-building programs, communication processes, and documentation control systems to ensure the effective implementation and integration of ESMP requirements. This involves having competent staff with sufficient training and experience to cover the ESIA requirements for the project in the designated project area.

COSTECH through the Project Implementation Team will be responsible for assessing the management and execution of the ESMP through monitoring and environmental audits. Any identified non-compliance during the evaluation requires corrective action by the contractor. It will oversee the implementation and monitoring of the ESMP, with overall responsibility for supervising all environmental management activities, aided by consultants (POM, 2021).

It is essential to note that the ESMP is not the sole document or management system tasked with addressing project impacts. Instead, each project-related subcontractor or material supplier must establish their own management systems to minimize and prevent environmental and social risks.

Therefore, the contractor must integrate the ESMP into their "project management system," which serves as the framework for managing their activities and prepare C-ESMP. This system defines responsibilities, internal reporting requirements, relationships for mitigation and monitoring actions related to the ESMP, and precise mechanisms for monitoring and evaluating the implementation of various ESMP requirements. The contractor is also obligated to ensure that project implementation complies with national and international EHS legislation and regulations, as well as contractual technical and quality specifications in line with the project's quality plan if required. Also, the contractor shall appoint an Environmental, Social, Health and Safety Officer to oversee the E&S aspects who are familiar with the compliance requirements, including WB EHS guidelines (POM, 2021).

The successful execution of this plan will necessitate extensive self-monitoring and regular reporting to the APIU. It is anticipated that, throughout the project implementation stage (construction), both the COSTECH and contractor will enlist the services of consultants, including environmental and social specialists, as well as environmental health and safety officers (EHS). These personnel will be appointed based on the specifications outlined in the following table for effective management and monitoring.

**Table 7-1: Roles and responsibilities of respective entities**

Entities	Responsibilities
Project Implementation Unit (PIU)	<ul style="list-style-type: none"> <li>○ Support the procurement officer at respective project implementing institutions in making sure that the bidding documents clearly cover the health, safety and environmental component with appropriate provisions of the same for the contractors to bid.</li> <li>○ Coordinate preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP) as per POM.</li> <li>○ Ensure that contractors have an Environmental Health and Safety Officer (EHS), who are familiar with the compliance requirements, including WB EHS guidelines.</li> <li>○ Review progress reports by the supervision engineer/consultant during civil works and conduct inspection of the sites.</li> </ul>
Design Consultants	<ul style="list-style-type: none"> <li>○ Understand the sub-project setting and site-specific requirements with discussions with the PIU;</li> <li>○ Incorporate the issues identified in the ESIA, ESMPs into the project design</li> <li>○ Provide cost estimates for implementing the design requirements.</li> </ul>
Supervision Engineer/Consultant	<ul style="list-style-type: none"> <li>○ Assist the PIU to ensure that the necessary environmental, health and safety authorizations and permits have been obtained;</li> <li>○ Maintain open and direct lines of communication between the PIU and contractor(s) with regard to environmental matters;</li> <li>○ Review and approve the contractor's site-specific construction ESMPs (CESMP), Health and Safety, Labour Management Plans and Traffic Management Plans together with the PIU; Conduct regular site</li> </ul>

	<p>inspections of all work areas to ensure compliance with CESMPs and E&amp;S specifications for contractors; Assist the contractor in finding environmentally responsible solutions to problems;</p> <ul style="list-style-type: none"> <li>○ Instruct the contractor(s) to take remedial actions within a specified timeframe, and carry out additional monitoring, if required, according to the contractual requirements and procedures in the event of non-compliances or complaints;</li> <li>○ Instruct the contractor(s) to stop activities which generate adverse impacts, and/or when the contractor(s) fails to implement the ESMP requirements / remedial actions;</li> <li>○ Provide training to the contractor on the EHS requirements to be followed; vii. Monitor the contractor's environmental awareness training program for all personnel working onsite;</li> <li>○ In case of any accidents or incidents, immediately notify the PIU and support the process of documenting and reporting the case to the WB;</li> <li>○ Prepare written reports for the PIU such as weekly report of non-compliance issues; summary monthly report covering key issues and findings from supervision activities; and consolidated summary report from contractor's monthly report report</li> </ul>
Contractor	<ul style="list-style-type: none"> <li>○ Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements;</li> <li>○ Work within the scope of contractual requirements and other tender conditions; iii. Prepare CESMPs based on the ESMP in the bidding documents and contracts;</li> <li>○ Train workers about EHS (including relevant WBG EHS Guidelines) and the site-specific environmental and social measures to be followed;</li> <li>○ The EHS officer of the contractor will participate in the joint site inspections with the PIU and Environmental Supervision Engineer/consultant;</li> <li>○ Carry out any corrective actions instructed by the Supervision Engineer/consultant</li> <li>○ In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; viii. Propose and carry out corrective actions in order to minimize the environmental impacts; ix. Send weekly reports of non-compliance to the Supervision Engineer/consultant; x. Send monthly progress reports to the Supervision Engineer/consultant.</li> </ul>

**7.4 Environmental and Social Cost**

The costs for implementing the mitigation measures have been estimated based on previous similar projects and engineering judgment. The estimated cost for environmental and social management of an establishment shall be included in the Contractor's Bill of Quantities (BOQ) during decommissioning. Also, the principal environmental and social cost includes the cost for implementing the mitigation measures proposed. Additional costs for implementing environmental and social management measures have been estimated and COSTECH shall cover all the costs proposed in the ESMP.

**Table 7-2: Proposed Environmental Social Management Plan (ESMP) for Mobilisation, construction, demobilization, operation and maintenance, and decommissioning phase.**

S/N	Environment al & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
<b>MOBILIZATION &amp; CONSTRUCTION PHASE</b>				
<b>POSITIVE SOCIAL IMPACTS</b>				
1	Jobs creation and Employment opportunities	<ul style="list-style-type: none"> <li>• Contractor should give priority to the local people in the project areas for available jobs.</li> <li>• The local people should be obtained through local officials for the sustainability and security of the project.</li> <li>• The contractor should provide employment based on the idea that everyone should have equal access to opportunities.</li> <li>• Conduct fair and transparent recruitment processes to ensure equal opportunities for all interested individuals, promoting inclusivity and diversity Local communities shall be encouraged to produce quality goods and services for the project.</li> <li>• Implement training programs to enhance the skills of the local workforce, ensuring they acquire the necessary qualifications for available job opportunities.</li> <li>• Ensure strict adherence to labor standards and regulations, providing a safe and supportive working environment for all employees</li> <li>• Both professional and unskilled laborers hired for the project should receive fair remuneration.</li> </ul>	Contractor/PIT	N/A
2	Stimulate economic growth	<ul style="list-style-type: none"> <li>• Purchasing materials from authorized local suppliers</li> <li>• Actively involve and engage local suppliers for construction materials needed during the establishment phase.</li> <li>• Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand</li> <li>• Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate in supplying materials and services for the project</li> </ul>	Contractor/PIT	N/A



S/N	Environment al & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>Integrate environmentally sustainable practices in construction to minimize negative impacts on the local environment, ensuring long-term benefits for the community.</li> <li>Maintain open and transparent communication with local suppliers and service providers to address any concerns and ensure that they are well-informed about project developments.</li> </ul>		
3	Increased skills and impart knowledge to local communities	<ul style="list-style-type: none"> <li>Develop and implement structured training programs for both skilled and non-skilled laborers in the local communities.</li> <li>Contractor shall provide on job skills and training.</li> <li>Actively engage the local workforce in construction activities, providing hands-on experience with new equipment and technologies</li> <li>Implement capacity building initiatives to equip individuals with essential skills required for their roles in the construction process</li> <li>Establish a system for continuous monitoring and evaluation of the training programs to ensure their effectiveness</li> <li>Involve local communities in the planning and execution of skill development initiatives to ensure relevance and sustainability.</li> <li>Implement a monitoring and evaluation system to track the effectiveness of the skills transfer programs.</li> <li>Regularly assess the impact on individuals and the community to make necessary adjustments for continuous improvement.</li> </ul>	Contractor/PIT	N/A
<b>NEGATIVE SOCIAL IMPACTS</b>				
4	Increased Traffic congestion	<ul style="list-style-type: none"> <li>Develop a comprehensive traffic management plan in collaboration with local authorities. This plan should include designated routes for construction vehicles to avoid peak traffic times and minimize disruption to main thoroughfares.</li> <li>Transportation of construction materials during off-peak hours to reduce the overlap with regular commuter traffic. Early morning,</li> </ul>	Contractor/PIT	2,500,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<p>evening, and weekend work can be considered to lessen the impact on daily traffic flow</p> <ul style="list-style-type: none"> <li>The contractor should install temporary traffic signals and clear signage to guide motorists and pedestrians safely around the construction site. This can help in managing the altered traffic patterns and prevent confusion</li> <li>The contractor should Work closely with local traffic enforcement to monitor and manage traffic conditions, ensuring that any arising issues are promptly addressed.</li> </ul>		
5	Community Disruption	<ul style="list-style-type: none"> <li>Utilizing quieter machinery, scheduling construction activities during less disruptive hours, and installing noise barriers around the site to reduce the impact on nearby community</li> <li>Developing a comprehensive traffic management plan that includes clear signage, implementing off-peak deliveries and staggered work schedules can also help minimize congestion.</li> <li>Employing dust suppression techniques such as water spraying, covering construction materials, and installing dust screens around the site</li> <li>Establish a clear and consistent communication channel with the community mostly neighbors</li> <li>Ensuring the construction site is well-maintained, with clear signage and barriers to prevent accidents. Regularly clean surrounding areas to minimize debris and maintain a tidy appearance.</li> </ul>	Contractor/PIT	15,000,000
6	Conflicts and grievances	<ul style="list-style-type: none"> <li>Conduct workshops and awareness programs for construction workers on cultural norms and local sensitivities, emphasizing respectful behavior towards married women and school children.</li> <li>Implement a structured grievance resolution mechanism that allows local community members to express concerns related to construction activities. This mechanism should ensure prompt and fair resolution of issues</li> </ul>	Contractor/PIT	1,500,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>Organize regular meetings between construction project representatives and the local community to discuss ongoing activities, address concerns, and foster open communication</li> <li>Appoint a dedicated community liaison officer who serves as a point of contact between the construction team and the local community, facilitating communication and addressing grievances promptly.</li> <li>Ensure timely and transparent communication about the construction schedule, potential disruptions, and any necessary adjustments to minimize surprises and conflicts</li> <li>Implement regular monitoring of construction activities to ensure adherence to guidelines and regulations, with penalties for non-compliance, thereby promoting responsible conduct among construction workers.</li> </ul>		
7	Impact on gender during employment	<ul style="list-style-type: none"> <li>Provide specific training sessions for project staff on recognizing and addressing gender biases. This includes promoting fair treatment and equal opportunities for both men and women.</li> <li>Implement transparent and inclusive hiring practices that ensure equal opportunities for men and women in employment and project-related activities.</li> </ul>	Contractor/PIT	N/A
8	Spread of diseases	<ul style="list-style-type: none"> <li>Several enhancement measures can be implemented to mitigate the spread of diseases, including HIV/AIDS, during the construction phase of an office building. A strict adherence to safety protocols, including the use of personal protective equipment (PPE) such as gloves and safety glasses, can minimize the risk of accidental injuries and exposure to contaminated materials.</li> <li>Providing comprehensive training on infection control and proper handling of hazardous materials is crucial to ensure that workers are aware of the risks and know how to protect themselves. Moreover, ensuring adequate access to clean water, sanitation facilities, and hygiene resources on construction sites can promote good hygiene practices and reduce the risk of disease transmission.</li> </ul>	Contractor/PIT/ Consultant	1,500,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>Implementing regular health screenings and access to healthcare services for workers can help detect and manage infections early, preventing their spread. Also, promoting education and awareness campaigns on HIV/AIDS prevention, including safe sex practices and the importance of regular testing, can empower workers to make informed decisions about their health.</li> <li>Collaborating with local healthcare providers and organizations specializing in public health can also provide valuable support in implementing these measures effectively. By prioritizing the health and safety of workers and implementing comprehensive prevention strategies, the construction phase of an office building can be conducted in a way that minimizes the risk of disease transmission, including HIV/AIDS.</li> </ul>		
9	Insecurity and theft	<ul style="list-style-type: none"> <li>Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security.</li> <li>Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents</li> <li>Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site.</li> <li>Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft.</li> <li>Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft.</li> <li>Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use.</li> <li>Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure.</li> </ul>	Contractor/PIT/LGA	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
10	Child labor	<ul style="list-style-type: none"> <li>Ensuring strict implementation of existing child labor laws and regulations. Introduce more stringent penalties for violations</li> <li>Increase the frequency and rigor of inspections at construction site to detect and deter child labor practices</li> <li>Mandate that construction contractor adhere to child labor regulations as part of their contract requirements.</li> <li>Provide training for workers on child labor laws and the importance of protecting children's rights</li> </ul>	Contractor/PIT /LGA	N/A
11	GBV,SH and SEA due to influx of workers	<ul style="list-style-type: none"> <li>Ensuring all workers sign a code of conduct that prohibits GBV, SH, and SEA. This code should be enforced strictly, with clear consequences for violations.</li> <li>Providing mandatory training on GBV/SH/SEA for all workers and management staff. This should include understanding what constitutes GBV/SH/SEA, reporting mechanisms, and the importance of respecting local cultures.</li> <li>Establishing confidential and accessible reporting systems for victims of GBV/SH/SEA. Ensure that these systems are well-publicized within the community and among workers.</li> <li>Engaging local communities in discussions about the risks of GBV/SH/SEA and the measures being taken to protect them. This could include community meetings, workshops, and distributing informational materials.</li> <li>Regularly monitoring GBV/SH/SEA risks and the effectiveness of mitigation measures. Include GBV/SH/SEA considerations in the project's grievance redress mechanism.</li> <li>Collaborating with local NGOs or community organizations that specialize in GBV/SH/SEA prevention and response. They can offer additional support and resources.</li> </ul>	Contractor/PIT /LGA	NA
<b>ENVIRONMENTAL IMPACTS</b>				

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
12	Impairment of air quality due to dust and gases emission	<ul style="list-style-type: none"> <li>• Implementing measures such as water spraying, dust screens, and barriers shall help to suppress dust emissions from activities like excavation and earthmoving.</li> <li>• Utilizing construction equipment with advanced emission control systems, such as diesel particulate filters and selective catalytic reduction technology, can significantly reduce the release of pollutants from machinery exhaust</li> <li>• Ensuring proper handling and disposal of construction waste are crucial to prevent their release into the air. Segregating and recycling materials wherever possible shall reduce the need for new resource extraction and associated pollution.</li> <li>• Exploring alternative materials with lower emissions profiles, such as low-VOC paints, eco-friendly adhesives, and sustainable construction materials like recycled steel shall help minimize the emission of harmful pollutants</li> <li>• Ensuring regular maintenance of construction machinery and equipment can optimize their performance and reduce emissions. Also conducting periodic inspections for leaks and proper functioning of emission control systems is essential for compliance with environmental regulations.</li> <li>• Keeping nearby community informed about construction activities, potential air quality impacts, and mitigation measures shall foster understanding and cooperation. Establishing channels for community feedback can also help address concerns promptly.</li> </ul> <p>Establish a monitoring system to regularly assess air quality during construction, ensuring that concentrations of PM2.5 and PM10 remain within acceptable limits.</p>	Contractor/PIT	15,000,000
12	Noise pollution	<ul style="list-style-type: none"> <li>• Ensuring that all construction equipment's are well-maintained and fitted with noise-reducing features such as mufflers and silencers can lower the noise output. Using newer, quieter models of machinery can also contribute to noise reduction.</li> </ul>	Contractor/PIT/ Consultant	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>• Regular noise monitoring shall help keep track of noise levels and ensure they remain within acceptable limits. This allows for timely adjustments to construction practices if noise levels exceed regulatory standards.</li> <li>• Keeping the neighbors informed about the construction schedule, expected noise levels, and duration of noisy activities will help manage expectations and reduce frustration. Providing a point of contact for noise complaints shall also facilitate better community relations.</li> <li>• Training construction workers on noise control measures and the importance of minimizing noise shall ensure that best practices are followed consistently on the site.</li> <li>• Provision of appropriate PPE's to all workers working in high noisy areas</li> </ul>		
14	Increased runoff due to the removal of vegetation and soil disturbance	<ul style="list-style-type: none"> <li>• Developing and implementing a comprehensive storm water management plan that includes these and other best management practices it will help ensures that runoff is effectively controlled throughout the construction and post-construction phases.</li> <li>• Regular maintenance and monitoring of these systems are essential to ensure their long-term effectiveness.</li> <li>• During construction, using silt fences, erosion control mats, and sediment basins will minimize soil erosion and prevent sediment-laden runoff from reaching nearby waterways. These measures will help to stabilize exposed soil and reduce the impact of construction activities on the surrounding environment</li> <li>• Using permeable or porous paving materials for parking lots and walkways will allow water to infiltrate through the surface, reducing runoff and promoting natural groundwater recharge.</li> <li>• After construction, revegetating disturbed areas with native plants and trees shall help to restore the site's natural ability to manage storm water. This will help to reestablish the ecological functions of the area, reducing runoff and improving soil stability.</li> </ul>	Contractor/PIT/ Consultant	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
15	Generation of solid waste	<ul style="list-style-type: none"> <li>• Contractor shall provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site.</li> <li>• Implement a comprehensive waste segregation system to separate recyclable materials from hazardous and non-biodegradable waste.</li> <li>• Adhere to proper disposal methods for hazardous substances and materials, following established guidelines and regulations.</li> <li>• Employ certified waste disposal services to ensure safe handling of hazardous waste</li> <li>• A special focus on waste minimization will be made in order to cut down on the amount of solid waste generated during site preparation and construction.</li> <li>• Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.</li> <li>• Develop a detailed waste management plan that outlines proper disposal methods, recycling procedures, and strategies for reducing waste generation.</li> <li>• Ensure adherence to the waste management plan throughout the construction and operational phases</li> <li>• Conduct training sessions for construction and operational staff on proper waste handling, segregation, and disposal practices.</li> <li>• Unusable construction trash, including broken pipes, formwork, and other building supplies, will be disposed at a designated area.</li> <li>• Ensuring no waste is discharged to the open/natural environment</li> </ul>	Contractor/PIT	3,000,000
16	Generation of liquid waste	<ul style="list-style-type: none"> <li>• Enforce and adhere to best practices in waste management to ensure that all liquid wastes are handled and disposed of in an environmentally responsible manner, minimizing health risks and pollution</li> </ul>	Contractor/PIT/ Consultant	5,000,000



S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>• Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.</li> <li>• Establish a monitoring system to regularly assess the effectiveness of waste management practices during construction. Enforce strict compliance measures to ensure that all generated liquid wastes are treated and disposed of according to established standards.</li> <li>• Develop and implement an emergency response plan to address any unforeseen incidents or spills during the construction phase, minimizing the potential for long-term environmental damage.</li> <li>• Regular maintenances of machinery to avoid leaks and spillages</li> <li>• Provision of appropriate mobile toilets or temporary toilets</li> <li>• Ensuring no waste is discharged to the open/natural environment</li> </ul>		
17	Occupational health hazards	<ul style="list-style-type: none"> <li>• Installing guardrails, safety nets, and personal fall arrest systems. Ensuring scaffolding is properly erected and inspected regularly. Use ladders safely and secure them to prevent slips.</li> <li>• Identifying and managing hazardous materials through proper labeling, storage, and disposal procedures. Implement dust control methods such as wet cutting and local exhaust ventilation. Providing workers with appropriate PPE like respirators and protective clothing.</li> <li>• Supply and enforce the use of PPE, including hard hats, safety glasses, gloves, ear protection, and high-visibility clothing. Regularly inspect and replace damaged PPE.</li> <li>• Implement noise control measures such as using quieter machinery, maintaining equipment to reduce noise levels, and providing ear protection. Conduct regular noise assessments to ensure compliance with permissible exposure limits.</li> <li>• Ensure that all electrical systems are installed and maintained according to standards. Use ground fault circuit interrupters (GFCIs) and ensure that electrical tools and equipment are properly grounded. Train workers on electrical safety practices.</li> </ul>	Contractor/PIT	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>• Educate workers on proper lifting techniques and provide mechanical aids like hoists and dollies to reduce strain. Design workstations to promote neutral postures and minimize repetitive motion.</li> <li>• Conduct comprehensive training programs on recognizing and avoiding job site hazards. Provide regular refresher courses and updates on new safety protocols and equipment.</li> <li>• Implement regular health screenings and medical check-ups to identify and address health issues early. Monitor workers for signs of overexposure to hazardous substances.</li> <li>• Develop and enforce a comprehensive site safety plan, including emergency response procedures. Assign safety officers to monitor compliance and address hazards promptly.</li> <li>• Foster open communication between workers and management regarding safety concerns. Use clear signage and warnings to indicate hazards and ensure that all workers understand the safety protocols</li> </ul>		
18	Surface and ground water contamination /pollution	<ul style="list-style-type: none"> <li>• Utilize silt fences, sediment basins, and erosion control blankets to minimize soil erosion and capture sediment before it can enter water bodies. Stabilize exposed soil surfaces with vegetation, mulch, or geotextiles to reduce erosion.</li> <li>• Design and install effective stormwater management systems to control runoff and promote infiltration. Implementing rain gardens and permeable pavements can also help manage stormwater and reduce pollutant loads.</li> <li>• Store and handle hazardous materials such as fuels, paints, and solvents in designated areas with secondary containment to prevent spills and leaks. Ensure proper labeling, storage, and disposal of hazardous materials in compliance with local regulations.</li> <li>• Establish a comprehensive waste management plan that includes the segregation, recycling, and proper disposal of construction</li> </ul>	Contractor/PIT	4,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<p>waste. Provide designated waste disposal areas and regularly remove waste to prevent accumulation and potential contamination.</p> <ul style="list-style-type: none"> <li>• Immediately stabilize disturbed areas with vegetation or other ground cover materials as soon as construction activities allow. This reduces the risk of erosion and sediment transport.</li> <li>• Develop and implement a spill prevention and response plan, including training for construction personnel. Equip the site with spill kits and ensure that workers know how to respond promptly to contain and clean up spills.</li> <li>• Conduct regular water quality monitoring of nearby surface water and groundwater to detect any signs of contamination early. This allows for timely implementation of corrective measures if pollution is detected.</li> </ul>		
19	Erosion of Exposed Surfaces	<ul style="list-style-type: none"> <li>○ Implement thorough compaction and resurfacing techniques during construction to minimize exposed surfaces prone to erosion.</li> <li>○ Introduce erosion control measures such as the use of erosion control blankets, sediment barriers, and vegetative cover to reduce the impact of rain, trampling, and vegetation clearance.</li> <li>○ Construction will be done as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant.</li> <li>○ Maintain gravel fill and/or re-vegetate around the structures.</li> <li>○ Plan construction activities considering weather conditions to avoid exacerbating erosion during periods of heavy rainfall.</li> <li>○ Most of construction activities will be done during dry weather.</li> <li>○ Implement measures to protect local resources during construction to minimize disruptions to the communities.</li> <li>○ Establish a monitoring system to track erosion control measures and enforce compliance with construction guidelines to prevent excessive sedimentation in runoffs.</li> </ul>	Contractor/PIT	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>○ Develop plans for post-construction restoration, including replanting vegetation and rehabilitating affected areas to promote ecosystem recovery.</li> </ul>		
20	Loss of biodiversity	<ul style="list-style-type: none"> <li>• Identify and protect any existing habitats, within or adjacent to the construction site. Implement measures to restore any disturbed habitats after construction is complete.</li> <li>• Incorporate green building techniques into the design and construction of the office building, such as using sustainable materials, maximizing energy efficiency, and installing green roofs or walls to provide additional habitat for wildlife.</li> <li>• Implement measures to minimize soil disturbance, erosion, and sedimentation during construction activities. Use silt fences, erosion control blankets, and sediment traps to prevent soil runoff into nearby water bodies.</li> <li>• Utilize native plant species in landscaping around the office building to create wildlife-friendly habitats and support local biodiversity. Native plants are adapted to the local climate and soil conditions, making them more resilient and beneficial to local wildlife.</li> <li>• Minimize light pollution and noise disturbance from construction activities, as these can disrupt the behavior and habitats of nocturnal species such as bats and certain bird species.</li> <li>• Implement stormwater management practices, such as permeable pavement, rain gardens, and retention ponds, to reduce runoff and filter pollutants before they enter local waterways.</li> <li>• Conduct regular environmental monitoring before, during, and after construction to assess the impact on local biodiversity and adjust mitigation measures as needed.</li> </ul>	Contractor/PIU/ Consultant	4,000,000
21	Impact on natural resource (Increased energy and	<ul style="list-style-type: none"> <li>○ Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the indigenous flora.</li> <li>○ Integrate green construction practices to minimize the need for extensive clearing of natural vegetation.</li> </ul>	Contractor/PIT/ Consultant	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
	water consumption)	<ul style="list-style-type: none"> <li>○ Explore alternative construction methods that reduce the ecological footprint.</li> <li>○ Close supervision of earthworks shall be observed in order to confine land clearance within the project site.</li> <li>○ Implement erosion control measures, such as the installation of sedimentation barriers and erosion control blankets, to prevent soil erosion from wind and water.</li> <li>○ Establish a biodiversity monitoring program to track the recovery of local fauna and ensure the effectiveness of mitigation efforts.</li> <li>○ Conduct awareness programs to educate the local community about the importance of preserving biodiversity and the ongoing mitigation measures.</li> <li>○ Regularly review and update the environmental management plan based on monitoring and feedback.</li> </ul>		
22	Impact on climatic change	<ul style="list-style-type: none"> <li>• Implement the use of renewable and cleaner energy sources for construction equipment to minimize the emission of greenhouse gases. This could involve using electric or hybrid machinery powered by sustainable energy.</li> <li>• Install and enforce the use of emission control technologies on fuel-powered equipment to reduce the release of carbon dioxide and noxious gases into the atmosphere during construction activities.</li> <li>• Optimize construction practices to minimize the overall carbon footprint, such as efficient waste management, recycling of materials, and reducing energy-intensive processes where possible</li> <li>• Adhere to green building standards and certifications that promote environmentally friendly construction practices. This includes designing and constructing buildings that are energy-efficient and have minimal environmental impact.</li> <li>• Implement a robust monitoring system to track and report greenhouse gas emissions during construction. This will help in</li> </ul>	Contractor/PIT	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<p>identifying areas for improvement and ensuring compliance with emission reduction measures.</p> <ul style="list-style-type: none"> <li>• Ensure strict adherence to local environmental regulations and standards governing construction activities. Regular inspections and enforcement measures can help prevent excessive emissions and promote responsible construction practices.</li> <li>• Plan for post-construction rehabilitation efforts to offset any environmental impact caused during the construction phase. This could involve planting trees, restoring natural habitats, or other measures to enhance the local environment.</li> </ul>		
	Increased vibration	<ul style="list-style-type: none"> <li>• Explore and implement advanced construction techniques that minimize vibrations. This may include the use of specialized equipment designed to reduce ground vibrations during activities like blasting and impact pile driving.</li> <li>• Establish effective communication channels with the local community to provide timely information about construction schedules and activities that may cause vibrations. This helps residents to take necessary precautions and prepares them for potential disruptions.</li> <li>• Install vibration monitoring devices in key locations to continuously monitor ground vibrations during construction. This real-time data can be used to assess the impact and adjust construction methods accordingly to stay within acceptable limits</li> <li>• Modify construction methods to minimize vibration generation. For example, consider alternative pile driving techniques or adjust blasting procedures to reduce the intensity of vibrations.</li> <li>• Foster an open dialogue with the local community to address concerns and gather feedback. This engagement can help in refining mitigation measures based on community input and building a collaborative approach to managing the impact.</li> </ul>	Contractor/PIT	N/A
	Loss of Visual Aesthetics	<ul style="list-style-type: none"> <li>• All structures should adhere to set standards in terms of quality, shapes, height, color etc.</li> </ul>	Contractor/PIT	4,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>• Integrate landscaping initiatives and create green spaces within and around the project site. Planting trees and maintaining natural elements will help preserve the visual appeal and soften the urbanized look.</li> <li>• Implement visual barriers such as construction fences, temporary screens, or artistic panels to shield construction activities from direct view. This will minimize the visual intrusion experienced by residents.</li> <li>• Enforce strict construction schedules to limit noisy and visually disruptive activities to specific hours, reducing the impact on the community during peak times.</li> <li>• Foster open communication with the local community to gather feedback and address concerns related to visual changes. This involvement can help tailor mitigation efforts to meet community expectations.</li> <li>• If nighttime construction is necessary, use low-impact lighting to minimize light pollution. Shielding and directing lights away from residential areas will preserve the night sky's visual quality.</li> <li>• Develop comprehensive plans for the post-construction period, including the restoration of altered landscapes. This may involve replanting native vegetation and restoring natural features to enhance the visual aesthetics.</li> </ul>		
<b>OPERATIONAL AND MAINTANANCE PHASE</b>				
<b>POAITIVE SOCIAL IMPACTS</b>				
1	Employment opportunities	<ul style="list-style-type: none"> <li>• Give priority to locals on non technical jobs</li> <li>• Develop good communication with local officials</li> </ul>	PIT	N/A
2	Regional economic boost	<ul style="list-style-type: none"> <li>• Provide long-term employment opportunities in diverse sectors such as administration, IT, finance, and management.</li> <li>• Enhance growth of Local businesses, including restaurants, cafes, retail stores, and service providers, benefit from the increased foot traffic and demand generated by the new office workers.</li> <li>• Create opportunities for local suppliers and contractors.</li> </ul>	PIT	N/A

S/N	Environment al & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>Engage in corporate social responsibility (CSR) activities, contributing to local social projects, education, and community services.</li> <li>The office building will become a hub for networking, collaboration, and innovation, attracting talent and fostering a culture of entrepreneurship.</li> <li>Establishing tech hubs within the office building to drive technological advancements and startup growth</li> </ul>		
3	Knowledge exchange	<ul style="list-style-type: none"> <li>Implement skill development programs and training initiatives</li> <li>Foster partnerships with local local universities and other training institutions</li> </ul>	PIT	N/A
4	Community Engagement	<ul style="list-style-type: none"> <li>Offer training programs and workshops to to enhance their skills and make them more employable in the growing market.</li> <li>Collaborate with training institutions to provide specialized training in areas related to the services and goods in demand</li> </ul>	PIT	N/A
5	Government Revenue Collection and economic growth	<ul style="list-style-type: none"> <li>The project will allocate a portion of its generated revenue to various governmental regulatory authorities such as the NEMC, DUWASA, TANESCO, FIRE and Rescue Force, and OSHA. This financial support will enable these authorities to carry out their functions effectively and contribute to overall regional development.</li> <li>Local authorities should identify the new sources of revenue in the area.</li> <li>Strengthening revenue collection mechanisms.</li> <li>Awareness creation for the people in the area on the importance of paying revenues.</li> </ul>	PIT	N/A



S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
<b>NEGATIVE SOCIAL IMPACTS</b>				
9	Increased incidences of diseases and ill health	<ul style="list-style-type: none"> <li>○ Implement public health education campaigns should be implemented to raise awareness about the transmission routes and prevention methods of HIV/AIDS and other infectious diseases.</li> <li>○ Ensure proper ventilation systems are in place to circulate fresh air throughout the building, reducing the concentration of airborne contaminants and preventing the spread of airborne diseases.</li> <li>○ Implement strict cleaning protocols to maintain cleanliness and hygiene within the building, including regular disinfection of frequently touched surfaces such as doorknobs, desks, and bathrooms.</li> <li>○ Develop and enforce health and safety policies that promote personal hygiene practices such as handwashing, respiratory etiquette (covering coughs and sneezes), and staying home when sick.</li> <li>○ Implement measures to reduce overcrowding within the building, such as staggered work schedules, telecommuting options, or rotating shifts, to minimize the risk of disease transmission in crowded areas.</li> <li>○ Consider implementing health screenings for employees and visitors entering the building, including temperature checks and symptom screenings, to identify and prevent the spread of contagious illnesses.</li> <li>○ Encourage vaccination among employees to protect against vaccine-preventable diseases such as influenza, measles, and COVID-19, if applicable.</li> <li>○ Ensure proper waste management practices are in place to prevent the accumulation of waste materials that could harbor disease-causing organisms and attract pests.</li> <li>○ Provide education and training to employees on disease prevention measures, recognizing symptoms of common illnesses, and the importance of seeking medical attention when necessary.</li> <li>○ Ensure employees have access to healthcare services and encourage them to seek medical attention promptly if they develop symptoms of illness.</li> </ul>	PIT	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
10	Increased pressure on social services and utilities	<ul style="list-style-type: none"> <li>○ Implementing energy-efficient technologies within the building, such as LED lighting and energy-efficient appliances, can reduce electricity demand.</li> <li>○ Water-saving fixtures and practices, such as low-flow toilets and faucets, can help conserve water usage.</li> <li>○ Conducting regular audits to identify areas of inefficiency and implementing conservation measures can further reduce resource consumption.</li> <li>○ Collaborating with local utility providers to assess and potentially upgrade infrastructure capacity can ensure sufficient water and electricity supply to meet the building's needs.</li> <li>○ Promoting employee awareness and engagement through education and training on sustainable practices can foster a culture of conservation within the office</li> </ul>	PIT	5,000,000
11	Disruption of Traffic flow	<ul style="list-style-type: none"> <li>○ Constructing designated parking spaces with adequate capacity that can accommodate vehicles efficiently and avoid on-street parking, which often exacerbates traffic congestion</li> <li>○</li> </ul>	PIT	N/A
13	Health and safety risks due to fire hazards	<ul style="list-style-type: none"> <li>○ Adequate number of appropriate fire fighting equipments like portable fire extinguishers and hydrant should be available onsite and serviced ontime</li> <li>○ Regular undertakes fire and other disaster drills and awareness training shall be conducted.</li> <li>○ Fire detectors and sprinkler systems should be installed in the buildings.</li> <li>○ Workers should be sensitized on appropriate fire prevention measures</li> <li>○ Good housekeeping should be maintained at all sites to reduce the fire risk.</li> <li>○ The design of the has strictly adhered to the Fire Safety Standards.</li> </ul>	PIT	5,000,000
<b>ENVIRONMENTAL IMPACTS</b>				

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
17	Energy Consumption and Greenhouse Gas Emissions	<ul style="list-style-type: none"> <li>Implement energy-efficient technologies such as LED lighting, motion sensors, and programmable thermostats to reduce energy consumption.</li> <li>If possible Install renewable energy sources such as solar panels to offset electricity usage.</li> <li>Encourage staff to adopt energy-saving practices like turning off lights and equipment when not in use.</li> </ul>	PIT	5,000,000
18	Increased storm water generation and overflow	<ul style="list-style-type: none"> <li>The storm water will be designed accordingly</li> <li>The design shall provide sufficient greenery area for facilitating soil infiltration.</li> <li>Creating rainwater management systems can help prevent runoff and promote infiltration. This may include the use of rainwater harvesting tanks, drainage systems, and water retention areas for collecting and distributing rainwater</li> <li>Installing permeable pavements to promote infiltration and reduce runoff.</li> <li>Utilizing green roofs on buildings to absorb and slow stormwater runoff, reducing the volume and velocity of water entering the drainage system.</li> </ul>	PIT	N/A
19	Impact from poor hygienic condition	<ul style="list-style-type: none"> <li>Provision of adequate toilets for workers and visitors.</li> <li>Sensitisation of workers on understanding of potential health and safety issues related to poor hygienic condition.</li> <li>Regular Inspection and maintenance of the waste water system network</li> <li>Improve dust suppression mechanisms within the building premises</li> </ul>	PIT	1,500,000
20	Generation of solid and hazardous wastes	<ul style="list-style-type: none"> <li>Provision of dust bins or rubbish pits for the wastes produced.</li> <li>Ensure that the scrap metals and other hazardous wastes are well managed stored and dispersed off via licensed scrap metal dealers.</li> </ul>	PIT	1,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>• Encourage staff to reduce paper usage through digital documentation and double-sided printing.</li> <li>• Partner with waste management companies to ensure proper disposal and recycling of waste materials.</li> <li>• Prohibit open burning since will increase pollutant gases to the atmosphere.</li> <li>• Implement a comprehensive waste segregation system to categorize different types of waste materials.</li> <li>• Implement a waste segregation system that separates waste into different categories such as recyclables (paper, plastic, glass, metal), organic waste (food scraps, yard waste), and non-recyclables. Provide clearly labeled bins for each category in easily accessible areas.</li> </ul>		
21	Generation of Liquid waste	<ul style="list-style-type: none"> <li>• Ensure that the wastewater is properly treated before being discharged into the receiving environment.</li> <li>• Develop and implement comprehensive waste management plans specifically targeting liquid waste generated. This includes proper disposal methods and the use of environmentally friendly practices.</li> <li>• Optimize sanitation systems to minimize liquid waste production. This may involve the installation of water-efficient fixtures, regular maintenance to address leaks, and the use of technologies that reduce water usage in sanitation facilities.</li> <li>• Implement strategies to control and manage rainwater runoff to prevent contamination. This could involve the installation of permeable surfaces, green infrastructure, and drainage systems designed to capture and treat runoff before it enters water bodies.</li> <li>• Promote water-efficient practices in laboratories to reduce water consumption. This may include the use of advanced equipment that minimizes water usage, recycling systems for laboratory water, and the adoption of best practices in water conservation.</li> <li>• Establish monitoring programs to regularly assess liquid waste generation and ensure compliance with environmental regulations.</li> </ul>	PIT	3,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<p>This involves conducting regular inspections, implementing corrective actions when necessary, and maintaining records to track the effectiveness of mitigation measures</p> <ul style="list-style-type: none"> <li>• Conduct training programs for staff involved in construction and operation to raise awareness about the importance of liquid waste management. Promote a culture of environmental responsibility and provide guidelines for responsible waste disposal.</li> <li>• Develop and implement emergency response plans to address unforeseen spills or incidents related to liquid waste. This includes having the necessary equipment and trained personnel to respond promptly to minimize the impact on the environment</li> </ul>		
<b>DECOMMISSIONING PHASE</b>				
<b>SOCIAL IMPACTS</b>				
	Loss of employment and business opportunities	<ul style="list-style-type: none"> <li>• Seminars shall be conducted on alternative means of livelihood after termination of job.</li> <li>• Implement comprehensive employment transition programs for affected workers, including skill development and retraining initiatives to enhance their employability in alternative sectors.</li> <li>• Establish a support mechanism for local businesses affected by the decommissioning, providing training, and resources to adapt to new market conditions</li> <li>• Conduct regular and transparent communication with stakeholders, including affected communities, to keep them informed about the decommissioning process, potential impacts, and mitigation measures.</li> <li>• Work closely with local government authorities to identify and implement measures to offset the negative impact on the affected persons, such as creating alternative employment opportunities or initiating community development projects</li> </ul>	PIT	N/A
	Loss of revenue to institutions	<ul style="list-style-type: none"> <li>• Explore alternative revenue streams to compensate for the loss incurred from the discontinued project.</li> </ul>	PIT	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
	and the government	<ul style="list-style-type: none"> <li>• Identify and develop new projects or initiatives that can generate income for both institutions and the government</li> <li>• Implement economic development programs in the project area to stimulate local economic opportunities.</li> <li>• Encourage entrepreneurship and job creation to offset the negative economic impact on residents.</li> <li>• Engage with the affected communities to understand their needs and concerns.</li> <li>• Implement social support programs or initiatives to assist individuals and businesses impacted by the loss of economic opportunities</li> </ul>		
<b>• NEGATIVE ENVIRONMENTAL IMPACTS</b>				
	Loss of aesthetic value due to haphazard disposal of demolished waste	<ul style="list-style-type: none"> <li>• Formulate a comprehensive waste management plan specifically tailored for the decommissioning phase. And, clearly outline procedures for the segregation, collection, transportation, and disposal of demolished waste.</li> <li>• Implement demolition techniques that minimize the generation of waste and reduce environmental impact.</li> <li>• Opt for methods that allow for the salvage and reuse of materials, thereby decreasing the amount of waste generated.</li> <li>• Conduct a thorough site characterization and assessment to identify potential environmental sensitivities and vulnerabilities. This will aid in determining appropriate disposal methods and areas, preventing contamination of soil and water bodies.</li> <li>• Identify and designate specific areas for waste disposal, ensuring they are environmentally suitable and comply with regulations.</li> <li>• Implement measures to prevent leachate from entering soil and water bodies.</li> <li>• Establish a monitoring and inspection program to assess the effectiveness of waste disposal measures.</li> <li>• Regularly inspect the disposal areas to identify and address any issues promptly.</li> </ul>	Contractor/PIT	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>Engage with the local community to raise awareness about the importance of proper waste disposal during decommissioning. Also, encourage community participation in waste management initiatives</li> </ul>		
	Dust and noise pollution from demolishing works	<ul style="list-style-type: none"> <li>Restrict demolition activities to specific time periods during the day when noise impact is likely to be less disruptive, such as during normal working hours. This can help minimize the disturbance to both site workers and residents</li> <li>Inform and engage with residents and workers in the surrounding areas about the timing and nature of the demolition work. Providing regular updates and addressing concerns can contribute to better community understanding and cooperation.</li> <li>Implement a comprehensive air quality monitoring system to track the emission of dust particles during demolition. This can help identify any exceedances of air quality standards and trigger immediate corrective actions.</li> <li>Dust suppression techniques, such as water spraying or misting systems, to control the release of dust particles into the air. This can help mitigate the impact on air quality and reduce potential health hazards.</li> <li>Provide site workers with appropriate PPE, such as masks or respirators, to minimize their exposure to airborne particulate matter and protect their health during the demolition activities.</li> <li>Ensure strict adherence to local regulations and standards related to noise and air quality during demolition. This includes obtaining necessary permits and approvals, as well as complying with established limits for noise and air pollutant emissions</li> </ul>	Contractor/PIT	5,000,000
	Health hazards to workers from demolishing work	<ul style="list-style-type: none"> <li>Contractor should prepare health and safety management plan</li> <li>Personal protective equipment (PPE), e.g., helmets, boots, goggles, earplugs, gloves and others will be provided and their use enforced to all workers involved in demolishing of structures during closure.</li> </ul>	Contractor/PIT	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible party	Estimated cost (TZS) Per Annum
		<ul style="list-style-type: none"> <li>• Contractor shall have registered and qualified HSE personnel to ensure health and safety of workers within the project area.</li> <li>• All workers involved in the demolishing work will be provided with training on health and safety matters</li> <li>• In case of injuries, a well-equipped first aid kit will be onsite and injured workers will be provided first aid service by a trained first aider</li> <li>• Hygienic conditions within the working areas will be maintained and enforced</li> </ul>		
<b>Total cost of mitigation measure (TZS)</b>				<b>90,500,000</b>



## CHAPTER EIGHT

### 8 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

#### 8.1 Introduction

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. There are four types of monitoring that are relevant to this ESIA.

- **Baseline monitoring:** the measurement of environmental parameters during a pre-project period and operation period to determine the nature and ranges of natural variations and where possible establish the process of change.
- **Impact/effect monitoring:** involves the measurement of parameters (performance indicators) during establishment, operation and decommissioning phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project. This monitoring provides experience for future projects and lessons that can be used to improve implementation methods and techniques.
- **Compliance monitoring:** takes the form of periodic sampling and continuous measurement of relevant parameter levels for checking compliance with standards and thresholds – e.g., for waste discharge, air pollution.
- **Mitigation monitoring** aims to determine the suitability and effectiveness of mitigation programs designed to diminish or compensate for adverse effects of the project.

Among the key issues to be monitored will be: (i) the status of the biological conditions; (ii) status of the physical works; (iii) the technical and environmental problems encountered; (iii) proposed solutions to the problems encountered; and, (v) the effectiveness of environmental and social measures adopted.

To ensure that mitigation measures are properly done, monitoring is essential. Table 8.1 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer are to be included in the project cost.

#### 8.2 Monitoring Frequency and reporting

Monitoring frequency is proposed for each critical parameter depending on the likelihood and level of change over time. Some parameters take longer time to show changes while others would change in very short time. Ambient air levels of pollutant gases in and around the project should be measured annually. Air emissions should be monitored after the air pollution control device for particulate matter (or alternatively an opacity level of less than 10%). Frequent sampling for parameters should be undertaken during start-up and continue throughout the operation and demobilisation phase. Some monitoring may have to continue even beyond demobilisation for impacts such as effects of the wastewater discharged into the environment.

Other parameters such as income, revenue, employment, changes in livelihoods, use of resources (water, energy) and changes in norms and values will be monitored on annual basis, so as to allow for change to take place.

Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions should be taken. Proponent is required to maintain records of air emission, effluents, hazardous waste sent off site as well as other parameters, fires, emergencies, accidents and ill health that may impact on the environment

or workers. Records of monitoring results should be kept in an acceptable format and easily accessible, and information reviewed and evaluated to improve the effectiveness of the environmental protection.

### **8.3 8.3 Monitoring Plan**

The proposed monitoring plan (Table 9.1) will be used by the proponent or the hired consultant for monitoring the proposed facilities during construction period and contains the following;

- The predicted impacts to be monitored as per schedule.
- Main parameters to be monitored.
- The sampling area.
- Where possible units or methods to be applied are indicated.
- The levels or target standards to be observed are also shown.
- The approximate costs. However, costs might change with the fluctuations of the shilling and cost escalations.

**Table 8-1: Proposed Environmental and Social Monitoring Plan (ESMP) for mobilisation/planning phase, construction phase, demobilisation phase and operation phase**

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
<b>MOBILIZATION AND CONSTRUCTION PHASE</b>							
Disruption of social activities	Number of complaints	<ul style="list-style-type: none"> <li>Regular communication with stakeholders</li> <li>Establish channels for receiving and addressing complaints or concerns from the public</li> <li>Monitor traffic flow and public transport availability, implementing traffic management plans and providing alternative routes if necessary</li> <li>Regularly measure dust and noise levels to ensure they stay within acceptable limits</li> </ul>	Weekly	Observation of records of complaints	No disrupted activities	Contractor/PIT	N/A
Air pollution from noxious gasses	Measurement of ambient gaseous (Noxious gasses (CO, CO <sub>2</sub> , NO, NO <sub>x</sub> , SO <sub>x</sub> ))	<ul style="list-style-type: none"> <li>Regularly verify that pollutant levels are within the limits set by local environmental regulations.</li> <li>Monitor gas emissions during the handling of materials such as cement, sand, and other fine particles that can become airborne</li> <li>The continuous measurement and analysis of emissions from construction activities that may release noxious gases into the atmosphere.</li> <li>Monitoring stations will be strategically placed to capture data on air pollutants, and real-time monitoring</li> </ul>	Quarterly	Measurement of ambient gaseous	TBS / WHO Guidelines • SO <sub>2</sub> < 0.5mg/m <sup>3</sup> • CO < 10 - 30mg/m <sup>3</sup> • NO <sub>x</sub> < 0.12-0.2 Conforming to EC directive 89/336/EEC	Contractor/PIT	1,500,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		<p>devices will be employed to track levels of harmful gases.</p> <ul style="list-style-type: none"> <li>• Periodic site inspections and air quality assessments to ensure compliance with established environmental standards and regulations.</li> <li>• If elevated levels of noxious gases are detected, immediate corrective actions should be implemented to mitigate the impact, and adjustments to construction practices may be made to minimize air pollution.</li> <li>• Regular reporting and communication of monitoring results to relevant stakeholders will be integral to maintaining transparency and accountability throughout the construction phase</li> </ul>			and ISO 12103-1		
Air pollution from dust emission	Particulate matter (PM <sub>10</sub> & PM <sub>2.5</sub> )	<ul style="list-style-type: none"> <li>• Regularly verify that pollutant levels are within the limits set by local environmental regulations.</li> <li>• Monitor dust emissions during the handling of materials such as cement, sand, and other fine particles that can become airborne</li> <li>• Frequent inspections of dust control measures, such as water spraying and dust suppression systems, to ensure their effectiveness.</li> <li>• Real-time monitoring tools and periodic site visits will be employed to promptly identify any exceedances of</li> </ul>	Quarterly	Measurement of particulate matter	TBS / WHO Standard  (PM <sub>10</sub> < 0.05-0.15 mg/m <sup>3</sup> & PM <sub>2.5</sub> <0.025-0.075 mg/m <sup>3</sup> )	PIT/Consultant	2,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		<p>acceptable dust levels through visual inspection. Also, the data collected shall inform timely corrective measures and adjustments to mitigate the impact of dust emissions on air quality, safeguarding both the environment and the well-being of the local community.</p> <ul style="list-style-type: none"> <li>Implement measures like water spraying, dust suppressants, and covering of stockpiles to reduce dust generation</li> </ul>					
Noise generation	Noise levels	<ul style="list-style-type: none"> <li>Identify and understand local noise regulations and standards that apply to construction activities.</li> <li>Implement continuous noise monitoring to capture data throughout the construction period</li> <li>The monitoring action for noise generation during the construction phase involves regular and systematic assessments of the decibel levels produced by construction activities. This includes; <ul style="list-style-type: none"> <li>The use of sound measuring devices positioned strategically across the construction site and its immediate surroundings.</li> <li>Track variations in noise levels to ensure compliance with established environmental regulations and standards.</li> </ul> </li> </ul>	Monthly	Inspection	<p>In compliance with WB and TBS standards:</p> <ul style="list-style-type: none"> <li>Daytime noise levels &lt; 60 dB</li> <li>Night-time noise levels &lt; 50 dB</li> </ul>	PIT/Consultant	1,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		<ul style="list-style-type: none"> <li>• Identification and implementation of mitigation measures if noise levels exceed permissible limits.</li> <li>• Hold regular meetings with community stakeholders to inform them of construction progress and any anticipated noisy activities</li> <li>• Establish a system for receiving and addressing noise complaints from the community.</li> </ul>					
Solid and liquid waste generation	Solid and Liquid waste (Kg for Solid waste, Litres for Liquid waste)	<ul style="list-style-type: none"> <li>• The monitoring actions for solid and liquid waste generation during the construction phase of the proposed development involve regular and systematic checks to ensure compliance with environmental and social standards</li> <li>• Continuous observation and documentation of waste disposal practices, both solid and liquid, to assess their impact on the surrounding environment.</li> <li>• Routine inspections, data collection on waste quantities and types, and verification of adherence to waste management protocols.</li> <li>• Immediate corrective measures should be implemented if any deviations or non-compliance are identified, with ongoing reporting and communication to stakeholders to maintain</li> </ul>	Weekly	Observation and M	No discharge of waste to the natural/open environment	PIT/Consultant	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		transparency throughout the construction phase.					
Health and Safety risks	- Number and type of safety equipment such as mask, helmet gloves and earplugs	<ul style="list-style-type: none"> <li>• Conduct daily, weekly, and monthly site inspections to identify potential hazards</li> <li>• Use checklists to ensure all areas and aspects of the site are covered</li> <li>• Continuously assess the site for new hazards that may arise as the project progresses</li> <li>• Observe workers to ensure they are following safe work practices and using personal protective equipment (PPE) correctly</li> <li>• Ensure all workers receive appropriate health and safety training before starting work and when new risks are identified</li> <li>• Conduct emergency drills to ensure all workers are familiar with procedures.</li> <li>• Monitor workers' health through regular medical check-ups and health assessments, especially for those exposed to hazardous substances or strenuous activities</li> <li>• Conduct regular maintenance and safety checks on all equipment and machinery</li> </ul>	Quarterly	Inspection; Voluntary testing;	Zero incidences/accidence	PIT/Consultant	7,000,000
Impact on natural resource	Amount of water and	<ul style="list-style-type: none"> <li>• Install smart meters to monitor real-time water and energy consumption</li> </ul>	Monthly	Measurement/ records / Observation	Efficient use of water	PIT/Consultant	10,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
(Energy and water)	energy consumed	<ul style="list-style-type: none"> <li>Maintain logs of daily and weekly water and energy consumption</li> <li>Monitoring the usage patterns, identifying potential sources of inefficiency or waste, and implementing measures to optimize resource utilization.</li> <li>Track the project's adherence to sustainable practices, ensuring that energy is sourced efficiently, and water usage is minimized.</li> </ul>					
<b>OPERATIONAL AND MAINTANANCE PHASE</b>							
Solid and liquid waste generation	Solid and Liquid waste	<ul style="list-style-type: none"> <li>Conduct regular waste audits to assess the types and quantities of solid and liquid waste generated</li> <li>Establish tracking systems to monitor the flow of waste from generation to disposal</li> <li>Provide training to employees on proper waste management practices</li> </ul>	Weekly	Observation and Measurement	No discharge of waste to the natural/open environment	PIT/Consultant	1,500,000
Health and Safety risks	- General safety condition of the area	<ul style="list-style-type: none"> <li>Conduct regular risk assessments to identify potential hazards</li> <li>Schedule regular safety audits and site inspections</li> <li>Develop and communicate emergency procedures</li> <li>Implement programs to promote safe behavior and attitudes among workers</li> <li>Identify and address any potential health and safety risks promptly, fostering a secure and healthy</li> </ul>	Quarterly	Inspection; Voluntary testing;	Zero incidences/accidence	PIT/Consultant	5,000,000



Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		environment throughout the office building's operational lifecycle.					
Impact due to Fire hazard	-Presence of fire fighting equipments and their statuses	<ul style="list-style-type: none"> <li>Conduct regular inspections of the office building to check for potential fire hazards such as exposed wiring, overloaded power outlets, and flammable materials.</li> <li>Regularly test and maintain fire detection and alarm systems to ensure they are functioning correctly</li> <li>Continuous monitoring of fire risks and readiness to address emergencies is crucial.</li> <li>Maintaining communication channels with local emergency services and periodically reviewing and updating the Fire Prevention and Emergency Response Plan to ensure its relevance and efficiency in mitigating fire hazards.</li> <li>Regular reporting and documentation of fire-related incidents, near misses, and corrective actions taken should be part of the monitoring system to enhance accountability and continual improvement.</li> <li>Provide regular fire safety training for all employees, including the use of fire extinguishers, the operation of alarm systems, and evacuation procedures.</li> </ul>	Quarterly	Inspection	Fire and Rescue Force Regulations/ No fire hazards	PIT/Consultant	5,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
Increase in Energy Demand	-Energy usage records	<ul style="list-style-type: none"> <li>Performing regular audits (annually or biannually) to track progress and identify new opportunities for energy savings</li> <li>Implement an Energy Management System that integrates various energy-consuming systems (HVAC, lighting, appliances) for real-time monitoring and control</li> <li>Ensure that the increased energy demand aligns with the projected estimates and complies with environmental standards.</li> </ul>	Quarterly	Inspection	Efficient use of Energy	PIT/Consultant	5,000,000
Increase in water demand	-Water usage records	<ul style="list-style-type: none"> <li>Install a main water meter to monitor the overall water consumption of the building.</li> <li>Check water usage data regularly to spot any unusual spikes or patterns.</li> <li>Conduct regular inspections of plumbing fixtures, pipes, and appliances to detect leaks</li> <li>Install low-flow toilets, faucets, and showerheads to reduce water consumption.</li> <li>Educate employees about the importance of water conservation and how they can contribute</li> </ul>	Quarterly	Inspection and measurement	Efficient use of water	PIT/Consultant	3,000,000
<b>Total</b>							<b>44,000,000</b>

## CHAPTER NINE

### 9 COST BENEFIT ANALYSIS

#### 9.1 Introduction

Cost Benefit Analysis (CBA) is the systematic process for calculating and comparing absolute costs and benefits of Business Resources. Costs and benefits are expressed in concrete monetary terms. The evaluation is often argumentative. However, CBA is a general method of project evaluation. This chapter describes the cost-benefit approach and estimation methods for the major costs and benefits of the proposed establishment. Cost benefit analysis estimates and compares the total benefits and costs of a project to the members of a specified community and project owner. CBA may be conducted at various geographical levels (international, national, state or regional). Critically, the principles and methods of CBA are the same at any spatial level. However, impacts that are transfers within one spatial level, such as the nation, may be benefits or costs at another spatial level, for example at regional level.

#### 9.2 Relevance and challenges

Determining whether the proposed establishment is feasible in absolute terms benefits should outweigh the costs. The relevance and challenges of quantifying CBA lies within its relevance for business operations; help to compare and prioritize measures and identify the most suitable project if comparison has to be made. However, not all data/information necessary for the assessment is readily available to allow for an accurate and comprehensive assessment.

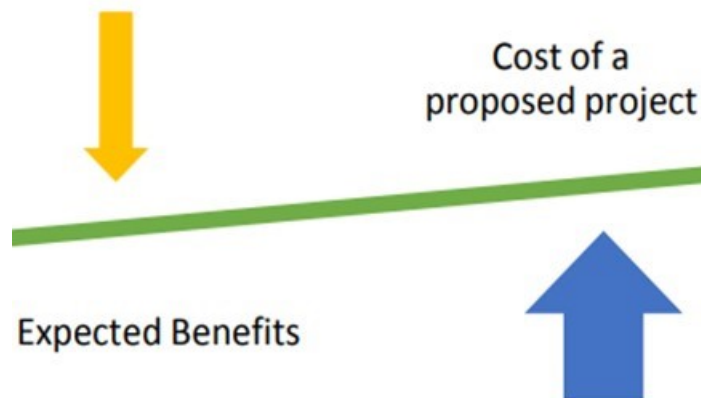


Figure 9-1: Cost and Benefit Analysis for CBA

#### 9.3 Costs analysis

The construction of the STI Complex at Salmin Mtaa to be implemented by COSTECH will incur initial costs related to construction of new building. Based on preliminary estimates and market research, the total construction cost is projected to be Seven Billion Three Hundred Sixty Million (TZS 7,360,000,000/-).

#### 9.4 Benefit analysis

- **Increased Operational Efficiency:** The new office building will provide modern facilities and infrastructure, leading to improved productivity and efficiency among staff.

- **Enhanced Collaboration:** The design of the new building will facilitate collaboration and knowledge sharing among employees, leading to better outcomes and innovations in research, science, and technology.
- **Better Public Services:** The construction of the office building will enable to deliver better services to the public, thereby enhancing its reputation and credibility.
- **Economic Stimulus:** The construction phase of the project will create jobs and stimulate economic activity in the local area, contributing to overall economic growth.

### 9.5 Cost of utilities and maintenances

- **Utilities:** The estimated annual cost of utilities (electricity, water, etc.) for the office building is TZS 15,000,000/= [Utilities Cost].
- **Maintenance:** The estimated annual cost of maintenance (cleaning, repairs, etc.) for the office building is TZS 20,000,000/= [Maintenance Cost].

### 9.6 Financial analysis

Net Present Value (NPV): To calculate the NPV, we discounted the future cash flows (benefits) generated by the project at an appropriate discount rate (e.g., 8%) over the project's lifespan. The NPV is calculated as the present value of future benefits minus the initial investment cost.  

$$\text{NPV} = \text{Present Value of Benefits} - \text{Initial Investment Cost}$$

### 9.7 Environmental cost benefit analysis

Environmental cost benefit analysis is assessed in terms of the negative versus positive analysis. Furthermore, the analysis is made to consider whether the impacts can be mitigated and the costs of mitigating the impacts are reasonable. As it has been mentioned, the benefits of the project, in terms of financial and social benefit are substantial, the environmental impacts may be mitigated and the financial resources needed to mitigate the impacts are relatively small compared to the actual capital investment (see table 7.2 and 8.1 of Environmental and Social Management and Monitoring Plan).

### 9.8 Social economic cost benefit analysis

The project may contribute to enhancing investment in various business and services that shall indirectly encourage local investors to invest more in the economy. All these will enhance employment opportunities to the Tanzanian citizens and contribute towards poverty reduction. As it can be seen in the impact analysis, there are no serious negative social economic impacts. It can therefore be deduced that the social benefit outweighs the social costs that are anticipated.

### 9.9 Net present value (npv) analysis

Utilizing a discount rate of 8%, the NPV of the proposed STI Complex over a 10-year period is calculated by subtracting the present value of costs from the present value of benefits. The NPV is a key indicator of the project's economic viability.

$$NPV = \sum_{t=1}^{10} \frac{Benefit_t - Cost_t}{(1+r)^t}$$

Where:

- $Benefit_t$  is the net benefit in year  $t$ ,
- $Cost_t$  is the net cost in year  $t$ , and
- $r$  is the discount rate.

### 9.10 Conclusion

Based on the cost-benefit analysis conducted, the construction of the STI Complex for COSTECH represents a financially viable investment with substantial long-term benefits. The project is expected to enhance operational efficiency, foster collaboration, improve public services, and stimulate economic growth. The NPV analysis indicates that the benefits outweigh the costs, further supporting the decision to proceed with the construction.

### 9.11 Recommendations

It is recommended that COSTECH proceed with the construction of the STI Complex as outlined in this report. However, close monitoring of costs and implementation schedules is advised to ensure the project stays within budget and on schedule.

## CHAPTER TEN

### 10 DECOMMISSIONING PLAN

#### 10.1 Preliminary Decommissioning Plan

The project is anticipated to last for over 50 years based on buildings standards and this document outlines an initial decommissioning plan. The plan aims to establish practical decommissioning approaches that can be executed safely, without endangering the public's health and safety, decommissioning personnel, or causing harm to the environment. It adheres to the guidelines and regulations set by relevant regulatory agencies. The purpose of this preliminary decommissioning plan is to ensure that the decommissioning and final disposition of the project though it's not expected to happen are taken into account during the project's initial design phase.

This preliminary plan will remain a dynamic document and undergo revisions throughout the operational life of the project. Regular reviews and updates will be conducted to incorporate any changes in facility construction or operation that may impact the decommissioning process. The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site.

#### 10.2 Objectives of the Plan

The initial plan aims to prioritize the inclusion of decommissioning as a crucial factor right from the beginning of the project, throughout the design phase, and during the operation phase. The plan serves the following objectives:

- The primary objective of the preliminary plan is to ensure that designers of the building and infrastructure are fully aware of decommissioning requirements during the initial project design. This means that if there are design options available for materials, system components, and component locations that can enhance decommissioning, those choices should be made.
- Another goal of the preliminary plan is to identify the potential decommissioning options and the final status of the facility. These options will be evaluated and narrowed down to the preferred decommissioning method as the end of the project lifespan approaches.
- The final purpose of the preliminary plan is to demonstrate to regulatory agencies that important considerations regarding decommissioning are taken into account as early as possible during the initial project design.
- Additionally, the plan serves as a starting point to showcase various aspects related to decommissioning, such as methods, costs, schedules, and the operational impact on the infrastructure facilities.
- The plan acts as the initial reference to show that aspects like decommissioning techniques, expenses, timelines, and operational effects on decommissioning will undergo continuous evaluation and improvement throughout the operational lifespan.

The plan will outline feasible decommissioning methods for the project, providing a general description. This description should demonstrate the practicality of the considered methods and their ability to ensure the health and safety of the public and decommissioning personnel. Design personnel should thoroughly examine the proposed decommissioning methods and take measures to incorporate design features that will facilitate the decommissioning process. Key considerations include:

- Estimating the required manpower, materials, and costs to support the decommissioning activities.

- Describing the intended final disposition and status of the plant and site after decommissioning.
- Discussing the commitment to allocate adequate financing for the decommissioning process.
- Identifying the necessary records to be maintained throughout the construction and operation phases that will aid in decommissioning, such as a complete set of "as built" drawings.

### **10.3 Preliminary Plan**

#### **Project Removal Methodology and Schedule**

COSTECH will be responsible for financing and carrying out all aspects of project decommissioning, which includes engineering, environmental assessment, permitting, construction, and mitigation activities related to the removal of the building facilities, as outlined in this Plan. The Proponent must also address the environmental impacts during and after the project removal by promptly responding to defined events during the monitoring phase.

Furthermore, the proponent is obligated to safely remove the facilities and its accompanying structures in a manner that:

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

The process of project removal will commence three months after closure and extend for a period of 6 months. During the initial 2 months following closure, the proponent will conduct an inventory of all components requiring removal or disposal. This inventory will encompass the identification of buildings and structures, to be demolished. Also, the method of disposal will be finalized. This information will be crucial for the development of the final decommissioning plan, which will then undergo approval by relevant authorities including NEMC.

Upon approval of the decommissioning plan, the removal of metal parts will be prioritized within the first month to prevent any potential vandalism. Subsequently, in the second month of the decommissioning process, the focus will shift towards removing concrete structures and foundations. The resulting debris will be repurposed as fill material for rural roads.

#### **Component to be demolished**

The elements of the project that need to be demolished are typically built using load-bearing masonry walls along with roofs made of steel or timber frames, as well as metal roofs.

##### **1. Buildings and other infrastructure**

- All construction elements, such as buildings, pillars, platforms, or ramps supporting machinery or equipment, will be dismantled and secured to ensure safety. The areas previously occupied by these structures will be restored and replanted with vegetation as necessary.
- Equipment that is no longer functional will be sold through an auction process to scrap dealers.
- The future utilisation of the water supply infrastructure (pipeline) will be determined in collaboration with the National and District Closure Committees. The project aims to transfer the pipeline infrastructure to the district for its ongoing use.

All disturbed areas will be landscaped and re-vegetated using indigenous trees

### 10.3.3 Decommissioning Phase

Project decommissioning has five phases:

- Pre-removal monitoring;
- Permitting;
- Interim protective measures;
- Project removal and associated protective actions; and
- Post-removal activities, including monitoring of environment and socio-economic activities.

The initial three phases will occur before the Project is removed, specifically within the first six months. The fourth phase, which involves the removal of the project and necessary protective measures, will take place six months after project closure. The fifth phase will commence after complete removal of the project, and due to its medium scale and relatively moderate impacts, it will continue for at least two years.

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

- a. **Pre-removal monitoring:** This phase involves assessing the environmental and socio-economic conditions of the project and its surroundings. The purpose is to identify any environmental or social liabilities that need to be addressed before obtaining closure permits. Additionally, this period will include inventorying all assets and facilities that require disposal and preparing a final decommissioning plan for approval by the National Environment Management Council (NEMC).
- b. **Permitting:** The proponent will acquire all necessary permits required for the project's removal. This includes permits from MoEST, NEMC, Local Government Authorities, and others as necessary.
- c. **Interim Protective Actions:** This phase focuses on implementing any interim measures necessary to safeguard human health and the environment during the removal process.
- d. **Project Removal:** As mentioned earlier, the project will be completely removed within a six-month timeframe.
- e. **Post-Removal Activities:** Following the project's removal, monitoring activities will continue for a period of two years to assess any lingering impacts.

Detailed information regarding the decommissioning of the project and its associated impacts, as well as proposed measures to restore the site to its former state, are provided in Table 11.1. The estimated cost for the decommissioning plan is TZS 63,000,000 which is subject to change based on currency value and other economic factors at that time.

**Table 10-1: Decommissioning and Closure Plan**

Activity	Closure Plan	Responsibility	Estimated Budget
Take apart all the equipment and dismantle the structures.	<ul style="list-style-type: none"> <li>• Take apart electrical devices such as air conditioners, generators, and other machinery.</li> <li>• Consult with TANESCO (Tanzania Electric Supply Company) to disconnect the power supply for the building project.</li> </ul>	COSTECH and Closure Committee	25,000,000



Activity	Closure Plan	Responsibility	Estimated Budget
	<ul style="list-style-type: none"> <li>• All concrete and metal structures, including offices, washrooms, and pavements, will be demolished.</li> <li>• Warning signs will be displayed, and a fence will be erected around all commercial buildings.</li> <li>• Qualified engineers will supervise all disassembling and demolition activities.</li> <li>• The Closure Committee will oversee and monitor all closure activities to ensure proper execution.</li> <li>• Technical assistance during the closure phase will be sought by consulting relevant stakeholders.</li> </ul>		
Personal Protective Equipment (PPE)	<ul style="list-style-type: none"> <li>• During the closure phase, it is mandatory for all workers to wear suitable personal protective equipment (PPE) such as a helmet, safety boots, dust mask, safety gloves, goggles, protective garments, and a safety vest.</li> </ul>	COSTECH and Closure Committee	5,000,000
Waste Management	<ul style="list-style-type: none"> <li>• During the closure phase, proper waste sorting will be implemented for efficient management.</li> <li>• A review process will be established to regularly update the waste management plan to adapt to changes in building plans, schedules, community standards, and recognized best practices.</li> <li>• Instead of being dumped on land, debris can be utilized to fill feeder roads, providing an alternative use.</li> <li>• Metal materials will be collected and transported to steel factories for recycling and subsequent metal production.</li> <li>• All hazardous wastes discovered during the decommissioning of the building will be cleaned up and disposed of in accordance with regulations. The closure committee will ensure that no waste is disposed of in water bodies</li> </ul>	COSTECH and Closure Committee	3,000,000

Activity	Closure Plan	Responsibility	Estimated Budget
Rehabilitation of project site	<ul style="list-style-type: none"> <li>• A suitable re-vegetation plan will be executed to restore the site to its original condition.</li> <li>• Measures will be implemented during the vegetation period to control surface water runoff and prevent erosion.</li> <li>• Regular monitoring and inspection of the area will be carried out to identify any signs of erosion, and necessary actions will be taken to rectify any occurrences.</li> <li>• Fencing and signage will be installed to limit access and minimize disturbances in newly vegetated areas.</li> </ul>	COSTECH and Closure Committee	30,000,000

## CHAPTER ELEVEN:

### 11 SUMMARY AND CONCLUSION

#### 11.1 Summary

The Environmental and Social Impact Assessment (ESIA) study for the proposed COSTECH STI Complex for the Science and Technology Institution reveals that the project implementation does not pose any significant environmental or social impact to the surrounding environment and community that cannot be mitigated. The project site is situated within a designated government offices area, specifically zoned for such developments, thus ensuring compliance with land-use planning policies. This area is devoid of residential zones and sensitive habitats, thus minimizing the potential for adverse effects on local residents and ecological systems. Comprehensive analysis indicates that the construction and operation of the building will not interfere with existing land uses, and mitigation measures for minor environmental impacts, such as dust and noise during construction, have been appropriately planned.

The absence of nearby residential areas and sensitive ecosystems implies that there are no significant disruptions expected to daily life or natural habitats. The project has been designed with sustainability in mind, incorporating energy-efficient technologies and environmentally friendly construction practices. This includes the use of green building materials, energy-efficient lighting, and water conservation systems, which will collectively reduce the building's ecological footprint. Also, the project's compliance with local environmental regulations and standards will ensure that all impacts will be managed and mitigated, further safeguarding the surrounding environment.

Moreover, the establishment of the STI Complex is expected to yield substantial social and economic benefits. It will serve as a hub for the scientist, Researchers, and innovators fostering an environment conducive to advanced research and development activities. The presence of this facility will likely attract highly skilled professionals, stimulate local economic growth through the creation of job opportunities, and enhance the area's reputation as a center for scientific and technological innovation. The new office building will provide modern facilities and infrastructure that will support collaborative projects, education, and training programs, thereby contributing to the broader goals of national development and technological advancement.

#### 11.2 Conclusion

The ESIA study for the proposed establishment of the COSTECH STI Complex at Salmnin Mtaa emphasizes the importance of implementing appropriate measures outlined in the Environmental and Social management plan (ESMP) throughout both the construction and operation phases of the project circle. These measures aim to mitigate any adverse effects on the local ecosystem and ensure the sustainable development of the project implementation.

The ESMP highlights the significance of proactive engagement and continuous communication with the relevant stakeholders particularly nearby community. By fostering a collaborative approach, the project seeks to address any concerns or inconveniences that may arise from the building's construction and operation. This involves regular consultations with the community to identify potential disturbances and the development of responsive strategies to alleviate these impacts.

This, EIS underscores the critical importance of emphasis to be placed on the necessity for stringent measures to prevent the discharge of any construction or operational waste into the open or natural environment. The study also recognizes noise, air quality pollution and storm water mismanagement as primary concerns, highlighting the imperative of implementing effective controls to manage these issues. Failure to address these aspects adequately could lead to

complaints from the neighboring community. Therefore, the ESIA underscores the significance of incorporating comprehensive measures to ensure that the construction and operation of the building are conducted with minimal environmental impact, fostering a harmonious coexistence with the surrounding community.

Further, Involving registered contractor, architects and quantity surveyors in a STI building construction project is essential for ensuring the project's success, safety, and financial efficiency. Architects bring expertise in design, functionality, and regulatory compliance, creating aesthetically pleasing and structurally sound buildings. They will ensure the project meets all legal requirements and COSTECH requirements. Quantity surveyors, on the other hand will provide critical cost management, budgeting, and financial planning services, ensuring that the project remains within budget and resources are used efficiently. Their involvement helps prevent cost overruns and financial mismanagement, ensuring that the project is completed on time and within the allocated budget. Together, these professionals will ensure a well-designed, compliant, and cost-effective construction project

Lastly, Assess Consulting Company Ltd, the ESIA consultant, asserts that if these mitigation measures are properly implemented, the project will provide significant benefits and its impact will be well managed, ensuring a harmonious coexistence with the surrounding community.

## BIBLIOGRAPHY

1. Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations 2018.
2. World Bank Environmental and Social Standards (ESS) for HEET as stipulated in the Environmental and Social Framework (ESF) and other guiding tools such as Environmental and Social Management Framework (ESMF), and stakeholder Engagement Plan (SEP).
3. World Bank, Project Operation Manual (POM) 2021.
4. World Bank, Project Appraisal Document (PAD) 2021.
5. The Population and Housing Census (National Bureau of Statistics), 2022
6. The Tanzania Development Vision 2025 of 2000.
7. United Republic of Tanzania, 1992. Energy Policy (1992).
8. United Republic of Tanzania, 1995. Land Policy (1995).
9. United Republic of Tanzania, 1995. The Education (Amendment) Act, 1995
10. United Republic of Tanzania, 1997. National Environmental Policy (1997).
11. United Republic of Tanzania, 1997. The Contractors Registration Act (1997).
12. United Republic of Tanzania, 1997. The Architects and Quantity Surveyors Act (1997).
13. United Republic of Tanzania, 2000. The Tanzania Development Vision (2000).
14. United Republic of Tanzania, 2000. National Human Settlements Development Policy (2000).
15. United Republic of Tanzania, 2002. National Gender Policy (2002).
16. United Republic of Tanzania, 2003. Occupational Health and Safety (2003).
17. United Republic of Tanzania, 2003. Construction Industry Policy (2003).
18. United Republic of Tanzania, 2004. Employment and Labour Relations Act No. 6 (2004).
19. United Republic of Tanzania, 2004. Environmental Management Act No. 20 (2004), Cap. 191.
20. United Republic of Tanzania, 2005 Impact Assessment and Auditing Regulations (2005).
21. United Republic of Tanzania, 2005 Impact Assessment and Auditing Regulations (2005).
22. United Republic of Tanzania, 2007. Engineers Registration Act and its Amendments 1997, Dar es Salaam, Tanzania (2007)
23. United Republic of Tanzania, 2007. The Land Act, 1999 The Urban Planning Act (2007).
24. United Republic of Tanzania, 2007. Fire and Rescue Act (2007)
25. United Republic of Tanzania, 2007. The Urban Planning Act (2007).
26. United Republic of Tanzania, 2008. The Prevention and Control of HIV/AIDS Act (No. 28), 2008
27. United Republic of Tanzania, 2008. The Workers Compensation Act (No.20), 2008
28. United Republic of Tanzania, 2009. Public Health Act (2009).
29. United Republic of Tanzania, 2009. Water Supply and Sanitation Act No. 12 (2009).
30. United Republic of Tanzania, 2009. The Standard Act of 2009
31. United Republic of Tanzania, 2021. National Environmental Policy (2021).
32. World Health Organisation (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99<sup>th</sup> percentile.