FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED EXPANSION AND RENOVATION OF THE LANZONI SISAL ESTATE LOCATED AT FARM NO. 251& 254, BAMBA MAVENGERO VILLAGE, MWIDURO WARD, MKINGA DISTRICT, TANGA REGION

PROPONENT

Mohammed Enterprises Tanzania Limited

Golden Jubilee Towers, Ohio Street, 20th Floor

P.O. Box 20660, Dar-Es-Salaam,

Tel; 075455227

Email; george@metl.net

CONSULTANT

Arms on Environment Limited

Plot No. 2 Togo Street Kinondoni

P. O. Box 22413, Dar es Salaam, Tanzania

Mob: +255 754 309679/ +255 655 770 772

E-Mail; armsrajabu47@gmail.com

SUBMITTED TO

National Environment Management Council

35 Regent Estate, P.O.BOX 63154, 11404 Dar es Salaam.

Tel. No: +255715265158 or +255754 366 968.

Email: dg@nemc.or.tz

SUBMISSION DATE: 8th April, 2025

ACKNOWLEDGEMENT

This Report has been prepared by ARMS on Environment Limited of Dar es Salaam on behalf of the Mohammed Enterprises Tanzania Limited. The Proponent wishes to thank all stakeholders and the Regulatory institution i.e., National Environment Management Council (NEMC) and individuals who have contributed views and ideas that form part of this report.

In particular, we wish to thank Mkinga District Council Officers and Leaders at the Local Community Level (Ward and Mtaa), and all other stakeholders for their valuable views and comments.

STUDY TEAM

This Environmental and Social Impact Statement has been prepared by the team of experts as tabulated in Table 1.0 below.

Table 1.1; Lead consultant information (Team leader)

SN	NAME	TITLE	SIGNATURE
1	Dr. Abubakar Salum Rajabu	Team Leader Environmental Scientist NEMC/EIA/0048	
2	Miss. Paulina Simon	Environmental Scientist NEMC/EIA/0497	
3	Miss. Mary Ngajilo	Sociologist EC/EE-EIA/2021/0113	

EXECUTIVE SUMMARY

E1.0 PROJECT INFORMATION

E1.1 Project Title

Environmental and Social Impact Assessment for the Proposed Expansion, Rotation and Modernisation of the Lanzoni Sisal Estate located at Bamba Mavengero Village, Mwiduro Ward, Mkinga District, Tanga Region.

E1.2 Name of the Project Proponent and Contact Address

Mohammed Enterprises Tanzania Limited
Golden Jubilee Towers, Ohio Street, 20th Floor
P.O. Box 20660, Dar-Es-Salaam,
Tel; 075455227
Email; george@metl.net

E1.3 Name of the Lead Consultant and Contact Address

Arms on Environment Limited
Plot No. 2 Togo Street Kinondoni
P. O. Box 22413, Dar es Salaam, Tanzania
Mob: +255 754 309679/ +255 655 770 772
E-Mail; armsrajabu47@gmail.com

E2.0 INTRODUCTION

Sisal is an endemic tropical crop whose leaves provide the world's most important hard natural fibre. The fibers are then used to produce twine, cordage for hay, packaging, baling, building and many other uses including carpets, wall covering, doormats, car mats, buffing cloth used for polishing of metal and furniture, fine yarn, bag cloth, padding, mattresses and handicrafts. New products developed from the sisal plant include pulp and paper mainly for making boxes for packaging.

Products obtained from sisal waste include biogas used in engine-generator sets to produce electricity. Sisal waste can also be used directly as animal feed.

Mohammed Enterprises (Tanzania) Ltd (shortly, "METL") has been involved in large-scale sisal farming in four regions: Tanga, Kilimanjaro, Morogoro and Coast regions of Tanzania. Currently, the company is one of the major sisal producers in the country contributing about 25% of the country's sisal production. The company has ten sisal estates covering a total land area of 34,669 Ha. The sisal plantations include, Alavi Sisal Estate, Fatemi Sisal Estate, Mjesani Sisal Estate, Bamba Sisal Estate, Lanzoni Sisal Estate, Mazinde Sisal Estate, Mabogo Sisal Estate, Kwalukonge Sisal Estate, Hassani Sisal Estate and Husseni Sisal Estate.

METL through funding from the African Development Bank (AfDB) is intending to increase sisal fibre production through improvement of the LANZONI Sisal Estate by increasing the area for planting sisals, undertake crop rotation, improving sisal processing machineries and other support facilities. The project is set to take five consecutive years of sisal planting and field maintenance.

The Lanzoni Sisal Estate is located at Bamba Mavengero Village, Mwiduro Ward, Mkinga District, Tanga region. The estate covers a total area of approximately 3798 hectares divided into 48Ha new plants, 506.8 hectares of Immature plants, 775.3 hectares of Mature plants and 42.3 hectares of old plants. The estate set to increase sisal fibre production through expansion and rotational of sisal planted area by 1483 Ha within 5-years period, and additional investment in the sisal fibre processing machines and other infrastructures. Currently, production capacity is approximately 750MT per year, after the project implementation 3000MT of sisal fibre are expected to be produced per annum in the next 10-years.

The minimum lifespan of the proposed project might be more than fifty years with the investment cost of about TZS 9,908,775,971.

The Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulation of 2018.), formulated after the Environmental Management Act No. 20 of 2004 requires project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. Being aware of the aforementioned legal requirement, the proponent (Mohammed Enterprises Tanzania Limited) commissioned ARMS on Environment Limited to conduct ESIA for the proposed Expansion, Rotation and Modernisation of the Lanzoni Sisal Estate.

E3.0 OBJECTIVE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

The objective of the ESIA study was to ensure that environmental concerns are integrated in all 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:

i. To identify and evaluate the significant environmental impacts of the project
ii. To evaluate the impacts of the various alternatives on the project
iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
iv. To generate baseline data for monitoring and evaluating impacts, including mitigation measures during the project cycle.
v. To seek the views and concerns of all stakeholders in regards to the proposed project.
vi. Develop an Environmental and Social Management Plan with mechanisms for monitoring and evaluating compliance and environmental performance.

E4.0 BRIEF DESCRIPTION OF PROJECT COMPONENTS

The proposed project will involve the following:

i. Farm Expansion and Rotation Program
ii. Buildings and civil works
iii. Installation of new plant, machinery and equipment's
iv. Improvement in electricity and water infrastructure of the estates
v. Improvement on transport facilities

E4.1 EXPECTED OUTPUTS

Currently, production capacity is approximately 750MT per year, after the project implementation 3000MT of sisal fibre are expected to be produced per annum in the next 10-years.

E5.0 PROJECT LOCATION, ACCESSIBILITY AND SIZE

The proposed project site is located at Bamba Mavengero Village, Mwiduro Ward, Mkinga District, Tanga Region. The estate can be accessed through the main road Segera-Tanga road then cross to Mlingano road (rough road). The site is about 23km from the main road and about 13km from Mjesani group of sisal estate. The rough road is not in good condition especially during rainy season. The estate has the total area of 2513Ha.

E6.0 EXISTING ENVIRONMENT AND SURROUNDING

Sisal leaves from Lanzoni estate are transported to Mjesani Estate for processing. Therefore, no processing is done at Lanzoni estate.

The proposed estate is bordered with Kichangani village in the Northern, Zigi river in the Southern and Western and Kwangena village in the Eastern.

E7.0 PROJECT ACTIVITIES

The development of the proposed project will involve various phases, including the design (planning) phase, construction phase, operation phase and decommissioning phase. The planning phase will involve surveying the proposed sites for construction of the facilities at the Lanzoni Sisal Estate. A survey, in this case, refers to land investigations, drilling, measurements and pre-works examination of the site. The actual construction phase of the project will involve standard construction activities such as construction management, site preparation and levelling, excavation, compaction, setting the foundation, installation of electrical and machine, water and wastewater infrastructure, erection of superstructures, etc. The operation phase will involve Sisal fibre productions which entails decortication, drying of sisal fibre from the corona, fibre brushing, pressing and bailing. While decommissioning phase will involve shutting down the estate and/or removing it from operation or use, followed by re-commissioning, repurposing or demolition.

E8.0 POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK

Tanzania is committed to attaining sustainable development goal. Some of the National laws, policies, plans, strategies and legislation relevant to this project have been discussed in this report. These include; National Environmental Policy 2021, National Land Policy 1995, Natural Water Policy 2002, National Gender Development Policy 2000, Environmental Management Act 2004 – Cap 191, Occupational Health and Safety Act No. 5 of 2003, The Fire and Rescue Army Act 2007, Environmental Impact Assessment and Audit Regulations as amended on 2018, Environmental Management (Water Quality Standard) Regulation, 2007, The environment management (Hazardous Waste Control and Management) Regulation, 2021, The Environment Management (Quality Standard for Control of Noise and Vibration pollution) Regulations, 2015, The Environment (Registration of Environment Experts) Regulations 2021 etc.,

E9.0 STAKEHOLDER CONSULTATION

Various stakeholders were consulted to obtain their views, comments and concerns. The information from the stakeholders was obtained through interviews and meetings. The stakeholders identified included;

- ✓ Tanzania Sisal Board
- ✓ Pangani Basin Water Board
- ✓ Tanga Regional Fire and Rescue Force
- ✓ Mkinga District Council staff; (District Agriculture, Irrigation and Cooperative Officer (DAICO), Land Officer)
- ✓ Village Executive Officer – Bamba Mavengero Village,
- ✓ Ward Executive Officer – Mwiduro Ward
- ✓ Local Community surrounding Lanzoni Estate
- ✓ Workers
- ✓ Project Proponent.

Some of the noted underlying issues are related to the;

- ✓ Improvement in Occupational health and Safety
- ✓ Waste management
- ✓ Salary review
- ✓ Potential for Infrastructure upgrades

E10.0 PROJECT ALTERNATIVES

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

i. "No Project Alternative"; VS "Project Alternative"-The Project Alternative was selected in favor of the: No Project Alternative" due to its long-term social and economic benefits.

ii. Alternative Source of water: Borehole, recycled water from decortications, rain water harvesting were the preferred options.
iii. Alternative Source of Energy: The proposed site will use electricity from TANESCO and standby generator to serve during the power cut. Also, for cooking the use of LPG shall be considered.
iv. Solid Waste Management Alternatives: By adopting the principles of reduce, reuse, recycle and recover resources, integrated solid waste management system offers significant environmental and financial benefits compared to landfilling and open waste burning.
v. Liquid Waste Management Alternatives: Septic tank and soak away pit will be used to manage domestic waste water. Wastewater from decortication process will be managed by waste stabilization ponds. However later the proponent might consider the use of treatment plant.

E11.0 IMPACT IDENTIFICATION AND ASSESSMENT

Impact identification was done by analyzing the project activities and determining their influence on the baseline environmental and social characteristics of the project area. The environmental characteristics of the project include biophysical (topography, soils, climate, rainfall, water resources, flora and fauna) and social characteristics (demography, settlement, land administration and tenure, economic activities, infrastructures and services, water supply and sanitation, healthy and HIV and AIDS). Public consultation complemented the field investigations and literature review. Identification of potential impacts and physical assessment of the following environmental components likely to be impacted was also conducted: a) physical /chemical; b) biological /ecological; c) social /cultural; and d) economic /operational.

E12.0 POTENTIAL SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS

The development of the proposed project will lead to a number of potential impacts in each project cycle. The impacts were identified, predicted and assessed. These were done through checklists together with professional judgment of the consultant and basing other similar projects.

E12.1 SUMMARY OF KEY POSITIVE IMPACTS

A summary of the key positive impacts identified in the ESIA study are indicated below:

i. Creation of employment
ii. Creation of a market for local construction materials
iii. Increase in Sisal fibre production
iv. Increase in revenue to the National and District Government
v. Income generation to local communities/ villagers
vi. Corporate Social responsibility benefits from the Estate

E12.2 SUMMARY OF KEY NEGATIVE IMPACTS

A summary of the key negative impacts identified in the ESIA study are indicated below:

i. Impact from exhaust emission
ii. Noise Pollution
iii. Impact from Vibration
iv. Soil erosion
v. Impact from solid waste generation
vi. Soil contamination
vii. Increase in accident incidences
viii. HIV/AIDS and other sexually transmitted diseases
ix. Potential increase in criminal activities
x. Room of improvement in waste management
xi. Risks of fire hazards
xii. GBV/SEA/SH impacts

E13.0 MITIGATION MEASURES

Many of the mitigation measures put forward are largely good engineering practice that shall be adhered to during all the project phases. The major mitigation measures to be observed include;

i. Ensure to set up a formal compliant register system which responds to complaints about nuisances in a timely manner
ii. Adopt policies for recruiting locally and hiring local sub-contractors
iii. Purchasing materials from as many local suppliers; and
iv. Hiring trucks to transport construction materials like sand, quarry and cement to the project site
v. Promote recycling and reuse of general refuse
vi. Ensure that disposal of hazardous and non-hazardous waste is carried out in line with relevant national legislative and regulatory requirements; any hazardous waste generated on construction sites must be collected, transported and further management by competent and licensed contractors
vii. Servicing machinery so that they can be in good condition at all times; and
viii. Providing ear protection materials for the workers in noisy areas.
ix. Working hours for significant noise generating construction work (including works
x. Conduct regular vibration monitoring tests to assess the frequency and scale of the vibrations on site, and make more informed decisions about the preventive or corrective actions they can take to better protect their people, other stakeholder and the environment.

xi. The design of the internal sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e., it should have the capacity to consistently handle the loads even during peak volumes;

xii. All drain pipes passing under building, driveway or parking should be of heavy-duty PVC pipe tube encased in concrete surround.

xiii. Contractor should ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents

xiv. Contractor should establish HIV/AIDS programmes to raise awareness

E14.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The options to minimize or prevent the identified social and environmental impacts as well as a monitoring plan have been suggested in this report and are contained in the project's ESMP in which the majority of them are based on good engineering practices. The Environmental and Social Management Plan (ESMP) presents the implementation schedule for the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. The project's ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. The engineering designs shall include the mitigation measures recommended in this report.

E15.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

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

E16.0 COST-BENEFIT ANALYSIS OF THE PROJECT

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

E.17.0 DECOMMISSIONING

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

environment and socio-economic activities. However, the proposed project will have a long-life span of more than fifty years.

E18.0 SUMMARY AND CONCLUSION OF THE ESIA STUDY

The ESIA was undertaken at all levels by following guidelines, laws and regulation related with environmental and social issues at a high level of care and due diligence. The assessment has also considered important stakeholders who are in one way of the other being impacted by the project. The ESIA study has scrutinized the environmental and social implications of the proposed Expansion, Rotation and Modernisation of the Lanzoni Sisal Estate and it was conducted to comply with relevant Acts, Laws and Regulations.

From the ESIA study that has been conducted, it has been concluded that the construction of the proposed project will generate socio-economic benefits to the people in the project area and the country. The study has also identified several negative environmental and social impacts and risks that will arise as a result of the project. However, if the mitigation measures that have been proposed in this ESIA report will be properly implemented, the negative impacts will be mitigated by avoiding, minimizing or even eliminating some of the negative impacts.

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunity Deficiency Syndrome
AfDB	African Development Bank
COVID – 19	Corona Virus Disease-19
CSR	Corporate Social Responsibility
CBOs	Community Based Organizations
CPA	Core Project Area
CO	Carbon monoxide
CO_2	Carbon dioxide
dB	Decibel
DOE	Division of Environment
DAICO	District Agriculture, Irrigation and Cooperative Officer
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization
FT	Foot
GBV	Gender-Based Violence
GM	General Motor
Ha	Hectare
HIV	Human Immune Virus
HP	Horsepower
KVA	Kilo Volt Amperes
NSRGP	National Strategy for Growth and Reduction of Poverty
NEMC	National Environment Management Council
NEP	National Environment Policy
NGOs	Non-Governmental Organizations
METL	Mohammed Enterprises (Tanzania) Ltd
TSB	Tanzania Sisal Board
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Authority
PPE	Personal Protective Equipment
PVC	Polyvinyl chloride

SO_2	Sulfur dioxide
SLDW	Sisal Leaf Decortications Waste
STDs	Sexually Transmitted Diseases
TANESCO	Tanzania Electricity Supply Company
TANROADS	Tanzania National Roads Agency
TBS	Tanzania Bureau of Standards
TIN	Taxpayer Identification Number
TOR	Terms of Reference
TRA	Tanzania Revenue Authority
TUWSSA	Tanga Urban Water Supply and Sewerage Authority
URT	United Republic of Tanzania
VAT	Value Added Tax
VEO	Village Executive Officer
WEO	Ward Executive Officer
WHO	World Health Organization

TABLE OF CONTENT

ACKNOWLEDGEMENT ii
STUDY TEAM iii
EXECUTIVE SUMMARY iv
LIST OF ABBREVIATIONS AND ACRONYMS xii
TABLE OF CONTENT xiv
LIST OF TABLES xix
CHAPTER ONE 1
1.0 Introduction 1
1.1 Project Background 1
1.2 Project Objective 2
1.3 Objective of Environmental and Social Impact Assessment Study 2
1.4 Scope of work 2
1.5 ESIA Approach and Methodology 3
1.5.1 Approach 3
1.5.2 Methodology 3
1.6 Environmental and Social Benefits 6
1.7 Report Structure 6
CHAPTER TWO 8
2.0 Project background and description 8
2.1 Introduction 8
2.2 Nature of the project 8
2.3 Project Location, Accessibility and size 8
2.4 Land use and Ownership 10
2.5 Existing situation 10
2.6 Description of the project components 10
2.7 Project activities 11
2.7.1 Planning Phase 11
2.7.2 Project Construction Phase 11
2.8.3 Project Construction Materials 12
2.8.3.1 Sourcing and transportation of Building Materials 12
2.8.3.2 Construction Equipment 14
2.8.3.4 Project construction workers 15
2.8.3. 5 Project Construction/Renovation Wastes 15
2.8.4 Project Operation Phase 15
2.8.4.1 Project Operation Activities 16

2.8.4.2 Project Operation Materials 17
2.8.4.3 Project Operation wastes 18
2.8.4.3 Project Resources 19
2.8.5 Decommissioning Phase 19
2.8.5.1 Decommissioning activities 19
2.8.3. 5 Project demolition wastes 20
2.9 Health and Safety Measures 20
2.9.1 OHS during construction phase 20
2.9.2 OHS during operation phase 21
2.10 Market Analysis 22
2.11 Project Boundaries 23
2.11.1 Institutional Boundaries 23
2.11.2 Temporal Boundaries 23
2.11.3 Spatial Boundaries 23
CHAPTER THREE 25
3.0 Policy, Administrative and Legal Framework 25
3.1 Overview 25
3.2 National Policies Framework 25
3.3 National Legal Framework 33
3.4 Administrative Framework / Institutional Arrangement 49
CHAPTER FOUR 53
4.0 Environmental and Social Baseline Conditions 53
4.1 Introduction 53
4.2 Geographic location 53
4.3 Geography 54
4.3.1 Climate 54
4.3.2 Hydrology 54
4.3.3 Topography and drainage 55
4.3.4 Soils 55
4.4 Biological environment 56
4.5 Water supply and Energy 56
4.5.1 Water resources 56
4.5.2 Energy supply 57
4.6 Geology 57
4.7 Economy 57
4.7.1 Fishing 58

4.7.2 Infrastructure 58
4.7.3 Trade 58
4.8 Population 58
4.9 Education & Health 58
4.9.1 Education 58
4.9.2 Health 59
4.10 Environmental Measurement Parameters 59
4.10.1 Average Ambient Gas Emission 59
4.10.2 Average Dust–Particulate Matters (PM 2.5 and PM10) 60
4.10.3 Average Ambient Noise Levels 60
CHAPTER FIVE 61
5.0 Stakeholder Consultation and Public Participation 61
5.1 Overview 61
5.2 Identification of Stakeholders 61
5.3 Public Participation Process 62
5.4 Identification of Issues and Problems 63
5.5 Stakeholders Views and Concerns 64
CHAPTER SIX 69
6.0 Assessment of Impacts and Identification of Alternatives 69
6.1 Overview 69
6.2 Methodology of impact identification 69
6.3 Impact Evaluation and Scoring Matrix 71
6.3.1 Magnitude 71
6.3.2 Significance 71
6.3.3 Probability of occurrence 71
6.3.4 Duration 71
6.4 Construction Phase Impacts 75
6.4.1 Positive impacts from construction phase 75
6.4.2 Negative impacts from construction phase 75
6.5 Operational Phase Impacts 78
6.5.1 Positive from Operational Phase 78
6.5.2 Negative from Operational Phase 79
6.6 Decommissioning Phase impacts 82
6.6.1 Positive Decommissioning Phase Impacts 82
6.6.2 Negative Decommissioning Phase Impacts 83
6.7 Project Alternatives 84

6.7.1 No Project Alternative 84
6.7.2 Project Alternative 85
6.7.3 Different Site Selection/ Location 85
6.7.4 Alternative Source of Water 85
6.7.5 Alternative Source of Power 86
6.7.6 Solid Waste Management Alternatives 86
6.7.7 Waste Water Management Alternatives 87
6.7.8 Alternative pesticides 88
CHAPTER SEVEN 89
7.0 Impacts Management or Environmental Mitigation Measures 89
7.1 Overview 89
8.0 Environmental and Social Management Plans 107
8.1 Overview 107
8.2 Institutional roles and responsibilities 107
8.2.1 Financing agency 107
8.2.2 Implementing agency 107
8.2.3 Supervision Consultant 107
8.2.4 Contractor 108
8.2.5 Local government authorities and local NGOs / CBOs 108
8.2.6 Local communities 108
CHAPTER TEN 129
10.0 Environmental Monitoring Plan 129
10.1 General Overview 129
10.2 Implementation of monitoring plan 129
CHAPTER ELEVEN 149
11.0 Cost Benefit Analysis 149
11.1 Introduction 149
11.2 Benefits Related to the Project 149
11.2.1 Benefits to METL 150
11.2.2 Benefit to the Neighbourhood 150
11.2.3 Benefit to the Government 151
11.2.4 Costs Related to the Project 151
11.2.5 Costs to Community 151
11.2.6 Costs to Government 151
11.2.7 Environmental Cost 151
11.4 Project Cost Benefit Analysis 152

CHAPTER TWELVE 153
12.0 Decommissioning Plan of the Project 153
12.1 Overview 153
12.2 Preliminary Decommissioning Plan 153
12.3 Demolition Methods 153
12.3.1 Materials Handling 154
12.3.2 Proposed Sequence 154
CHAPTER THIRTEEN 157
11.0 Conclusion and Recommendations 157
11.1 Conclusion 157
11.2 Summary of Positive and Negative Impacts 157
11.2.1 Summary of key positive impacts 157
11.2.1 Summary of key negative impacts 157
11.3 Overall Recommendation 158

LIST OF TABLES

Table 2.1; Lead consultant information (Team leader) iii
Table 2.1: Location/Coordinates of the Lanzoni Sisal Estate by Google Earth in WGS84 Datum.....8
Table 3.1: Institutional framework.....13
Table 4.1: Showing Agro-economic zone 51
Table 4.2: Average values of measured gaseous compared with local and/or international standards.....60
Table 4.3: Average values of measured PM 2.5 and 10 compared with local and/or international standards.....60
Table 4.4: Average values of measured Noise levels compared with local and/or international standards.....60
Table 5.1: Stakeholder identification and analysis.....61
Table 5:2: Public participation process.....62
Table 5.3: Categories of issues and problems.....63
Table 5.4: Stakeholders consulted and their views.....64
Table 6.1: Impact scoring matrix with significant level.....72
Table 8.1: Impacts Mitigation / Enhancement measures.....90
Table 9.1: Shows Environmental and Social Management Plan.....109
Table 10.1: Monitoring plan for the proposed project.....130
Table 10.2: Proposed Environmental and Social Monitoring Plan.....132
Table 12.1: Decommissioning activities plan.....135

LIST OF FIGURES

Figure 2:1: Location of Lanzoni Estate at Mkinga District, Tanga Region, Tanzania.....8

CHAPTER ONE

1.0 Introduction

1.1 Project Background

Sisal is an endemic tropical crop whose leaves provide the world's most important hard natural fibre. The fibre is then used to produce twine, cordage for hay, packaging, baling, building and many other uses including carpets, wall covering, doormats, car mats, buffing cloth used for polishing of metal and furniture, fine yarn, bag cloth, padding, mattresses and handicrafts. New products developed from the sisal plant include pulp and paper mainly for making boxes for packaging.

Products obtained from sisal waste include biogas used in engine-generator sets to produce electricity. Sisal waste can also be used directly as animal feed.

Mohammed Enterprises (Tanzania) Ltd (shortly, "METL") has been involved in large-scale sisal farming in four regions: Tanga, Kilimanjaro, Morogoro and Coast regions of Tanzania. Currently, the company is one of the major sisal producers in the country contributing about 25% of the country's sisal production. The company has ten sisal estates covering a total land area of 34,669 Ha. The sisal plantations include, Alavi Sisal Estate, Fatemi Sisal Estate, Mjesani Sisal Estate, Bamba Sisal Estate, Lanzoni Sisal Estate, Mazinde Sisal Estate, Mabogo Sisal Estate, Kwalukonge Sisal Estate, Hassani Sisal Estate and Husseni Sisal Estate.

METL through funding from the African Development Bank (AfDB) is intending to increase sisal fibre production through improvement of the LANZONI Sisal Estate by increasing the area for planting sisals, undertake crop rotation, installing sisal processing machineries and other support facilities. The project is set to take five consecutive years of sisal planting and field maintenance.

The Lanzoni Sisal Estate is located at Bamba Mavengero Village, Mwiduro Ward, Mkinga District, Tanga region. The estate covers a total area of approximately 3798 hectares divided into 48Ha new plants, 506.8 hectares of Immature plants, 775.3 hectares of Mature plants and 42.3 hectares of old plants. The estate set to increase sisal fibre production through expansion and rotational of sisal planted area by 1483 Ha within 5-years period, and additional investment in the sisal fibre processing machines and other infrastructures. Currently, production capacity is approximately 750MT per year, after the project implementation 3000MT of sisal fibre are expected to be produced per annum in the next 10-years.

The minimum lifespan of the proposed project might be more than fifty years with the investment cost of about TZS 9,908,775,971.

The Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulation of 2018.), formulated after the Environmental Management Act No. 20 of 2004 requires project developers

to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. Being aware of the aforementioned legal requirement, the proponent (Mohammed Enterprises Tanzania Limited) commissioned ARMS on Environment Limited to conduct ESIA for the proposed Expansion, Rotation and Modernisation of the Lanzoni Sisal Estate.

1.2 Project Objective

The proposed project has been planned for the purposes of increasing sisal production by expanding the acreage under sisal crop through new planting in the fallow land and implement crop rotation in a total of within 5-years period, and additional investment in the sisal fibre processing machines and other infrastructure.

1.3 Objective of Environmental and Social Impact Assessment Study

The objective of the ESIA study was to ensure that environmental concerns are integrated in all project activities in order to contribute to sustainable development. The EIA study was conducted from 15th January 2023-to date.

The specific objectives of conducting the Environment and Social Impact Assessment study with respect to the project was:

i. To identify and evaluate the significant environmental impacts of the project
ii. To evaluate the impacts of the various alternatives on the project
iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
iv. To generate baseline data for monitoring and evaluating impacts, including mitigation measures during the project cycle.
v. To seek the views and concerns of all stakeholders in regards to the proposed project.
vi. Develop an Environmental and Social Management Plan with mechanisms for monitoring and evaluating compliance and environmental performance.

1.4 Scope of work

This study entailed the following: -

i. To provide description of the relevant parts of the project including project location, design, components and activities;
ii. To review of policies, legislation, standards and regulations governing Environment at International, Regional and Local levels;
iii. To assemble, evaluate, and present baseline data on the relevant environmental and social characteristics of the project area;

iv. To make consultation with Government agencies, local communities and the private sector operating near the project area;

v. To assess and quantify the potential environmental impacts resulting from the building development, especially within the zone of influence of the project;

vi. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives;

vii. To develop an Environmental Management Plan (EMP) detailing actions and responsibilities for impacts mitigation and monitoring.

1.5 ESIA Approach and Methodology

1.5.1 Approach

Several approaches and study methods to be used in carrying out this assignment with the view of obtaining quantitative and qualitative data (baseline data) in order to prepare the report. Main approaches used were;

i. Follow Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulation of 2018.)

ii. Follow broad ecological examinations such as transect walk and detail analysis of the project area.

iii. The scoping is being undertaken as initial stakeholder identification through identification of issues, problems and concerns, summary of results and ToR for EIA.

1.5.2 Methodology

The study included the following methodologies:

i. Meeting and Interview;

ii. Review of Documents;

iii. Transect Walk

iv. Site visits;

i. Meeting and Interview

Key stakeholders were identified and specific meetings and interviews schedules to gather their views and perceptions on the project. Some of the key Stakeholders consulted in this process include the following; Tanzania Sisal Board, Mkinga District Council Officers (District Agriculture, Irrigation and Cooperative Officer (DAICO) and District Land Office), Village and Plant Manager. Specific results of the interview and meeting is presented in subsequent chapters in this report.

ii. Review of Document

Reviews 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.

iii. Site visits

The objectives of site visits were to observe and capture baseline data on the existing biophysical and socio-economic environment of the project area. In addition, the visits provided an opportunity to consult stakeholders and senior government officials on their views regarding the project and its potential impacts.

iv. Transect Walk

The EIA team undertook a transect walk around the project site. This exercise was carried out in order to observe physical features existing in the project site to establish relationships with the project building that pose environmental and social issues worth noting for studies and identify the major environmental and socially sensitive receptors. The transect walk was undertaken in sub wards in the vicinity of the project to consult members living near the project site.

1.6 Environmental and Social Benefits

The Project will open many opportunities to the districts and other neighboring centres, regions, and nation at large. The Project will allow more sisal production, thus boosting local economies within short times and more benefits will be gained. The Project activities will offer some short-term employments to local community such as construction labourers, security personnel, contractors, Engineers, Environmental Impact Assessment teams, etc. Many more benefits ranging from taxes on construction materials, availability of good infrastructure in the districts, etc. will be realized. Overall, the project will have great benefits economically and environmentally compared to current status of the district. Therefore, the benefits to be realized from the project surpass the envisaged environmental and social costs within the lifetime of the project.

1.7 Report Structure

The ESIA study was prepared as per the guidelines provided under the Environmental Management Act No. 20 of 2004 (Cap 191) (Amendment 2018) and its subsequent EIA and Audits Regulations GN 349 of 2005. Thus, EIS is comprised of the following;

i. Executive Summary
ii. Introduction, objectives, rationale and methodology
iii. Project description, location and relevant components of the project and project activities
iv. Policy, Legal and Administrative Framework
v. Environmental and Social Baseline Information

vi. Public Participation and Stakeholder's Consultations
vii. Identification and Assessment of Impacts
viii. Project Alternatives
ix. Impact mitigation and enhancement measures
x. Environmental Mitigation measures
xi. Environmental and Social Management Plan
xii. Environmental and Social Monitoring Plan
xiii. Conclusion and Recommendations

CHAPTER TWO

2.0 Project background and description

2.1 Introduction

In this chapter an attempt has been made to describe the location and accessibility of the project site, project boundaries, existing situation, project components, project utilities, and project activities to be undertaken.

2.2 Nature of the project

The project will entail the following activities; planting of new sisals, uprooting of old sisal plants, construction of new worker's house, factory buildings, workers house, farm roads and bridges, and other civil works, installation of new decortication machines, brushing and pressing machines, and improvement of infrastructures such as buying of new generator, drilling of boreholes and addition of water storage tanks.

2.3 Project Location, Accessibility and size

The proposed project site is located at Bamba Mavengero Village, Mwiduro Ward, Mkinga District, Tanga Region. The estate can be accessed through the main road Segera-Tanga road then cross to Mlingano road (rough road). The site is about 23km from the main road and about 10km from Mjesani group of sisal estate. The rough road is not in good condition especially during rainy season. The estate has the total area of 9196Ha.

The estate is bordered with Kichangani village in the Northern, Zigi river (about 60 meter) in the Southern and Western and Kwangwena village in the Eastern.

Table 2.1: Location/Coordinates of the Lanzoni Sisal Estate by Google Earth in WGS84 Datum

Sn	Latitude	Longitude
1	-4.54000000	39.03000000

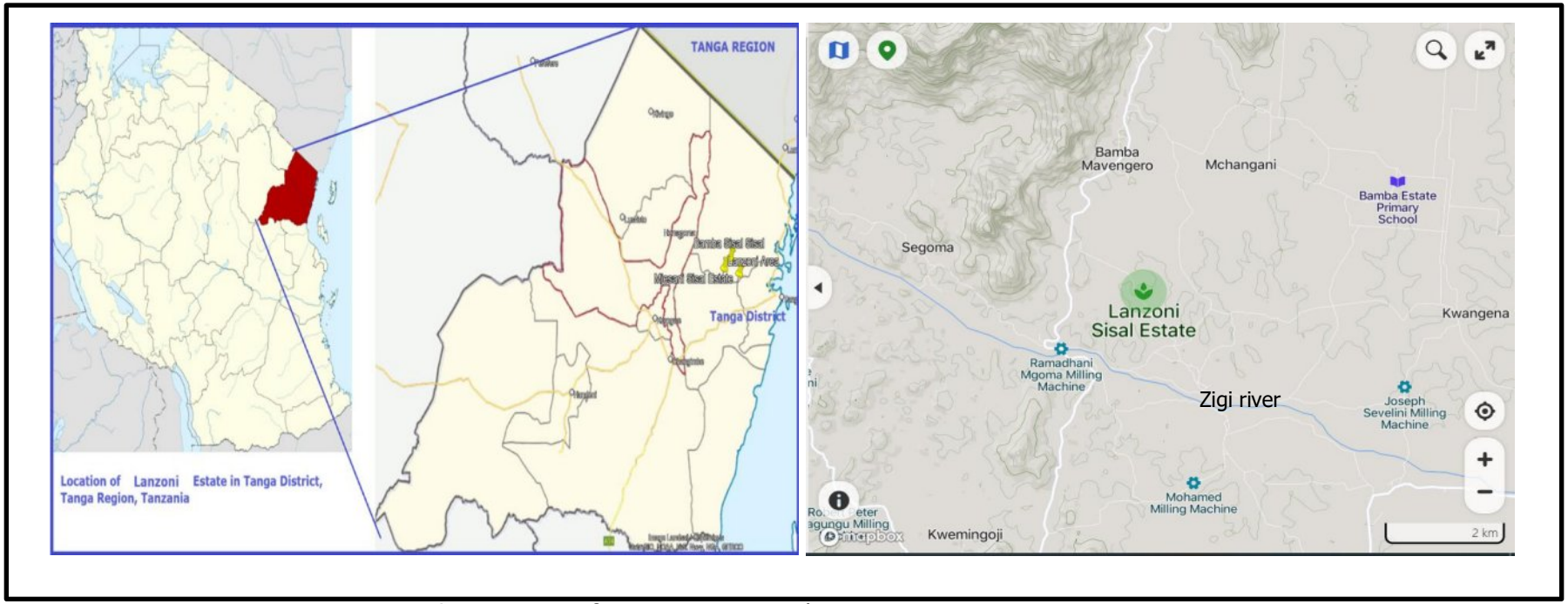

Figure 2:1: Location of Lanzoni Estate at Mkinga District, Tanga Region, Tanzania

2.4 Land use and Ownership

The parcel of land is legally owned by METL with the certificate of Occupancy No.48108. The land shall be used for agricultural purpose only; Use Group 'R' Use Classes (d) as defined in the Urban Planning (Use groups and Classes) Regulation of 1960 amended in 1993. See attached copy of the ownership document. Hence the development in the area is compatible with the designed land use of the title.

2.5 Existing situation

Sisal leaves from Lanzoni estate are transported to Mjesani Estate for processing. Therefore, no processing is done at Lanzoni estate. The distance from Lanzoni to Mjesani is about 13km.

2.6 Description of the project components

The proposed project will involve the following:

i. Farm Expansion and Rotation Program

These will involve planting of new sisals. It is planned that in the five consecutive years, 1146Ha will be planted with new sisal annually. In each year about 231Ha, 268Ha, 351Ha, 327Ha and 391Ha of land will be planted with new sisals respectively. Also, there will be uprooting of old sisal plants and new sisal planting.

ii. Buildings and civil works

This will involve construction of factory buildings, worker's house, farm roads and bridges and other civil works.

iii. Installation of new plant, machinery and equipment's

This will include installation of corona-GM 25, brushing machine (6FT), press machine-250kg, workshop equipment and other equipment's.

iv. Improvement in electricity and water infrastructure of the estates

This will entail procurement connection and installation of Transformer (500kVA), High-Tension lines, electric generators (550KVA), and other accessories.

The project will drill new boreholes (8'at 100mtr), construct/buy water storage tanks (200,000 liters), water pump-10HP. Before drilling new boreholes make sure the water use permit includes the permit to construct and use water from borehole are acquired.

Generator specifications;

Item	Specifications
Canopy Noise Level	81 dB(A) at 1m
Fuel Consumption	93.1 litres per hour (at 100% load)
Exhaust Emissions Level	Unregulated

v. Improvement on transport facilities

This include buying of motor vehicles such as tractors, trucks, pick-ups and motorcycles. The motor vehicles will be used for farm operation such as transport of sisal leaf and fibre, workers and other services.

vi. Expected Outputs

Currently, production capacity is approximately 750MT per year, after the project implementation 3000MT of sisal fibre are expected to be produced per annum in the next 10-years.

2.7 Project activities

The project activities are as follows;

2.7.1 Planning Phase

The activities to be involved are as follows;

i. Land preparation
ii. Planning and seeking of the appropriate approvals from the relevant authorities
iii. EIA Project Report preparation

2.7.2 Project Construction Phase

2.7.2.1 Project Construction Activities

Project construction activities will involve land clearance, cultivation, plantation, field maintenance, construction activities, installation of new machines and improvement of various infrastructure.

i. Land Clearance

In 5-years consecutively, the project will undertake land clearance of around 1483 Ha for sisal planting. This will involve the use of heavy-duty crawler tractors with suitable equipment such as dozer blades and Marden rollers used to clear bush and old sisal plants. The brush cut area is usually given rest of about two months to allow rotting of the brush cut plant materials. This land clearing operation also involves heaping, stumping and allowing decomposition of the dead vegetative materials in order to prepare the land for ploughing.

ii. Land Cultivation

The use of heavy-duty crawler tractors with appropriate rome harrows / ploughs are required for carrying out first and second ploughing for the purpose of establishing the best seedbed with the required ploughed

depth. The land preparation for new sisal planting is carried out in conjunction with the planting of sisal nursery. The ratio of sisal nursery to planted field is a hectare of sisal nursery to 14 hectares of new sisal planted in double rows. Single row planting will require less hectarage of nursery but in this project document it has been assumed that double row planting will be carried out in each Estate. An average of 220 Ha of nursery is expected to be planted every year.

iii. **Planting**

Activities involved in this operation include measuring, holing, digging planting materials from mature nurseries, transport of the planting materials, actual planting, refilling of dead planted sisal and application of fertilizers.

iv. Other overheads

The project will entail estates maintenance of the physical infrastructure and the sisal crop, harvesting and processing of sisal products as well as marketing of the final products.

v. Buildings and Civil Works

This will involve the following activities;

- Site clearance; including removal of natural vegetation and trees and any buildings in the construction site
- Earthwork activities such as clearing of site access road, excavation for the preparation of construction of building infrastructure, and drainage system;
- Construction of yard and fence, generator room, corona shed, corona waste canal and oxidation ponds, roofing of tow collection area, workers house etc.
- Construction of borehole and rainwater harvesting system for the building;
- Construction of parking facilities for loading / off-loading trucks and other vehicles. There will be enough room for vehicles (either motorized or man- powered) to turn around in a loading /off-loading;
- Site clean-up and rehabilitation of cleared areas

vi. Utilities

The project will undertake construction on the infrastructure for utilities including electricity and water by procuring new generator, drilling boreholes, water tanks, pumps and others.

2.8.3 Project Construction Materials

2.8.3.1 Sourcing and transportation of Building Materials

Building materials will be transported to the project site from their extraction, manufacture, or storage sites using transport trucks. Materials such as sand, gravel and quarry stone will be obtained from approved sources found at Kwa Liyemba in Mkinga district. Water for construction activities will be obtained from the boreholes present within the site.

Concrete blocks will be used for construction. Use of concrete block is more environmentally friendly than use of burnt bricks, which contribute to deforestation. The concrete blocks are stronger and long lasting, do not lead to deforestation as burnt bricks do and that procurement of large quantities of cement for making the concrete blocks will contribute to increased growth of the local economy.

Other materials such as cement, paints, timber, roofing materials, windows, doors and other joinery, tilt and roller doors, wallboard and plasterboard, light fittings, fuel and oil, electricity, water, ceramic tiles, polythene, steel, steel pipes, PVC pipes, adhesives, copper wires, gas (acetylene and oxygen), cardboard will also be sourced for the project. Construction materials will be sourced depending on the construction stage.

Majority of the materials will be procured within the country, however, due to demand for quantity and quality, some of the materials will be imported.

Table 2.2: Summary of Raw materials, Source and Quantity

Requirements	Type	Source	Quantity (Estimates)	Mode of Transport
Raw Materials	Aggregates	Kwa Liyemba	150-350m^3	Trucks
	Sand	Kwa Liyemba	400-800 m^3	Trucks
	Cement	Tanga	300-500 Tons	Trucks
	Water	Borehole		Trucks
	Reinforcement bars	Dar es Salaam/Tanga	150-300 Tons	Trucks
Manpower	Skilled	Contractor	10	Communal buses
	Unskilled	Community around	40	Communal buses
Equipment's	Excavator	Contractor	1	Trucks
	Bulldozer	Contractor	1	Trucks
	Motor grader	Contractor	1	Trucks
	Plate compactor	Contractor	1	Trucks
	Trucks	Contractor	5	
	Construction Crane	Contractor	2	Trucks

Source: BOQ

- **Electrical Work**

Construction phase will involve use of electricity for welding, metal cutting etc., Electricity will be supplied by TANESCO and there will be a standby generator with capacity of 550KVA to be used when power cut off.

Electrical works such as installation of electrical gadgets, devices and appliances including electrical cables, lighting apparatus, sockets etc. will be carried out by a licensed electrician to the satisfaction of the TANESCO.

- **Storage of Materials**

Building materials will be stored on site. Bulky materials will be carefully piled on site. To avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in bits. Materials such as cement, paints and glasses among others will be stored in temporary storage structures, which will be constructed within the project site for this purpose.

2.8.3.2 Construction Equipment

The project activities will involve the use of different machinery/equipment as follows;

i. Land preparation machines and equipment's

The project will use include Bulldozer, Motor Grader, Crawler tractor, Rome harrow.

ii. Field maintenance and leaf transport equipment

The project will use the following equipment's; Tractors, Disc-Inter Harrows, 4-disc plough, rotary slashes, Sisal Harvesting Knife and other equipment's.

iii. Build and civil works machines/ equipment's

Different equipment/machinery will be used during construction phase. These will include:

a) Bulldozers for clearing the site, removal of top soil and vegetation materials, and pushing out stumps;
b) Motor Graders for grading and levelling land for buildings and access road formation;
c) Tippers/lorries for transporting construction materials;
d) Light machinery like pedestrian rollers for access road compaction;
e) Heavy rollers for access roads compaction;
f) Front end loader for loading materials onto tippers and lorries;
g) Several light equipment like wheel burrows, shovels, picks;
h) Concrete mixers;
i) Earth mover;
j) Compactor;

k) Wheelbarrow; and Hammers and bolt and nut fasteners, hand saw, electric and gas welders, electric saws and grinders, load roller, trucks, hand drills and drill bits, wire cutters, concrete mixer trucks, wheel loader, fork lift, excavator

2.8.3.4 Project construction workers

A construction labour force of both skilled and non-skilled workers will be employed. About 50 workers are expected to be employed for construction of worker's camp and factory buildings. About 600workers will be employed for land clearance, cultivation, and planting. The number of workers will be added depending on the nature of the activity. Gender will be considered during employment. For the semiskilled and unskilled workers, people from the nearby communities will be employed. Some project workers will be coming from their home to the project site while others will be staying in workers' camp/quarters.

2.8.3. 5 Project Construction/Renovation Wastes

It is anticipated that the project will generate a variety of waste during its construction phase. The characteristics of the waste are discussed in this section.

a) **Soil:** The soil generated during excavation will be stockpiled along the foundation trenches and used for re-establishment of site at the end of the project.
b) **Pieces of timber/wood, empty cement bags and pieces of iron steel:** large pieces of timber/wood generated during the construction phase will be transported back to the contractor's yard for reuse in future while the small pieces of timber/wood will be disposed-off. Empty cement bags will be collected and disposed to the dumpsite/ sold to local vendors.
c) **Empty paint buckets:** The empty paint buckets will be disposed-off to registered plastic waste dealers.
d) **Excess sand and stock piles:** These can be used for future construction activities e.g. renovations. Upon completion of the project, these will be moved by the contractor to a suitable yard.
e) Domestic wastes such as Food remains, plastic bottles etc.: The proponent will provide dust bins for temporarily storage of waste within the premises before final disposal to the designated dumping site.
f) Old sisal plants/grasses/shrubs: will be collected in one place and left to decompose.

2.8.4 Project Operation Phase

The operation phase will involve production of sisal fibres. Sisal fibre production starts with nursey preparation to obtain the seedlings. Sisal field maintenance include sisal planting, weeding, de-suckering, de-bushing, sisal harvest and soil preparation. Sisal fibre production entails decortication, drying of sisal fibre from the corona, fibre brushing, pressing and balling.

2.8.4.1 Project Operation Activities

i. Feeding

This is the preliminary stage for fibre processing soon after cutting of sisal leaves and transporting from the farms by the use of trailers. It is always achieved by unloading the trailers and loading the feeding table directly by throwing the bundles of sisal leaves where the bundles are untied ready for the next stage.

ii. Shaking

After feeding the sisal leaves are then allowed to pass on the shaker wheel specifically for removing the dust on the leaves and separating the leaves from bundled to an arrangement that will allow the next stage.

iii. Decortications

Decorticators (corona) are used to extract sisal fibre. Leaves are crushed and beaten by a rotating wheel set with blunt knives, so that only fibre remain. The other parts of the leaf are washed away by water. Decorticated fibre is washed before drying by sun or alternatively, wet fibre may be dried by hot air. This wet process requires water (about 40,000 litres per shift). No chemical substances are applied at this stage. Before squeezing, sisal fibre is rinsed to ensure the requisite quality is achieved (about 20,000 litres of water per day). Wastewater is produced and discharged through designated channels. From the drums the sisal fibre is conveyed to a squeezing part ready for transportation to drying lines.

iv. Drying

The fibre quality depends upon moisture content so proper drying is important. At the project site, the sun is used for drying fibre.

v. Brushing

Before baling sisal must be brushed to remove pieces which adhere after decortication and drying. - Brushing also frees individual fibre from each other and removes the short fibre, which are called tow. - Brushing machine contain of revolving metal beaters; hanks of fibre are fed into them by hand, one end first and then the other.

vi. Grading

Grading is done for marketing purposes as different grades attract different prices. This is the process of separating the brushed fibre into various categories according to length, color and presence of impurities, length being the predominant character. Grading is a continuous process that starts from leaf cutting, when leaves are sorted into similar sizes.

Sisal fibre is always graded according to quality for marketing purposes following the recommended sisal grades by the Tanzania Sisal Board.

vii. Baling and packaging

Aimed at achieving the lowest possible volume, in order to realize savings on freight charges, while facilitating ease of handling. Sisal fibre is therefore baled under great pressure to achieve high density ($1.7m^3/T$). In the baling process, bales are labeled indicating the grades, origin, date, and mark of the producer. The standard bales are normally in units of 100kg, 200kg and 250kg.

viii. Labelling

The bales are labelled legibly and indelibly with the following information. a) product name; b) grade; c) trade mark of the producer; d) country of origin; e) bale number; f) date of production (baling); and g) bale net weight in kilograms.

ix. Storage

This is to store fibre waiting for brushing, already brushed fibre, and bales waiting for transportation to port of export. The storage facility has adequate ventilation and is stored properly to avoid direct contact with walls, bare floor, and any possible contamination.

viii. Transportation

Sisal fibre is transported to ports and to local buyers (local and international markets). There is a sisal bag manufacturing plant located in Morogoro with a sisal spinning plant. Transportation department include plant operators, small vehicle drivers and heavy truck drivers.

2.8.4.2 Project Operation Materials

i. Production equipment

The sisal fibre production equipment including;

i. Corona
ii. Brushing machine
iii. Press machine
iv. Workshop equipment and other equipment

ii. Materials

- **Water**

The estate will be supplied with water from Zigi river. The Pangani Basin Water Board grant water use permit. There will be water storage tanks of different capacities. Water is used in decortication process. About 40,000 litres of water is estimated to be used per shift of 8-hours a day.

- **Electrical Supply**

The estate will be supplied with electricity from TANESCO. There is also a standby generator with a capacity of 550KVA to serve during power cuts. The estate will use electricity for running machines, lighting, computers, office equipment, and facilitating heating, cooling, and ventilation.

- **Motor vehicles**

The project will use the following motor vehicles for transporting sisals and staff to work places.

i. Truck
ii. Dump truck
iii. Bus and Pickups
iv. Tractors and Trailers

- **Sanitary facilities**

There will be two (2) sanitary facilities and two (2) changing rooms for each gender. Sanitary facilities should be in good condition, clean, sufficient in number and easy to access to ensure the hygiene and dignity of people, as well as to avoid the transmission of certain infectious diseases.

2.8.4.3 Project Operation wastes

i. Sisal processing waste

Waste such as sisal leaf decortications waste (SLDW), short fibres (flume tow) and sisal dust are expected to be generated. Flume tow generated will be collected, dried and later used for making sacks. Sisal leaf decortications waste (SLDW) will be used as fertilizer in the sisal farms.

ii. Domestic waste

These include waste like food waste, paper, glass, ropes, dried leaves etc. This waste will be collected in the dustbins positioned in different location and then decomposed. The management has to ensure waste segregation.

iii. Liquid waste

Waste water from decortication process, kitchen and other sanitary facilities. Sisal is harvested and processed using a decorticator machine which crushes sisal leaves into fibre, resulting in generation of sisal juice or liquid waste. Liquid waste from decortication will be managed by using waste water treatment ponds which are situated within the estate.

Liquid waste from kitchen and sanitary facilities will be managed by using septic tanks and soak away pits.

iv. Hazardous wastes

Types of hazardous waste to be generated include fuel, oil, lubricants, scrap metals and plastics. Fuel, oil, and lubricants will be collected and disposed of in accordance with environmental regulations. Meanwhile, scrap metals and plastics will be temporarily collected and stored in a designate area before provided and/or sold to recyclers.

v. Storm Water Management

At the proposed site and marginal zone areas, Storm water drainage system development is needed. Water management structures will be constructed to maintain storm water following the natural topography of the area.

2.8.4.3 Project Resources

- **Project Operation workers**

Currently the project has employed over 600-700 workers depending on the season this include skilled workers, slashers, cutters, loaders, drivers, security man, headmen etc. Some workers will be staying in workers' camp/quarters and others will be coming from their homes.

2.8.5 Decommissioning Phase

Decommissioning is the last phase in the lifetime of such facilities, following their design, construction, operation and permanent shutdown. It comprises different administrative and technical activities whose purpose is to remove or to minimize the residual hazards in the facility after it is shut down.

2.8.5.1 Decommissioning activities

These will involve;

i. Removal of structures on or beneath the ground;
ii. Disposal or secure isolation and/or treatment of contaminated equipment in-situ or offsite
iii. Remediation of aesthetics (back-fillings, stained soil removal, waste disposals, etc.) and containment control of contaminant and general site clean-up.
iv. Access controls for physical structures remaining on- site that are unsafe or hazardous to humans or animals
v. Remediation of aesthetically unacceptable portions of the site (filling of pits, removal of stained soil and odorous material, levelling of mounds, disposal of waste rock) etc.
vi. Clean-up of the site to a level which will provide long-term environmental protection and will be safe for the intended future use
vii. Re-vegetation

2.8.3. 5 Project demolition wastes

Demolition waste is waste debris from destruction of buildings, roads, bridges, or other structures.

i. **Concrete and Brick:** Concrete and brick can be recycled by crushing it into rubble. Once sorted, screened and contaminants are removed, reclaimed concrete or brick can be used in concrete aggregate, fill, road base, or riprap. Mobile concrete crushers also allow for recycling of concrete on-site.

i. **Wood:** Wood can be reused, repurposed, recycled. Reused wood can eliminate the need for full-size new lumber if used for smaller building components. Repurposed or recycled wood can be used in pathways, coverings, mulches, compost, animal bedding, or particleboard.

ii. **Drywall:** Drywall is made primarily of gypsum. Once the gypsum is depapered, it can be added in cement production, as a soil amendment, used in aerated composting, or recycled into new drywall. Gypsum recycling can be particularly beneficial because in landfill conditions gypsum will release hydrogen sulfide.

iii. **Asphalt:** Asphalt, from shingles or asphalt concrete, is typically recycled and used in pavement.

iv. **Metal:** Scrap metal is an established industry focused on the collection, buying, selling, and recycling of salvaged materials.

v. **Sisal Waste:** Will be collected in one place and left to decompose.

2.9 Health and Safety Measures

The project site should be registered to the Occupational Safety and Health Authority (OSHA) before commencement of any business operation as per section 16(2) of the Occupational Health and Safety Act, 2003.

2.9.1 OHS during construction phase

Occupational health and safety in construction involves the identification, assessment, and control of hazards to minimize the risk of injury and illness to workers. It is essential to ensure that all workers have the necessary training, knowledge, and equipment to work safely.

Before the work starts, competent Environment Health and Safety personnel should:

- Identify and devise risks and their management strategy
- Ensure training – site specific and job-specific
- See that the workforce has access to PPEs and know how to use them
- Observe, inspect and report that agreed safe work methods are implemented, site-wide

Upon arrival at the site, employees, contractors and visitors should receive information about the site hazards and steps taken to control those risks. Also, briefing them about the hazards, PPEs, welfare facilities and site rules can ensure that the work in progress is smooth and efficient.

Moreover, it is important to promote a safety culture in the construction industry, where workers are encouraged to report hazards and near-misses, and where safety is given priority over productivity.

Preventive measures

Much of the construction works include scaffolds, and collective fall prevention becomes a necessity. They must be equipped with toe boards and brick guards. Personal prevention such as podium steps, can be used to prevent falls while working at height. If the weather seems inappropriate, emergency and rescue procedures should be well-defined in advance to avoid adverse effect on workers. All working platforms must be checked for safe conditions and should be inspected for slip and trip hazards.

Other preventive measures that make safe conditions certain are:

i. Regular inspections of the site and the machineries to detect hazards in the first place
ii. Selection of the right PPE (respirators, helmets) to avoid inhalation of asbestos, dust and fibre with provision for appropriate trainings.
iii. Avoid repetitive motions and use long-handled tools to reduce the need of bending down.
iv. Make sure that workers are protected from wet concrete (provide PPE and proper washing facilities)
v. Ensure safe dismantling procedures are in place
vi. Site traffic (for vehicles or moving equipment) should be planned and managed to avoid fatalities onsite
vii. Forklifts should be used carefully in material handling
viii. Pneumatic silencers should be used to reduce noise; electrical hazards (faulty wiring) must be checked and firefighting equipment should be in place

2.9.2 OHS during operation phase

To comply with safety standards, the project will be operated following all procedures provided by OSHA. Here are different OHS procedures;

i. **Risk Assessment:** A systematic process of evaluating potential hazards before they can cause harm. Once these risks are clearly understood, appropriate measures are taken to mitigate (reduce the potential impact or likelihood) or eliminate the risks. For some hazards, elimination might be possible, like replacing a toxic substance with a non-toxic one. For others, mitigation measures might be more appropriate, like using protective gear or improving ventilation.
ii. **Emergency Response Planning:** Essential components of this plan include marked evacuation routes, designated assembly points outside the danger zone, and a list of emergency contact numbers, including local authorities and medical facilities. Regular drills are pivotal in familiarizing all employees with the plan, ensuring that panic doesn't set in in the face of a real emergency and everyone knows their roles and responsibilities.

iii. **Chemical Handling and Storage:** Some workplaces use chemicals, A designated storage area ensures that chemicals are stored in controlled conditions, minimizing the risk of spillage or unwanted reactions. Employees, especially those directly handling these chemicals, need rigorous training on safe handling procedures, which includes the correct method of transferring chemicals between containers, the importance of using fume hoods, and steps to take in case of accidental exposure.

iv. **Ergonomics:** Ergonomics involves designing and arranging a workplace to optimize it for human use, ensuring that tasks, equipment, and the environment support the user's ability to work efficiently and safely. Ergonomic keyboards and mice can reduce the risk of repetitive strain injuries like carpal tunnel syndrome. Moreover, the arrangement of daily tasks plays a role too. Intermittently changing tasks or taking short breaks can prevent muscle fatigue and cognitive burnout, ensuring the employee's well-being.

v. **First Aid:** The immediate care given to an injured person before professional medical care is available. A crucial element of first aid preparedness is having a kit with essentials like bandages, antiseptics, and pain relievers, which can address minor injuries or stabilize more severe ones. Workers should have basic knowledge of first aid practices.

vi. **Housekeeping:** A clean and organized workplace is not just aesthetically pleasing but also critical for safety. Regular cleaning ensures that potential hazards, like spills that can cause slips, are immediately addressed. Organized walkways without obstructions can prevent tripping hazards and are especially vital during emergencies for swift evacuations.

vii. **Fire Safety:** Fires are among the most common and destructive hazards. Preparedness for such an eventuality begins with having fire extinguishers readily available. But it's equally important for employees to know how to use them. Different fires (electrical, chemical, or paper-based) require specific types of extinguishers, and using the wrong one can exacerbate the situation. Modern buildings also use smoke detectors and sprinkler systems as early warning and response systems. These devices need regular testing to ensure they are always functional. The objective is to detect a fire early, suppress it if possible, and allow safe evacuation.

viii. **Training and Education:** Specific training sessions should be conducted whenever new staffs are introduced. This holistic approach to training ensures that the entire workforce is prepared, aware, and actively participating in maintaining a safe work environment.

2.10 Market Analysis

METL sisal fibre are sold in both local and international markets. The company is estimating to export about 80% of the sisal fibre produced. The balance of the produce (about 20%) are locally sold, specifically to METL Group of companies involved in the sisal spinning and sisal bags manufacturing. The export markets include Japan, India, Yemen, Spain, Italy, Belgium, Holland, France, Ethiopia, Germany and the EAC states.

2.11 Project Boundaries

We can identify three types of boundaries that are considered in conducting EIA. The boundaries are Institutional, Temporal and Spatial boundaries.

2.11.1 Institutional Boundaries

Institutional boundaries refer to those institutions and sectoral boundaries in which the project lies or interacts. These can be determined from political boundaries, Acts, regulations and institutional mandates and administrative structures. This proposed development touches the interest of a number of people and administrative units in relation to several policies, laws and plans, and the overall land and settlements acts. The institutional framework includes; Minister responsible for environment in the Vice President's office, Division of Environment NEMC, District Council and Ward and sub-ward (with committees for environment).

2.11.2 Temporal Boundaries

Temporal boundaries refer to the lifespan and reversibility of impacts. The impact of the proposed project will have implications that stretch very far into the future until when decommissioning is undertaken. Also, consideration needs to be given to what happens when the project ends, where there is need for site restoration and decommissioning of the project.

2.11.3 Spatial Boundaries

Spatial boundaries are crucial to decide on whether impacts are likely to occur at Local, Regional, National or International Level. The proposed project will have wide ranging implications that could be felt Locally, Regionally, Nationally and probably outside the country thus, causing impacts as far as those areas. In this study, spatial impacts will be determined from the core project area (the area within the proposed project development). The Area of Impact and Area of Influence.

a) Core Project Area

In determining the spatial dimension of the project, it is important to consider impact in a contour layout, starting with the Core Project Area (CPA). This is the area where the project is located and, which will bear most impacts than the rest. In this case the Bamba village, Mwiduro Ward, Mkinga District is the Core Project Area (CPA).

b) Area of Impact (AoI)

This is the area which surrounds the Core Project Area (CPA). This is an area that borders the proposed project area. This area plays an important role and bears some positive or negative impacts. The area of Impact in the case of the proposed project would include Mjesani and Bamba. These areas will be linked with the proposed development through road transport, supply of services and goods as well as labor force.

c) Area of Influence (AoI)

The area beyond the area of impact is further away from the proposed project. It consists of the centers of decision making that can influence the development of the industry. This center of decision making includes National Environment Management Council and the Ministry responsible for Environment. The proposed project may attract contractors and consultants beyond Tanzania.

CHAPTER THREE

3.0 Policy, Administrative and Legal Framework

3.1 Overview

This project needs to comply with the Tanzania's national environmental policy and legislation because it is going to be implemented in Tanzania. Tanzania currently aims at achieving sustainable development through rational use of natural resources and incorporating measures in any development activities in order to safeguard the environment. The main legal document which drives towards achieving this goal is the National Environmental Policy (NEP), which was approved by the GOT in 1997. The NEP advocates the adoption of Environmental Impact Assessment (EIA) tool for screening development projects, which are likely to cause adverse environmental impacts.

3.2 National Policies Framework

Relevant policies and legislation pertaining to ground water and surface water pollution, pollution of soil, land and land use, air pollution health and safety were examined, among others in order to ensure that the proposed establishment meets and abide to the existing regulations. These are described below.

Various national policies relevant to this project have been considered. The summary of policies reviewed and their relevance is provided below.

1) National Environmental Policy 2021

The Policy highlights sustainable development as its core concept. It states that Tanzania is committed to sustainable development in the short, medium and long-term and adopts key principles of sustainable development. It is the main policy document governing environmental management in Tanzania by addressing environmental issues as both natural and social concerns. The policy has also proposed framework environmental legislation to take account of the numerous agencies of Government involved in regulating various sectors. Thus, the NEP defines strategic plans for environmental management at various levels and provides approach for mainstreaming environmental issues for decision-making and defining sector policy action plans. In regards to environmental management and protection the policy identifies six key problem areas as; Land degradation; Lack of access to good quality water; Environmental pollution; Loss of wildlife habitat and biodiversity; Deterioration of aquatic ecosystems; and Deforestation.

In order to achieve the above policy objectives; the following measures shall be put in place; Planning and implementation of water resources and other development programmes in an integrated manner and in ways that protect water catchment areas and their vegetation cover; and improved management and conservation of wetlands.

Relevance to the Project: The project will be required to address policy objectives by ensuring that damage to the biophysical and social environment is avoided or minimized during implementation of the project activities which are expected to have impacts.

2) National Land Policy 1995

The National Land Policy of 1995 (Revised in 1997) recognizes the need for protecting environmentally sensitive area such as catchment areas, rivers, fragile waterways, game reserves, etc. The policy stresses that these sensitive areas should not be allocated to individuals. Additionally, the policy promotes land tenure system to encourage the optimal use of land resources, and to facilitate transport-based social-economic development. The Land Policy provides for "full fair and prompt compensation" when land is acquired. Similarly, the project implementation will keenly observe the policy requirements.

The National Land Policy set in motion a land reform giving respect to customary and common rights. In addition, roles of government in land tenure and management have been devolved to the local level and establishment of supporting systems for land registration and entitlement to the sub ward level.

Furthermore, the policy emphasizes on the protection of environment and natural ecosystems from pollution, degradation and physical destruction. In addition, the policy recognizes the importance of social services such as water, roads, energy and solid waste management for environmental protection. It also identifies the need for conservation and preservation of prehistoric/historic sites and buildings.

Relevance to the Project: This policy is relevant to the proposed project and the project design will ensure protection of existing land ownership patterns, social services, proper disposal of solid wastes and suitable landscape works to protect sensitive areas in the project area.

3) The National Water Policy, 2021

NAWAPO's objective is to develop a comprehensive framework for sustainable management of the national water resources. In this case the policy recognizes the need to protect water sources against pollution and environmental degradation. The Water Policy reflects the shift in approach towards comprehensiveness and economics. In addition, the Policy aims at ensuring that beneficiaries participate fully in all states of water resource developments and recognizes the fundamental but intricate linkages between water and socio-economic development, including environmental requirements. The Policy expounds on the importance of water for domestic use, agriculture, livestock keeping, mining energy, fisheries, environment, human health, wildlife and tourism, forestry, navigation and trans-boundary requirements. The policy states that "a holistic water (river) basin approach, integrating multi-sector and multi-objective planning and management, should be taken in order to ensure sustainability and protection of the resource."

With these basic shifts in approach and the attempt to co-ordinate and harmonize the sectoral policies, it is in line with though guidance from the Convention of Wetlands and the vision of the National Environmental Policy.

Relevance to the Project - The proposed project could result into pollution for ground and surface water in the area. In this case project designs will ensure water sources (including streams which ultimately flow into the water sources) are suitably protected to minimize impacts during the renovation and operational phases of the project.

4) National Gender Development Policy 2000

Main objective of this policy is to provide guidelines to ensure gender sensitive plans, programs and strategies in all sectors and institutions. The policy gives emphasis on gender equality with it aims at establishing strategies on poverty eradication through ensuring that both women and men get access to existing resources for their development. It values the role played by women in bringing about development in the society.

Construction sector is also committed to ensuring gender mainstreaming at all levels, through provision of equal opportunities to both men and women in road works and related activities.

Relevance to the Project: The policy requires the project management ensure that gender issues are given emphasis. It also requires that women and men are given equal employment opportunities in the project, whenever possible. Therefore, this project will ensure that women, will be adequately involved at all levels of the project planning to implementation.

5) The National Employment Policy, 2008

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

It therefore aims at preparing conducive environment for the unemployed to employ themselves by directing more resources to the self-employment sector, identifying potential areas for employment and lay down strategies of how to utilize areas in promoting employment industry, identify and elaborate on the status and roles of various stakeholders in promoting and sustaining employment, and to develop the self-employment sector in the rural areas as to reduce the rate of migration to urban areas.

Relevance to the Project: The EIA study will fully abide by the provisions of this policy. The Management will abide to the relevant provisions of the policy to ensure that local residents, especially the youth, women

and other vulnerable groups, are given priority in all employment opportunities that will arise during the expansion and operational phases of the project.

6) National Health Policy 2003

The Health Policy is a vital guide towards health development of any country. It is particularly, important in a country like ours where resources and technology are more limited than in other countries, which are relatively better off in both technology and resources The National Health Policy is aimed at providing direction towards improvement and sustainability of the health status of all the people, by reducing disability, morbidity and mortality, improving nutritional status and raising life expectancy. The policy recognizes that, good health is a major resource essential for poverty eradication and economic development. The main objectives of the policy are:

- Sensitize the community on common preventable health problems, and improve the capabilities at all levels of society to assess and analyse problems and design appropriate action through genuine community involvement.
- Promote awareness among Government employees and the community at large that, health problems can only be adequately solved through multi sectoral cooperation involving such sectors as Education, Agriculture, Water, Private Sector including Non-Governmental Organization, Civil Society and Central Ministries, as Regional Administration and Local Government, and Community Development, Gender and Children.
- Promote and sustain public-private partnership in the delivery of health services.

Relevance to the Project: The implementation of this project will ensure that all the staff, workers at the project site will have necessary personal protective equipment, such as gloves, dust mask and the local communities will be informed and protected against all health risks, including awareness on health problem so as to attain poverty reduction hence to achieve economic development.

7) National Policy on HIV/AIDS 2003

The policy provides a framework, direction and general principles in the national response to interventions in the prevention, care and support of the infected and affected by the HIV/AIDS epidemics and mitigation of its impacts. Tanzania is facing major threats to the survival of its people and the development chances of the nation from a concentrated and a generalized HIV /AIDS epidemic. The National Multi-Sectoral Strategic Framework (NMSF) on HIV / AIDS will translate the National Policy of HIV/AIDS by providing strategic guidance to the planning of programmes, projects and interventions by various stakeholders in the fight against HIV/AIDS. In order to make sure that NMSF meets its objectives, the following goals were set

GOAL 1: Reduce the spread of HIV in the country.

GOAL 2: Reduce HIV transmission to infants.
GOAL 3: Political and government leaders consistently give high visibility to HIV /AIDS in their proceedings and public appearances.
GOAL 4: Political leaders, public and private programmes, projects and interventions address stigma and discrimination and take Human Rights of persons living with HIV /AIDS into account.
GOAL 5: HIV /AIDS concerns are fully integrated and prioritized in the National Poverty Reduction Strategy and Tanzania Assistance Strategy.
GOAL 6: Reduce the prevalence of STIs in the population.
GOAL 7: Increase the knowledge of HIV transmission in the population.
GOAL 8: Increase the number of Persons living with HIV /AIDS who have access to a continuum of Care and Support from Home / Community to Hospital levels.
GOAL 9: Reduce the adverse effects of HIV /AIDS on orphans

Relevance to the Project*:* The Estate Management and the District Council is required to make sure that there are no any discrimination and stigma and also take Human rights of person living with HIV/AIDS into account.

8) The National Investment Promotion Policy, 1996

The Policy is promoting investment opportunities that private sector can take up and increase economic growth. The Investment Promotion Policy outlines areas and conditions for investment and comes as a result of the economic liberalization program that promotes the role of the private sector in economic activities in Tanzania. The Policy encourages private sector investments whilst also taking into accounts environmental consideration so as to ensure investments yield the expected benefits.

Relevance to project: The proposed project came into being as a result of this policy that promotes the role of the private sector in economic development. This Environmental Impact Statement will assess the contribution of the proposed development to improvement of social welfare through employment and economic growth as well as an increase in availability of sisal fibre in Tanzania.

9) The Tanzania Development Vision 2025

Composite Development Goal for the Tanzania Development Vision 2025 (URT, 2000) 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 public resources towards achieving shared goals and achieve sustainable semi-industrialized middle market economy by year 2025.

Relevance to the Project: The establishment of the estate aims at improving commercial and business status for development and improvement of livelihoods of the people in the region and national wide.

10)The National Strategy for Growth and Reduction of Poverty (NSGRP/ MKUKUTA)

The National Strategy for Growth and Reduction of Poverty (NSGRP) or Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania (MKUKUTA) is focusing on promoting economic growth and reducing poverty in Tanzania. The NSGRP is a five years' program from 2005/06 to 2009/10, which addresses the Tanzania Development Vision 2025 for high and shared growth, high quality livelihoods, peace, stability and unity, good governance, high quality education and international competitiveness. In addition, NSGRP is contributing to implementation of the Millennium Development Goals.

The main objective of the NSGRP is to stimulate economic growth and reduce poverty, improve quality of life and social well-being and improve good governance and accountability. The strategy recognizes the close linkages between economic growth, good governance and improved quality of life and social well-being, and poverty reduction. Among the various factors that have been identified to stimulate growth is the improvement of industrial sector in order to stimulate economic growth.

Relevance to the Project: Project implementation is consistent with the relevant provisions of the NSGRP, as it seeks to improve living standard of people.

11) The National Agriculture Policy of 2013

The National Agriculture Policy of 2013 is a comprehensive framework aimed at transforming Tanzanian agricultural sector into a vibrant, sustainable, and competitive entity. It focuses on enhancing productivity, ensuring food security, promoting efficient water usage, and fostering rural development. Key objectives include modernizing agricultural practices, integrating technology, improving infrastructure, and empowering farmers through better access to credit, markets, and information. The policy emphasizes the importance of agro-processing, diversification of crops, and encouraging private sector participation. By addressing challenges such as climate change, land degradation, and market volatility, the policy seeks to secure the livelihoods of farmers while ensuring environmental sustainability and national food security.

Relevance to the project: National Agriculture Policy of 2013 provides a supportive framework for projects by promoting sustainable agricultural practices, encouraging private sector investment, supporting research and development, and fostering market development. Adhering to the principles and objectives outlined in the policy can enhance the viability and success of a sisal estate project while contributing positively to the overall agricultural development goals of the country.

12) The Workmen's Compensation (Accident) Convention of 1925

The Workmen's Compensation (Accident) Convention of 1925 was an international treaty established under the auspices of the International Labor Organization (ILO). Its primary aim was to ensure that workers who suffered from work-related accidents received adequate compensation and benefits from their employers. The convention laid down principles and standards for providing compensation to workers for injuries or illnesses resulting from their employment, regardless of fault. It emphasized the responsibility of employers to maintain a safe working environment and to compensate workers promptly in case of accidents. The convention aimed to protect workers' rights and promote social justice in the field of occupational safety and health globally. *Revered in the policy at* ***Article 1*** Each Member of the International Labor Organisation which ratifies this Convention undertakes to ensure that workmen who suffer personal injury due to an industrial accident, or their dependents, shall be compensated on terms at least equal to those provided by this Convention

Relevance to the project: Workmen's Compensation (Accident) Convention of 1925 is relevant to the project by ensuring legal protection, promoting safety measures, and demonstrating compliance with international labor standards concerning worker compensation in case of accidents or injuries.

13) The National Energy Policy, 2015

Energy Sector plays an important role in the socioeconomic development of any country. To ensure effective management of the sector, the Government of Tanzania launched the first National Energy Policy in 1992. To cope with increasing activities in the Energy Sector and accommodate public sector reform objectives, a new National Energy Policy was launched in 2003. Despite several interventions in the past decade, the Energy Sector has been facing some challenges embedded in policy, legal, regulatory and institutional frameworks. To address the challenges and achieve the desired policy objectives, the Government has decided to formulate the National Energy Policy, 2015 (NEP, 2015) that will further enhance provision of adequate, reliable and affordable modern energy services to Tanzanians in a sustainable manner. The new policy also provides comprehensive legal, regulatory and institutional frameworks for petroleum, electricity, renewable energies, energy efficiency as well as local content issues. This policy outlines measures to adopt clean technology and minimize pollution in developing Tanzania’s energy sector. It focuses on utilization of various energy resources among others include water, gas, coal, petroleum and wind in a sustainable and environmentally friendly manner. The policy 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 development endeavors. The Policy indicates that more than 40% of all imported petroleum is consumed within the transport sector. The development of the sector therefore has both direct and indirect implications for the total energy consumption and social-economic growth.

Relevance of the project: This project is complying with the provisions of this policy by ensuring that energy is sourced from recognized source such as TANESCO and Generator as well as conducting energy audit.

14) The National Economic Policy (NEP) of Tanzania in 2004

The National Economic Policy (NEP) of Tanzania in 2004 aimed to foster sustainable economic growth, reduce poverty, and achieve macroeconomic stability. It emphasized private sector-led development, infrastructure improvement, and enhancing human capital through education and healthcare. Key strategies included promoting investment, improving agricultural productivity, and addressing regional disparities. The policy sought to integrate Tanzania into the global economy while ensuring equitable development across the country. As primary objective of this policy is to provide general guidelines which will ensure that the majority of the citizens of Tanzania have access to opportunities to participate effectively in economic activities in all sectors of the economy. In this regard, sector policies will give preferential treatment to nationals where necessary so as to enhance their bargaining position and opportunities.

Relevance to the project: NEP of 2004 in Tanzania provided a strategic framework that supported agricultural development, infrastructure enhancement, private sector growth, and regional equity - all of which could have positive implications for the planning and execution of project during that period. The proponent is to ensure opportunities to workers as well as neighboring citizen to participate effectively for example in providing opportunity for local sisal growers to sell sisal leaves.

15) Construction of industry policy 2013

Construction industry development is a deliberate and managed process to improve the capacity and effectiveness of the construction industry to meet the national economic demand for buildings and other physical infrastructure facilities, and to support sustainable national economic and social development objectives, while ensuring; (i)Increased value for money to industry clients as well as environmental responsibility in the delivery process, (ii)The viability and competitiveness of domestic construction enterprises, (iii)Optimization of the role of all participants and stakeholders through process, technological, institutional enhancement and through appropriate human resource development.

Relevance to the project: the proponent is required to improve the production and quality of goods as well as taking into consideration the Environmentally friendly products and practices also to promote application of cost effective and innovative technologies and practices to support socio-economic development activities such as road works, water supply, sanitation, shelter delivery and income generating activities.

3.3 National Legal Framework

This section addresses the legal (Laws, Regulation and Guidelines) and regulatory framework, which is relevant to the proposed project. The legal and regulatory framework provides the various legal aspects that must be adhered to as the project in designed, implemented and later when it is decommissioned.

1) The Environmental Management Act, Cap 191

Environmental Management Act No.20 of 2004 is the principle legislation governing environmental management in the country. The Act recognizes the right of every citizen to clean, safe and heath environment, and the right of access to environmental resources for recreational, educational, health, spiritual, cultural and economic purposes. Part IX provides for Waste Management. The section makes separate provisions on governing the management of solid waste; litter; disposal and transportation of liquid waste and sewerage; management of gaseous waste and management of hazardous waste. Local government authorities are given specific obligation to minimize solid, liquid, gaseous and hazardous wastes falling under their respective jurisdictions. The proponent has to observe environmental quality standards in respect of air water and soil as stated in 2007 Regulation. Also Carrying out self-Monitoring and environmental Audit and submit the reports to NEMC.

In order to ensure there is effective implementation of national environmental policy objectives, the Act has identified and outlined specific roles, responsibilities and functions of various key players and provides a comprehensive administrative and institutional arrangement which consists of: National Advisory committee; Minister responsible for environment; Director of environment; National Environmental Management Council (NEMC); Sector ministries; Regional secretariat; and Local government authorities (City, Municipal, District and Town Councils).

Relevance to the Project: The Act is relevant because the project is expected to have some impacts to the environment (such as noise, vibration, and dust during renovation stage). Thus, monitoring of the mentioned parameters would require adherence to the developed environmental standards (international and national) and Environmental Management Plan (EMP) and Monitoring Plan (MP) to be prepared as part of design for the proposed project.

2) Occupational Health and Safety Act No. 5 of 2003

Part IV of this Act make provisions for safety, health and welfare for persons at work in factories and other places of work; to provide for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities for persons at work. Proposed expansion, rotation and modernization of the Estate will entail the employment of both skilled and unskilled laborers, and as such will comply with this Act. Part 111 of the Act calls for the registration of the market or workplaces to obtain compliance certificate as well as submission of drawings in blue prints which depict

vital sections to the OSHA's Chief Inspector for approval. Occupational health and safety are key aspects in the operations. First aid equipment, sanitary facilities and effective Personal Protective gears will be provided to employees and maintained by the contractor during the period of renovation.

Relevance to the Project: The proponent shall observe the provision of this Act during all stages of the project development and operation.

3) Local Government Act (District and Urban Authorities) of 1982

This Act provides for detailed responsibility for Urban and District Councils in the administration of their day-to-day activities. EIA and waste management are pointed out as one of the activities to be managed by both district and urban authorities.

Relevance to the Project: The project activities including this EIA study will seek to liaise closely with Mkinga District Council and other stakeholders in the project area will be required to fully abide the provisions of this law in order to ensure effective management of waste to be generated.

4) The Land Act, 2019

The Land Act seeks to control land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. This Act identifies three categories of land – village, public and general, and distinguishes protected or restricted land (e.g. National parks, forest reserves, etc.) and ensures that tenure and rights of legitimate land users are considered and respected. Land sensitivity and potential environment impact of the proposed establishment of shall be considered in order to ensure that the land is not polluted and to allow for natural and rapid restoration of cleared vegetation or disturbed land.

Relevance to the Project: The design and implementation of this EIA process is consistent with this legislation. The proposed project will be carried out within the limits of the site earmarked for the activity.

5) The Fire and Rescue Army Act 2007

The Fire Fighting and Rescue Act of 2007 stipulate that every building with more than one storey should be installed with a number of facilities for firefighting. Buildings have to be provided with adequate means of escape and firefighting facilities. Also, buildings as infrastructure require fire protection to facilitate their regular functioning and service delivery. Protection of buildings is not only necessary for such purposes, but also for the safety of the users.

Relevance to the project: The proposed development under the Act requires the installation of firefighting equipment's. Also, the proponent will employ skilled and knowledgeable personal to use the equipment and means against fire hazards could render attempts to contain fire outbreaks.

6) Water Resource Management Act 2009

The water resources management Act of 2009 principally seeks to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account ten (10) fundamental principles including:

- Protecting biological diversity especially the aquatic ecosystems;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Providing for systems for managing the growing demand for water use through integrated planning and management of surface and groundwater resources, in ways that incorporate economic, environmental and social dimension in the planning process;
- Proving implementation of international obligations stipulated under international legal instruments to which Tanzania is party and
- Facilitating social economic development.

Apart from incorporating sustainable water use principles and having pollution prevention conditionality in the water permits, the Act goes a step further by putting in place a regime for water resource protection, abstraction (surface and groundwater) and use. Under Section 33(1) of the Act, for the whole or part of a water source, a determination of the ecological reserve shall ensure that adequate allowance is made for each aspect of a reserve.

Relevance to the Project: This EIA study will ensure that all relevant potential impacts from the proposed expansion, rehabilitation and modernization are properly mitigated to avoid any potential social and environmental problems. The discharge of waste water will be restricted as stated in the law, that waste water should be treated before discharged to the environment. Operation activities of the estate will ensure sustainable and efficient use of water.

7) The Water Supply and Sanitation Act No. 12 of 2019

This legislation provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; provides for establishment of water supply and sanitation authorities as well as community owned water supply organizations; and provides for appointment for service providers. The main aim of this law is to ensure the right of every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interest of customers.

Under this law, the Minister responsible for water affairs shall establish water authority and cluster water authorities in order to achieve commercial viabilities.

Relevance to the Project: The project proponent will ensure that no any kind of waste to be discharged in water sources so as to ensure water conservation and protection is well managed.

8) The Public Health Act 2009

Part IV of the Act provides for need to maintain cleanness and hygiene and prevent nuisance during renovation works. It calls for effective management of solid, liquid, gaseous, and hazardous wastes. Section 76 of the Act specifically requires every authority to undertake periodic studies to determine the type of solid and liquid wastes generated from markets, institutions and industries; and determine appropriate methods for sorting and storage of the wastes.

Relevance to the Project*:* This project will involve a level of waste generation and therefore the EIA study will design waste management activities to be implemented during the implementation of the project.

9) HIV and AIDS (prevention and Control) Act No. 28 of 2008

The Act provides for prevention, treatment, care, support and control of HIV and AIDS, for promotion of public health in relation to HIV and AIDS. HIV and AIDS education in workplace, the Act requires that every employer in consultation with the ministry shall establish and coordinate a workplace programme on HIV and AIDS for employee under his control and such a program shall include provision of gender response HIV and AIDS education, distribution of condoms and support to people living with HIV and AIDS.

Relevance to the Project: The project Proponent will observe the requirement of this Act during project implementation by promoting awareness and education concerning the prevention and control of the spread of the disease.

10) The Workers Compensation Act, 2015

The law provides for compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the course of employment to establish the Fund for administration and regulation of works compensation and to provide for related matter.

Relevance to the Project: This Act is very relevant to this project as workers will be exposed to various hazards during expansion, rehabilitation and modernization of the estate. The developer and the contractor will have to ensure safety and health of workers at the project environment.

11)The Urban Planning Act No. 8 of 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. Expropriation of land for water infrastructure development and associated activities in urban areas shall comply with the provisions for this law. Under Section 3 among

other things the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development.

Relevance to the Project*:* The provision of the requirement by this project is in full compliance with the Urban Planning Act.

12)The Engineers Registration Act, 1997

There is hereby established Board known as the Engineers Registration Board which has responsibility of regulating the activities and conduct of engineers and of engineering consulting firms in accordance with the functions and powers conferred upon it by this Act. Qualification for registration of Engineers as stated in part iii section 10(1) of this act that "subject to the provisions of this Act, a person shall be entitled, on making an application to the Board in the prescribed manner and on payment to the Board of the prescribed fee, to be registered under this Act and to have his name entered in the register as a registered engineer".

Relevance to the project: This project has an engineering works which involves various designs for the renovation of the estate. Example design for Building, Installation facilities such electricity, sewerage systems, waste management (waste water treatment plant, solid waste management system). All required engineering part will be done by a registered engineer to ensure compliances of the Act.

13)The Contractors Registration Act, 1997

There is hereby established Board known as the Contractors Registration Board. The purpose of contractor's registration Board is stated under this act in part ii section 3(2a-d). As explained in this act a contractor is "any person who himself as a developer or investor, undertakes the renovation, erection, installation or alteration of any structure, for public use or otherwise, situate below, on or above the ground or other work connected therewith or the execution of any alteration or otherwise to any structure, for public use or otherwise, or other work connected therewith, where such person undertaking to do any such work."

Part iii section 7(1) of this act states the registration of the contractors. "The Registrar shall keep and maintain registers of contractors of different types, categories and classes, in which the name of every person entitled to have his name in them as a registered contractor, shall be entered as soon as it is practicable after being accepted by the Board for registration".

Relevance to project: The proposed project contractors to be involved will be a registered member of the board as already being explained in part iii section 7(1) of the contractor's registration Act of 1997.

14)Environmental Impact Assessment and Audit Regulations as amended on 2018

The Environmental Impact Assessment and Audit regulations are made under Environmental Management Act. No 20 of 2004. The regulations provide basis for undertaking Environmental Impact Assessment and

Environmental Audit for various development projects with significant environmental impacts in the country. This section gives a brief description of some provisions in the regulations that are relevant to this study.

Part 111 of the Environmental Impact Assessment and Audit Regulation, formed under G.N. No. 349 of 2005 deals with project registration and screening procedures. Section 5 requires the registration applicant for Environmental Impact Assessment Certificate to submit a project brief report in the format shown in the THIRD SCHEDULE of the EMA (2005) and FIRST SCHEDULE of the regulation. According to the provision, the applicant is required to submit a project brief report to the National Environmental Management Council (NEMC). Section 6 (1) requires a developer/project proponent to register the project in accordance with format specified in the THIRD SCHEDULE of the regulations. The section also, specifies issues to be covered by the proponent in the project brief report. Section 6 (3) requires a project brief to be prepared by a registered environmental impact assessment expert.

According to Section 11 (1) project proponent is required to undertake an environmental impact assessment especially if the project brief has no sufficient mitigation measures, or undertake a preliminary assessment if more information is required to determine a screening decision.
Further details and guidance for the conducting of EIA is provided; these include relevant steps for undertaking Preliminary Environmental Assessment (PEA -Section 11 (2)). Part IV Section 13(1) requires the proponent to conduct EIA in accordance with general environmental impact assessment guidelines and in accordance with the steps outlined in the FOURTH SCHEDULE of the regulations. Whereas Section 16 specifies EIA study should examine environmental, social, cultural economic and legal issues, The FIRST SCHEDULE gives list of projects subjected to EIA and those that do not requiring EIA and it categorizes the projects into two types namely: Type A (projects requiring a mandatory EIA) and Type B (project requiring PEA).
According to the schedule, Type B Projects are those projects that are likely to have some significant adverse impacts but the magnitude of impacts is not well known. Thus, a PEA is required to determine whether the project should proceed without a full EIA.

Part X Section 44 (1 and 2) outlines the objectives of Environmental Audits and its principal functions. Section 45 outlines the basic principles under which the environmental audit is conducted and Section 46 (1) specifies the type of projects requiring environmental audits as specified in the THIRD SCHEDULE to EMA (2005) and FIRST SCHEDULE of the regulations.

Relevance to the Project: A project of this categorization is likely to have some social and environmental impacts. Following the review of the project brief submitted to NEMC, the decision was made to undertake Environmental Impact Assessment. Based on this, all phases of the EIA study will abide by the provisions of this Act.

15) Environmental Management (Air Quality Standards) Regulation, 2007

The object of these regulations is to set baseline parameters on air quality and emissions and enforce minimum air quality standards. They are also meant to help developers including industrialists to keep abreast with environmentally friendly technologies and ensure that the public health as well as the environment is protected from various air pollution emissions sources. These Regulations stipulates the role and powers of the National Environmental Standards Committee. According to the regulations, the approval of a permit for emission of air pollutants shall be guided by ambient, receptor, emission and specification standards approved by the Minister. Offences and penalties for contraveners are also provided for in the regulations.

Emission and emission limits of sulphur and nitrogen dioxides, carbon monoxide, lead, ozone, black smoke and suspended particulate matter together with their test methods are specified. Tolerance limits and test methods for dust, sulphur dioxide and nitrogen oxides from cement factories into the air as well as from motor vehicles are also given. These pollutants are not expected to be generated from the project activities in significant amounts since special measures will be implemented to avoid emissions during operation.

Relevance to project: The proponent will ensure that mitigation measures on dust and gaseous emission are enforced on implementation of the project throughout the life cycle.

16) Environmental Management (Soil Quality Standards) Regulation, 2007

These regulations set limits for soil contaminants in agriculture and habitat, enforce minimum soil quality standards, prescribe measures designated to maintain, restore and enhance the sustainable productivity of the soil and prescribe minimum soil quality standards for sustaining ecological integrity and productivity of the soil. According to the regulations, among others, the National Environmental Standards Committee has the powers to set pollutant limits and specify procedures for determination of the quality of soil for protection of the soil from degradation as a result of anthropogenic activities such as agricultural and mining activities and waste disposal. Owners and operators of a main polluting activity are required to voluntarily register with NEMC and obtain a soil pollutants discharge permit. Obligations of polluters are also given. According to the regulations, the NEMC plays a crucial role in soil quality compliance and enforcement. Recording and reporting requirements, Offences and penalties for non-compliance as well as how appeals against aggrieved decisions should be handled are stipulated. Contaminant limits for selected soil pollutants mainly halogenated hydrocarbons (example, trichloethylene, dichloromethane, tetrachloroethylene, carbon tetrachloride, etc.), fuel hydrocarbons (benzene, ethylbenzene, total xylenes, toluene, etc.), organic and inorganic pesticides (lindane, Atrazine, DDT, sulphur, Hexachlorobenzene, Aldrin, etc.) and their respective test methods are specified. The Regulations also cover contaminant limits for some heavy metals (e.g. arsenic, cadmium, nickel, copper, zinc, etc.) together with their test methods. Most of the pollutants covered in these regulations will not be produced from the project activities in appreciable concentrations.

However, there is a potential for soil pollution from petroleum hydrocarbons due to the use of fossil fuels for running machineries, plants and vehicles during the renovation phase. Fossil fuels will be applied in a rational manner to minimize residues and consequently soil and water pollution.

Relevance to project: The proponent will manage well all solid and liquid wastes to be generated and oil spills at each project phase to avoid the soil contamination.

17) Environmental Management (Water Quality Standard) Regulation, 2007

Among others, the object of the regulations is to enforce minimum water quality standards prescribed by the National Environmental Standards Committee, enable the National Environmental Standards Committee to determine water usages for purposes of establishing environmental quality standards and values for each usage and ensure all discharges of pollutants take into considerations the ability of the receiving water to accommodate contaminants for protection of human health and conservation of marine and aquatic environments. The Regulations elucidate the role of the National Environmental Standards Committee of Tanzania Bureau of Standards in setting minimum quality standards for water, sewerage, etc. They also give prohibitions and prescribed minimum water quality standards. The applicant of water right is obliged to indicate the likely impact on the environment and comply with prescribed effluent or receiving water standards, which are not below the standards specified in these regulations if the water right or permit is granted. The regulations give NEMC the power to designate main water polluting activities for which prior grant of permit must be obtain from the Council. It can be observed from the regulations that, the NEMC plays a crucial role in water quality compliance and enforcement. Recording and reporting requirements, Offences and penalties for non-compliance as well as how appeals against aggrieved decisions should be handled are stipulated.

The Regulations specify permissible limits for selected physical, inorganic, organic and microbiological components of Municipal and industrial effluents and the respective test methods of the pollutants. Specific tolerances and methods of testing for effluents of chrome and vegetable tanning industries and fertilizer industries are given. Regarding drinking water, the regulations specify microbiological requirements and classification of non-chlorinated piped water sources, chemical and physical limits as well as radioactive materials limits for quality of drinking water supplies. Also specified in the regulations are minimum distances from sources of water contamination and sampling frequency for water quality monitoring of various sources.

Relevance to project: The developer will minimize the impacts of the project activities to groundwater and nearby surface water sources and river ecosystems.

18) The Local Government (Urban Development Control) Regulations, 2008, (GN No. 242/2008)

These regulations were made by the Prime Minister under powers conferred upon him by the Local Government (Urban Authorities) Act Cap 288. The Regulations provide for a mechanism for control of insanitary premises, management of night soil including its disposal. It prohibits depositing refuse on streets, pollution of water, fire in buildings or houses, straying animals, and construction of drainage.

19) The Environment (Registration of Environment Experts) Regulations 2021

These Regulations make provision with respect to Environmental Experts and establish the Environmental Expert Committee. The Regulations provide for the certification and registration of Environmental Experts and contain rules relative to the practice and discipline of Environmental Experts and define functions, powers and internal organization of the Committee.

Relevance to project; The proponent complies with the requirements of this Act as it has engaged a registered and experienced Firm to conduct the Environmental Impact Assessment for the proposed project.

20) The urban planning (Use Group and Use Classes) Regulations. 2018

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. Expropriation of land for water infrastructure development and associated activities in urban areas shall comply with the provisions for this law. Under Section 3 among other things the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development.

Relevance to project*:* The proponent shall abide to the requirements of this Act by promoting proper use of land and protecting land.

21) The environment management (Hazardous Waste Control and Management) Regulation, 2021

These Regulations may be cited as the Environmental Management (Hazardous Waste Control and Management) Regulations, 2021. These Regulations shall apply to all categories of hazardous waste and to the generation, collection, storage, transportation, treatment, recycling, reuse, recovery and disposal of hazardous waste and their movements in, into and out of Mainland Tanzania. The regulation requires that any person dealing with hazardous waste in Tanzania be guided by following principles of environment and sustainable development:

i. The precautionary principle
ii. Polluter pays principle, and
iii. The producer extended responsibility

Relevance to project: The management shall abide by the provision of this regulation through proper management of hazardous waste.

22) The Environment Management (Quality Standard for Control of Noise and Vibration pollution) Regulations, 2015

These Regulations shall apply to the control of noise and environmental vibrations in Mainland Tanzania. The objectives of these Regulations shall be to- (a) ensure the maintenance of a healthy environment for all the people in Mainland Tanzania, the tranquility of their surrounding and their psychological wellbeing by regulating noise and vibration levels; (b) prescribe the maximum permissible noise and vibration levels from a facility or activity to which a person may be exposed; (c) provide for the control of noise and vibration and mitigating measures for the reduction of noise and vibration; (d) set baseline parameters on noise and vibration permissible levels based on a number of practical considerations and acceptable limits; (e) enforce minimum noise and vibration limits prescribed by the National Environmental Standards Committee; (f) help developers such as industrialists to keep abreast with environmentally friendly technologies; and (g) ensure protection of human health and the environment from various sources of noise and vibration pollution.

Relevance to project: The management shall abide by this regulation and shall not make or cause to excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; also, the workers within the plant shall be provided with protective equipment's such as ear plugs to prevent the noises from the machines from affecting them.

23) The Environmental (Solid Waste Management) Regulations. 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.

Relevance to project: The solid wastes generated during all the project phases shall be separated at the point of generation and stored in the dustbins and collected by special vehicles to the designated dumpsite.

24) The Fire rescue force (safety inspection and certificates) regulation, 2012

The Act stipulate that the Certificate issued shall be valid for a period of one year from the date of issue, there after the property owner shall apply for it to be renewed. Any owner of the property, premises, vehicle, vessel who fails to renew his Fire Safety Certificate within one month after its expiry will be required to pay the principal amount payable in respect of that property plus penalty of twenty-five per centum (25%) for late payment.

Relevance to project: The estate management shall by the provision of this Act consulting fire and rescue force for inspection and renewal of certificate annually.

25) Fire and rescue force (precautions in building) regulation,2015

The provisions of this Part shall apply in determining the design, renovation, protection, location, arrangement and maintenance of exit facilities to provide safe means of escape for occupants from all buildings hereafter erected, altered or changed in occupancy.

4.-(1) The areas which are designated as means of escape shall include- (a) exit staircase; (b) firefighting lobby; (c) smoke stop lobby; (d) exit passageway; and (e) escape corridors. (2) The areas which are designated as means of escape shall not be turned into other usage.

Relevance to project: The contractor shall abide by the provision of this Act by designating proper exit routes to be used during fire emergency.

26)The Companies Act, [CAP 212 R. E 2019]

An Act to repeal and replace a law relating to companies and other associations, to provide for more comprehensive provisions for regulation and control of companies, associations and related matters. 3.-(I) Any two or more persons, associated for any lawful purpose may, by subscribing their names to a memorandum of association and otherwise complying with the requirements of this Act in respect of registration, form an incorporated company, with or without limited liability. 15.-(I) On the registration of the memorandum of a company the Registrar shall certify under his hand that the company is incorporated and, in the case of a limited company, that the company is limited, and, in the case of a public company, that the company is a public company. Effect of registration (2) From the date of incorporation mentioned in the certificate of incorporation, the subscribers to the memorandum, together with such other persons as may from time to time become members of the company, shall be a body corporate by the name contained in the memorandum, capable of exercising all the functions of an incorporated company, but with such liability on the part of the members to contribute to the assets of the company in the event of its being wound up as provided for in this Act. 16.-(I) A certificate of incorporation given by the Registrar in respect of any association shall be conclusive evidence that all the requirements of this Act in respect of registration and of matters precedent and incidental thereto have been complied with and that the association. is a company authorized to be registered and duly registered un-Conclusiveness of certificate of incorporation der this Act.

Relevance to project: The proponent complies by the provision of this Act and the company is incorporated on the 18th day of January 2007.

27) The Investment Act, [CAP 38 R.E 2022]

An Act to make provision for investment in Tanzania, to provide for more favorable conditions for investors, and for related matters. All investors whether or not this Act applies to them to obtain necessary permits, authorizations, approvals, registrations, consents, licenses and any other matter required by law for a person to set up and operate an investment.

Relevance to project: The proponent shall abide by the provision of this Act by seeking proper permits, authorizations, approvals, registrations, consents required by law to operate the Sisal Estate.

28) The Income Tax Act R.E 2019

An Act to make provisions for the charge, assessment and collection of Income Tax, for the ascertainment of the income to be charged and for matters incidental thereto. 4.-(1) Income tax shall be charged and is payable for each year of income in accordance with the procedure in Part VII by every person - (a) who has total income for the year of income or is a corporation which has a perpetual unrelieved loss determined under section 19 for the year of income and the previous two consecutive years of income; (b) who has a domestic permanent establishment that has repatriated income for the year of income; or (c) who receives a final withholding payment during the year of income. (2) The amount of income tax payable by a person for a year of income shall be equal to the sum of the income tax payable with respect to subsection (1).

Relevance to project: The Act is relevant because the project is expected to have income due to the operations of sisal estate. The proponent shall adhere to the provision of the Act and pay the required tax imposed by the Government.

29) The village land Act cap114 R E 2019

An Act to provide for the management and administration of land in villages, and for related matters. The village council shall, subject to the provisions of this Act, be responsible for the management of all village land. (2) The village council shall exercise the functions of management in accordance with the principles applicable to a trustee managing property on behalf of a beneficiary as if the council were a trustee of, and the villagers and other person's resident in the village were beneficiaries under a trust of the village land. (3) In the management of village land, a village council shall have regard to— (a) the principle of sustainable development in the management of village land and the relationship between land use, other natural resources and the environment in and contiguous to the village and village land; (b) the need to consult with and take account of the views and, where it is so provided, comply with any decisions or orders, any public officer or public authority having jurisdiction over any matter in the area where the village land is; (c) the need to consult with and take account of the views of other local authorities having jurisdiction in the area where the village land is. (4) A village council may establish a committee to advise and make recommendations to it on the exercise of any of the functions of the management of village land but,

notwithstanding the provisions of section 110 of the Local Government (District Authorities) Act such committee shall have no power to take any decisions concerning the management of village land.

Relevance to project: The proponent shall abide by the provision of this Act by cooperating with the village council on different matters.

30) The Business Licensing Act, 1972

An Act to repeal and re-enact Trades Licensing Ordinance. (5) Any building or part of a building (including any out-house, shed or other structure, and also any part of land enclosed by a fence, howsoever constructed), which is used as an office, Shop, godown, store or warehouse or otherwise as a place where any business is normally carried on, or which is normally used by a person carrying on business for any purpose connected with his business shall, for the purposes of this Act be deemed to be a place where such business is being carried on: Provided that- (a) any place only temporarily used by a person carrying on business for any specific purpose connected with the business shall be deemed not to be a place where such business is normally carried on; (b) where two or more separate portions of a building or two or more separate Places on the land comprised in the same right of occupancy granted, or deemed by any written law to have been granted, under the Land ordinance, are used by the same person for the purpose of, or -in connection with, the business carried on by him, such portions or, as the case May be, places shall, in relation to such business, be deemed to be One Place of business.

3..-(l) No person shall carry on m Tanganyika, whether as a principal or agent, any business unless- (a) he is the holder of a valid business license issued to him In relation to such business; and (b) such business is being carried on at the place specified m the licence. (2) No person shall carry on business at two or more places, unless he is the holder of a separate business licence issued to him M' relation to such business for each of such place: provided that, m any such case, if a valid business licence exists m respect of any of the places of business (hereinafter referred to as -the principal place of business") the holder shall be deemed not to have contravened the provisions of this subsection-

Relevance to project: The proponent abides by the provisions of this Act and has a valid business license for the proposed project

33) **The urban planning(building) regulations,2018**

Use Class: Individual dwelling houses designed for use as dwellings by single families, together with such outbuildings as are normally used therewith, but not including dwelling houses designed for occupation by more than one family, and not including dwelling accommodation built over or attached to commercial, office or industrial buildings of Groups E to M inclusive. Terraced dwelling houses (in blocks of two or more) each dwelling designed for use by a single family, together with such outbuildings as are normally used therewith, but not including dwelling accommodation attached to commercial, industrial or office buildings

of Groups E to M inclusive. Dwelling houses occupied principally as dwellings, but also used by the occupiers or tenants for professions and occupations and not used in any way as industrial buildings or for the public display or sale of goods or for the storage of bulky equipment or materials used in the occupier's profession or occupation.

Relevance to project*:* The proponent shall abide to the requirements of this Act by adhering to the use as designated by the law.

34) The Government Chemist Laboratory Authority Act no 8 of 2016

This Act establishes the Government Chemistry Laboratory Authority and provides with respect to its functions, powers and administration. The authority shall be the supreme and referral laboratory of the Government of Tanzania. It shall carry out, among other things, testing of food and drugs. it shall also carry out functions under the Environmental Management Act. The Act also requires other laboratories to register with the Chief Government Chemist. The authority shall conduct research activities, laboratory analysis and advise the Government on matters relating to forensic toxicology, forensic biology, DNA, illicit drugs, forensic chemistry, food, drugs, occupational health, industrial and consumer chemicals and products and environmental samples for executing health, legal, social wellbeing and environmental interventions.

Relevance to project*:* The proponent shall abide to the requirements of this Act by adhering to standards in the products they produce (sisal).

35) The industries and consumer chemicals (management and control) regulations,2020

5.-(1) Any person who imports or exports a chemical shall- (a) be registered and be issued a certificate; (b) register the premises and chemicals; (c) create awareness to the public on the inherent risks of indiscriminate use and misuse of chemicals; (d) set and adhere to the code of practice and guidelines on the safe use and handling of chemicals; (e) apply for chemical importation or exportation permit for every chemical consignment prior to importation or exportation; and (f) submit to the Registrar, in writing, the name of an authorized agent.

Relevance to project*:* The proponent shall abide to the requirements of this Act by registering as the importer and user of chemicals, as well as proper usage of chemicals to control risks.

36) The industrial and consumer's chemicals (management and control) Act, 2003

An Act to provide for the management and control of the production, importation, transportation, exportation, storage, dealing, and disposal of chemicals and for matters connected therewith. This Act introduces measures for the control of production, importation, exportation, transportation, storage,

handling and placing on the market of industrial or consumer chemicals or chemical products and provides for the carrying out of such control.

Sections 3 to 10 provide for administration of this Act and establish for this purpose a Technical Committee and define the functions of the Government Chemist Laboratory Agency, the Chief Government Chemist, the Ministerial Advisory Board for the Government Chemist Laboratory Agency and the Emergency Response Committee. The Chief Government Chemist shall act as the Registrar of Chemicals, the functions of which are set out in section 10. Sections 11 to 47 contain provisions relative to the control of the production, importation, transportation, exportation, storage, handling, placing on the market and disposal of chemicals. Measures of control include registration of chemicals, certification, use restrictions, inspection, packing labelling requirements and precautionary measures. Other provisions of this Act concern financial arrangements, liability and regulation making powers of the Minister. Offences are defining and penalties prescribed

Relevance to project*:* The proponent shall abide to the requirements of this Act by providing proper management and control of the production, importation, transportation, exportation, storage, dealing, and disposal of chemicals to be used in the project.

37) The Employment and Labour Relations Act Cap 366 RE 2019

An Act to make provisions for core labour rights, to establish basic employment standards, to provide a framework for collective bargaining, to provide for the prevention and settlement of disputes, and to provide for related matters. 5.-(1) No person shall employ a child under the age of fourteen years. (2) A child of fourteen years of age may only be employed to do light work, which is not likely to be harmful to the child's health and development; and does not prejudice the child's attendance at school, participation in vocational orientation or training programmes approved by the competent authority or the child's capacity to benefit from the instruction received. (3) A child under eighteen years of age shall not be employed in a mine, factory or as crew on a ship or in any other worksite including non-formal settings and agriculture, where work conditions may be considered hazardous by the Minister.

Relevance to project; The proponent shall abide to the requirements of this Act by not employing a child below 18 years old in factory site.

38) Tanzania Meteorological Agency Authority Act, 2019

An Act to establish the Tanzania Meteorological Authority (TMA), to make better provision for the management, control, provision, coordination and regulation of meteorological services, to repeal the Meteorology Act Cap.157 and to provide for related matters.

The Act provides that any person who intends to engage in any meteorological observations, weather forecasting activities or weather modification activities shall apply for a permit to the authority. The Act provides extensively for the manner and conditions of application and issuance of meteorological permits.

Relevance to project; the proponent shall abide to the requirement of this Act by requesting meteorological data for weather forecasts, climate services and warnings.

39) The Customs Management and Tariff Act (CAP 403 R.E 2019

The Customs Management and Tariff Act (CAP 403 R.E 2019) is Tanzanian legislation governing the regulation and administration of customs procedures, tariffs, and related matters. It outlines the procedures for the importation, exportation, and transit of goods, aiming to facilitate trade while ensuring compliance with national laws and international agreements. The Act covers tariff classifications, valuation methods for customs duties, customs procedures at ports and borders, enforcement mechanisms, and penalties for violations. Its primary objectives include revenue collection, protection of domestic industries, and facilitating international trade in accordance with Tanzania's economic policies and international obligation

Relevance of the project: the developer will comply with this Act and ensures smooth importation of equipment and materials, manages costs through tariff regulations, and supports overall project planning and execution within the legal framework of the country.

40) The National Social Security Fund (NSSF) Act of 2022

The National Social Security Fund (NSSF) Act of 2022 is a legislative framework aimed at establishing and regulating a national social security fund in Tanzania. It typically outlines provisions related to the management, contributions, benefits, and governance of the fund. Key aspects often include eligibility criteria for membership, conditions for entitlement to benefits such as retirement pensions, disability benefits, and survivor benefits, as well as mechanisms for fund administration and oversight. The Act is designed to provide social security coverage to eligible individuals and ensure the sustainability and effective operation of the fund.

The principal Act is amended in section 7-

a) by substituting for subsection (1), the following - Every eligible employee shall register as a member of the fund and shall make regular contributions to the fund in accordance with this Act and regulations made under this Act.";
b) by substituting for subsection (2), the following - Every employer, irrespective of the number of employees, shall register with the fund as a contributing employer and shall make regular contributions for his or her employees in accordance with this Act and regulations made under this Act.

Relevance to the project: NSSF Act of 2022 is relevant to the project primarily in terms of ensuring compliance with labor laws, providing social security benefits to workers, and potentially offering investment opportunities or partnerships. Understanding and integrating the provisions of this Act into the project's framework is essential for legal and operational success.

41) The Workers Compensation CAP 263 R.E 2015

The law provides for compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the course of employment to establish the Fund for administration and regulation of works compensation and to provide for related matter.

Relevance to project: This Act is very relevant to this project as workers will be exposed to various hazards during expansion, rehabilitation and modernization of the estate. The developer and the contractor will ensure safety and health of workers at the project environment through provision of compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the course of employment.

42) The Environmental Management (Prohibition of Plastic Carrier Bags and Plastic Bottle Cap Seals) Regulations, 2022

Provide the prohibition of importing, exporting, and manufacturing, selling, storing and supplying all plastic carrier bags, regardless of their thickness. Also provide that any person shall not import, export, manufacture, store, distribute, supply, sell or offer for sale beverages with plastic bottle cap seals.

Furthermore, a person shall not sell or offer for sale beverages or commodities wrapped in plastic unless the nature of such commodities requires wrappings by plastics.

In addition, a person who imports, exports, manufactures, sells, stores, distributes, supplies, possesses or uses plastic packaging exempted under these Regulations shall ensure that the waste exempted plastic packaging are managed and disposed of in accordance with the Environmental Management (Solid Waste Management) Regulations, 2009 and the Environmental Management (Hazardous Waste Control and Management) Regulations, 2021

Relevance of the project: The Act is relevant to the project as developer will comply these requirements by not importing, exporting, and manufacturing, selling, storing and supplying all plastic carrier bags, regardless of their thickness.

3.4 Administrative Framework / Institutional Arrangement

The administrative and institutional arrangements for environmental management for all sectors in Tanzania are stipulated in the environmental Management Act No. 20 of 2004 (Cap 191). The Act mentions the Minister Responsible for Environment as the overall in-charge for the administration of all matters related to the environment. Part 111 of EMA, 2004 provides details of administrative and institutional

framework for environmental management in Tanzania. The Act also mentions seven (7) institutions which are involved in environmental management in Tanzania. The administrative authority for environmental assessment and monitoring at national level is vested in the office of the Vice-President, where the Minister Responsible for Environment is seated. Other legal institutions for environmental management in the country include: National Environmental Advisory Committee, Director of Environment, National Environment Management Council (NEMC), Sector Ministries, Regional Secretariat and Local Government Authorities (Township, Ward, Sub wars "Mtaa and Kitongoji").

The Minister Responsible for Environment - has overall responsibility of matters related to environment, including the approval of the EIA reports.

The National Environmental Advisory Committee (NEAC) - is comprised of members with experience in various fields of environmental management in the public and private sector and in civil society. The committee advises the Minister on any matter related to environmental management.

The Division of Environment (DoE) - headed by the Director of Environment deals with the development of Environmental policy and co-ordination of its implementation. It's also plays an advisory role to the Government on all matters pertaining to environmental management including overarching mandate on the functions of the National Environmental Management Council (NEMC).

National Environmental Management Council (NEMC) – headed by the Director General has the overall responsibility of undertaking enforcement, compliance, review and monitoring of Environmental Impact Assessment, and in this regard facilitates public participation in environmental decision making. Other functions of NEMC include recommendations to the Minister to approve, reject or approve with conditions, specific EIS and to make recommendations on whether to revoke EIA Certificates in cases of non-compliance.

The Sector Ministries- are required to establish Sector Environmental Sections headed by the Sector Environmental Coordinator which, among other things, have the responsibility to ensure environmental compliance by the Sector Ministry and to oversee the preparation of, and implementation of, all EIA's required for investments in the sector.

The Regional Secretariat -headed by the Regional Environmental Management Expert (REME), is responsible for the co-ordination of all environmental management programs in their respective regions. The regional administrative Act No. 9 of 1997 provide for Regional Commissioners to oversee regional secretariat Councils, with district commissioner directly supervising the district councils.

Table 3.1; Institutional framework

Level	Institution	Roles
National	The Vice President's Office (Division of Environment, NEMC)	- Co-ordinate Environmental Management Policy, Environmental Management Act and EIA guidelines - Approval of ToR, Review of EIA - Issuing an Environmental Certificate - Environmental Monitoring and Compliance Auditing - Advise Government on all environmental matters
	Ministry of Land, Housing and Human Settlements development	- Land use planning, - Issuing of Right of Occupancy, - Valuation and compensation.
Regional	Regional commissioner's Office	- Oversee and advice on implementation of national policies at regional level - Oversee enforcement of laws & regulations - Advice on implementation of development projects and activities at regional level
District	Mkinga District Commissioner's Office	- Oversee and advice on implementation of national policies at District level - Oversee enforcement of laws & regulations - Advice on implementation of development projects and activities at District level
	Mkinga District Council (District Executive Director Office)	- Overseeing all development activities in the district
Ward	Ward Development Committees (Ward Executive Officer, Ward Extension officers), Ward Environment committee	- Oversee general development plans for the Ward - Provide information on local situation and Extension services - Technical support & advice - Project Monitoring

Village (community)	Councils (Chairman /VEO, Environment Committee): and other leaders	- View on socio-economic and cultural value of the sites and project operations. - Rendering assistance and advice on the implementation of the project - Project Monitoring (watchdog for the environment, ensure wellbeing of residents and participate in project activities
Project proponent	Mohammed Enterprises Tanzania Limited	- Project design and planning and facilities renovation - EIA study - Project implementation (operation) - Project monitoring and internal auditing - Project decommissioning

CHAPTER FOUR

4.0 Environmental and Social Baseline Conditions

4.1 Introduction

This section describes the baseline condition as they relate to physical environment, biological environment, the socio-economic environment within the core project area and the marginal zones. The sub sections of physical, economic, social characteristics and Infrastructure and demographic characteristics are based on secondary data observation, while the last sub section including biological environment are based on the primary survey obtained during field work.

4.2 Geographic location

a) Physical Environment

Bamba Mavengero is a locality in Mwiduro, Mkinga District Council, Tanga. The district is one of eleven administrative districts of Tanga Region in Tanzania. It was created from Muheza District in 2007. The district covers an area of 2,712 km^2 (1,047 sq mi). The district is comparable in size to the land area of Samoa. The administrative capital of the district is Parungu Kasera. The district is bordered by Tanga District to the south east and Muheza District to the south west. On the east the district is bordered by the Indian Ocean. On the west is Korogwe District and Lushoto District. The latter's northern boundary is a slither of Mkomazi National Park. On the north the district borders Kenya. The highest point in the district is Mhinduro Peak at 913m. The district is home to the Umba Game Controlled Area, the Umba Valley; the world's only source of Umba saffires. According to the 2012 Tanzania National Census, the population of Mkinga District was 146,802.

b) Administrative subdivisions

Administratively, there are 2 divisions, 21 wards, 85 villages, 335 *Vitongoji* (hamlets), and 1 election constituency within the council.

Wards

Mkinga District is administratively divided into 22 wards; Boma, Bosha, Bwiti, Daluni, Doda, Duga, Gombero, Kigongoi Magharibi, Kigongoi Mashariki, Kwale, Manza, Mapatano, Maramba, Mayomboni, Mhinduro, Mkinga, Mienzani, Moa, Mtimbwani, Mwakijembe, Parungu Kasera and Sigaya.

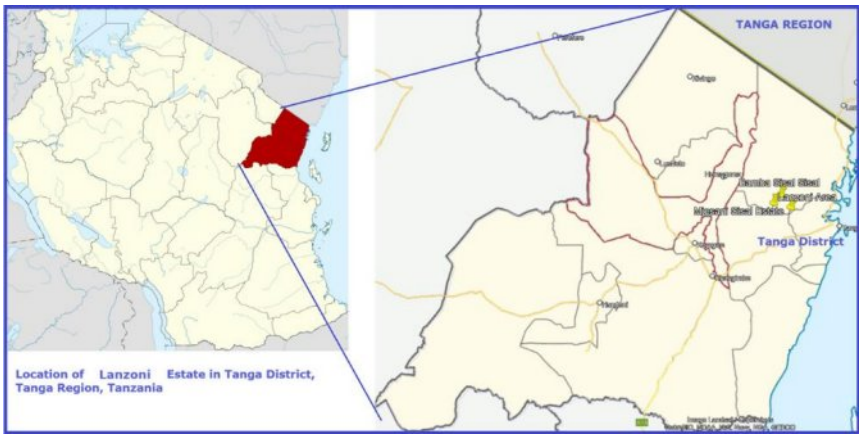

Figure 4.1: Location of Lanzoni Estate at Mkinga District, Tanga Region, Tanzania

4.3 Geography

There are many different topographic characteristics in Mkinga District. The coastal plain rises to around 100 meters above sea level and stretches 20 to 30 kilometers inland from the India Ocean. The rest of the district climbs gradually to a height of roughly 400 meters above sea level as it moves from the east toward the northern and mid-southern regions. The northern regions gradually increase toward the Umba hills, which stretch into Kenya and are around 800 meters high.

The Zigi River, which separates Muheza and Mkinga districts by flowing southeast into the Indian Ocean, serves as the district's primary drainage system. The Umba River drains the majority of the district's northern region, flowing east into Kenya before emptying into the Indian Ocean.

4.3.1 Climate

The district features a semi-arid climate with variations in the amount of rainfall, landforms, soil types, and potentials for land use. Typically, there is enough rainfall to support the cultivation of many different crops. Bimodal rainfall in the district ranges from 450 to 1000 mm, with an average of 750 mm. 16 °C is the usual temperature. In the council's 18 km^2. of land, which comprises a separate biological zone, the population's primary sources of income are fishing and mariculture.

4.3.2 Hydrology

The area is largely supplied with water from Zigi river. The river rises in the Amani Nature Reserve in the east Usambara Mountains in Muheza District, more precisely in Handeni Mountains, at an altitude of 1130 meters and flows for 100 km in a long course and multiple changes of direction to its mouth 40 km north of the town of Tanga in the Indian Ocean. Its tributaries are the Kihuhui (from south) and the Musi (from North).

4.3.3 Topography and drainage

The district has a variety of topographic features. The coastal lowland extends about 20 to 30 kilometers inland from the India Ocean and rises to about 100 metres above sea level. The rest of the District rises gradually from the east towards the northern and mid-southern areas to about 400 metres above sea level. The northern areas rise gradually towards the Umba hills (about 800 metres) that extend into Kenya.

The Zigi River in the south forms the main drainage of the district; it flows southeast into the Indian Ocean, and forms the boundary between Muheza and Mkinga districts. The Umba river is the major drainage of the northern part of the district and it flows east into Kenya and then into the Indiana Ocean.

4.3.4 Soils

Four major types of soils were identified.

i. Well drained, deep to moderately deep, red and yellowish red clays, sandy clays, loams and clays, mainly on Usagara rock within the mountainous areas;
ii. Well to medium drained, shallow, moderately deep to deep red and brown sandy loams, loamy sands and clays in the upland areas
iii. Well to moderately well drained, light colored sands and yellowish brown to yellowish red loams and clays in the coastal areas
iv. Poorly to imperfectly drained, grey to black clays and sands (partly saline) in the alluvial plains as well as minor valleys and depressions

4.3.5 Agro-economic zone

The region is subdivided into four main zones namely; coastal belt, wet plains, dry plains and mountain belt. The major characteristics of each zone is indicated below;

Table 4.1: Showing Agro-economic zone

The region can be Subdivided into four main zones namely coastal belt, wet plains, dry plains and mountain belt. The major characteristics of each zone are as indicated below. Zone	Average Rainfall	Main Activity	Dominant Crops
Coastal belt: (0-15m above sea level) Covers Pangani district, Tanga and part of Muheza district	800-1400mm.	Agriculture and Fisheries, Sea Weeds (Mwani)	Citrus fruits, Sisal, Coconuts, Cashewnuts, Maize, Cassava, Rice and Sea Weeds.
Wet Plains (300-600m. above sea level) Covers mostly Muheza and Korogwe districts	800-1000mm.	Agriculture and Horticulture	Sisal, Coconuts, Cashewnuts, Cotton, Maize, rice, beans, Cassava and Citrus fruits
Dry Plains (200-600m. above sea level Handeni, part of Korogwe, Muheza and Pangani.	500-800mm	Beekeeping Agriculture and Livestock (beef cattle)	Timber, Honey, Sisal, Cotton, Tobacco, Maize, Cassava and beans.
Mountain belt (1000 - 2000m above sea level Covers areas in Lushoto, (Usambara mts) Muheza (Amani mts) and Handeni (Nguu mts) districts.	800-2000mm.	Agriculture, Horticulture and Livestock (Small holder dairy cattle)	Tea, Coffee, Cardamon, maize, potatoes, bananas, beans, vegetables and temperature fruits.

4.4 Biological environment

There are extensive forest reserves in the Mkinga District. In Tanzania's Eastern Arc of Mountains, some of the Usambara, home to unique variety and endemic species of their flora and fauna are located in the western part of the district. Before 1990, there were 5 forest reserves totaling roughly 20,145 hectares. Before independence, these reserves were formed. Since the 1990s, when the Central Government established ten additional forest reserves, the area covered by forest reserves has grown to 5,394 hectares. Additionally, the district contained the well-known hunting and tourist destinations of the Game Controlled Area of Umba and the Open Areas of Mkota and Mwakijembe.

4.5 Water supply and Energy

4.5.1 Water resources

Zigi river is the main source of water in the region. According to the Tanga Urban Water Supply and Sewerage Authority (TUWSSA), about 26,000m^3 of water are abstracted daily from Zigi River for supply to customers in Tanga region.

Water Sector in Mkinga District services a total of 21 Wards which comprise of a total of 85 Villages. Water Sector under National Water Policy (NAWAPO 2002) intends to provide citizens with Water with distance that does not exceed 400metres from their residents. The Water needed in Mkinga District is approximately

3,527,460 litres while the available Water currently is approximately1, 893,660 litres. Mkinga District has a population of 146,802, people.

Out of these only 64,127 people get safe and clean Water which is equivalent to 54.3% of all inhabitants of Mkinga District. Nationally only 57.8% of Citizens enjoy clean and safe water in the rural areas while 86% of Citizens in Urban areas enjoy the service of clean and safe water.

4.5.2 Energy supply

Electricity supplied in the area is through National Grid (TANESCO). All the area is accessed by electricity. Most of the workers' camps inside the estate have reasonable electricity supply while the village houses around the estate fall under REA Project. Other sources include generator, natural gas and solar.

4.6 Geology

The geology of the area is dominated by high-grade metamorphic rocks of the amphibolites and granulites facies which belong to the Pretorozoic Mozambican Belt of the age of 800 to 500 ma old (Mruma and Kinabo,2004) in Nikundiwe (2004).

4.7 Economy

The backbone of the Mkinga economy is agriculture. The district's residents rely on agriculture for more than 80% of their income. Despite the fact that 80% of the population is dependent on agriculture, poverty continues to be a pervasive problem, especially for homes whose crop production is the sole source of income. The condition is demonstrated by the populace's low per capita income. Mkinga's per capita in 2010 was 230,000 TZS, which is low compared to the region's 765,331 TZS and the country's 770,464 TZS in 2011. German colonial period saw the initial development of sisal estates, and the sector dominated the local economy up until the 1970s. Through the port of Tanga, substantial amounts of sisal from the Mkinga District were exported. A significant source of employment, the sisal plantations drew laborers from as far afield as Zambia and Mozambique. In the wake of the industry's collapse, the majority of estates stopped producing. Large plantations like Kauzeni Estate Hekta 608, Lugongo Estate Hekta 3669.4, Mjesani Estate Hekta 6420, and Mtapwa Estate Hekta 475 produced a lot of sisal during the 1970s.

Since sisal plantations employed a sizable population and provided them with a means of money to support their way of life, their demise had a noticeable effect on the neighborhood. Not only was sisal production utilized to alleviate poverty, but there was also a lack of community empowerment on the part of the government to make use of other resources, such as the abundant arable land; the average household only cultivates around one acre. Despite the fact that about 80% of the population works in agriculture, only 30% of arable land is thought to be cultivated. There are 250,580 acres of arable land in the district. The area used for agriculture is only 75,574 (Ha).

4.7.1 Fishing

Within its seven wards, the Mkinga district is home to 21 fishing communities, including Mayomboni, Moa, Kwale, Manza, Boma, Doda, and Mtibwani. There are roughly 2086 and 410 fishing boats, of which 396 are active and 14 are malformed. Additionally, there are 20 fish farmers, 10 pearl oyster merchants, and 70 seaweed farmers divided into two groups.

4.7.2 Infrastructure

Paved trunk road T13 from Tanga to the Kenyan border passes through the district at the town of Horohoro. The 406 km of roads in the Mkinga district are divided into feeder roads, district roads, and regional highways (all falling under TANROADS). Tanga Regional roads cover 85 kilometers, while district and feeder roads cover 321 kilometers. In the meanwhile, 40 kilometers of regional roads (from Mtimbwani to the Horohoro Boarder) are being upgraded from gravel to tarmac. Generally speaking, 81 km of the district's 285 km of earth roads have been improved to gravel standards. Only 50% of the whole road network is passable in all weather. Some settlements are still not reachable by road. Kibewani-Mzingi (12 km), Mjesani-Gombero (17 km), Gombero-Mkinga (18 km), Kizingani-Gandikani-Kwale (5 km) are a few of these communities.

4.7.3 Trade

Mkinga has very small trade sector. For instance, the number of guest houses with a business license climbed from 60 in 2008 to 150 in 2011. From 20 in 2008 to 60 in 2011, pubs and glossaries were granted a hard drink license. More businessmen and small business owners who qualify for business licenses are still being educated and trained by trade officers to register their businesses. However, the amount of money collected annually by the council increased from 68 million in the fiscal year 2007/2008 to 300 million in the fiscal year 2010/2011.

4.8 Population

The council had a total population of 146,802, out of whom 73,048 were men (49.8%) and 73,754 were women (50.2%) according to the August 2022 population census. Most of the residents of the district are from the Digo, Segejeu, and Wasambaa ethnic groups, the former two being the native groups.

4.9 Education & Health

4.9.1 Education

As of 2022, there were 94 Schools in Mkinga District, 79 of are primary schools and 15 are secondary schools. The primary education department comprises 76 primary schools with a total of 28,254 students, 14,258 of whom are boys and 13,996 of whom are girls. These students are in grades I through VII. Because it complies with the National rate, which mandates that every child of school age be enrolled, the Standard I enrolment status is satisfactory. According to enrollment records from 2011, all anticipated

school-age children were registered. A total of 5339 students, comprising 2733 boys and 2606 girls, or 104% of the anticipated student population, were enrolled. In the district's 21 wards, there are a total of 15 secondary Schools. There are 6741 pupils enrolled in these schools, 3633 of whom are boys and 3633 of whom are girls. There are 22 disabled pupils among them, 10 of whom are boys with physical disabilities, one boy with a skin condition, and 11 girls as of 2012.

The Complementary Basic Education in Tanzania (COBET) and Integrated Community Based Adult Education (ICBAE) programs both fall within the purview of the Adult Education unit. There are 2,300 students enrolled in adult education circles (classes), including elementary classes, upgrading classes, and fund-raising groups, of which 847 are men and 1453 are women.

4.9.2 Health

In Terms of Healthcare facilities, as of 2022 Mkinga District is home to 3 health centers and 27 clinics. There is no district hospital; instead, the community accesses healthcare through a referral system to the regional hospital in Bombo. This is a significant issue that forces serious patients, particularly pregnant women, to travel great distances in order to access medical care, particularly surgical services. Another issue in the district is a lack of access to safe and clean water, especially during dry seasons when only 54.3% of the population does, which increases the risk of communicable diseases.

4.10 Environmental Measurement Parameters

Measurement of air quality, dust and noise levels were conducted. Data were collected during the day from 13:35-14:30hrs. Air quality measurements were within prescribed (TZS845:2005) and WHO, 2005 while Noise levels were within the Environmental Management (Standard for the control of Noise and Vibrations Pollution) permissible level as described below.

4.10.1 Average Ambient Gas Emission

The average measured concentrations of O_2, CO_2, CO, NO, NO_2 and SO_2 are presented in Table 4.2. All the measured parameters were found to be within stipulated local (TBS) and international guidelines i.e. WHO Ambient Air Quality Guidelines. The observed low pollutants levels reflect no significant sources of air pollution from the site environment since no activity started.

During construction and operation phase, emission sources will be from vehicle exhaust emissions and standby generators. In general, the baseline air quality study has established that the site has relatively clean air. All measured pollutants were found below respective standards stipulated by International (WHO) and Tanzanian Emission standards.

Table 4.2: Average values of measured gaseous compared with local and/or international standards

Sampling Point	Measured Average Ambient Pollutant Gases					
	O_2	CO_2	CO	NO	NO_2	SO_2
	%	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Latitude -4.540° and Longitude 39.030°	20.9	0.01	2.00	0.00	0.02	0.00
Local standard (TZS: 845:2005)	-	-	30	0.2	0.2	0.5
International standard [WHO:2005]	-	-	15	0.2	0.2	0.5

Source: Field measurement. Sampling date: 3rd October, 2023

4.10.2 Average Dust–Particulate Matters (PM 2.5 and PM10)

From the results summarized in table 4.3, the assessed location had dust concentration which comply with both TBS (TZS845:2005) and WHO, 2005 guidelines. During data collection there were no activities which emit dust emission; this might be the cause of low emission level.

Table 4.3: Average values of measured PM 2.5 and 10 compared with local and/or international standards

Sampling Point	PM 2.5 [$\mu g/m^3$]	PM 10 [$\mu g/m^3$]
Latitude -4.540° and Longitude 39.030°	7	10
Local standard (TZS: 845:2005)	**N.M**	**60-90**
International standard [WHO:2005]	**25**	**50**

Source: Field measurement. Sampling date: 3rd October, 2023

4.10.3 Average Ambient Noise Levels

From the results summarized in table 4.4 below, all locations had noise levels which comply with the Environmental Management (Standard for the control of Noise and Vibrations Pollution) which is 60dBA during the day.

Table 4.4: Average values of measured Noise levels compared with local and/or international standards

Sampling Point	Noise Levels in dBA
Latitude -4.540° and Longitude 39.030°	36.0
Standard	**60**

Source: Field measurement. Sampling date: 3rd October, 2023

CHAPTER FIVE

5.0 Stakeholder Consultation and Public Participation

5.1 Overview

Stakeholder engagement is the continuous and iterative process by which the proponent identifies, communicates, and facilitates a two-way dialogue with the people affected by its decisions and activities, as well as others with an interest in the implementation and outcomes of its decisions and the project. It considers the different access and communication needs of various groups and individuals, especially those more disadvantaged or vulnerable, including consideration of both communication and physical accessibility challenges. The stakeholders' engagement under this project was conducted for the following reasons;

i. To identify stakeholders and build and maintain a constructive relationship with them, in particular with project-affected parties.

ii. To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be considered in project design and environmental and social performance

iii. To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.

iv. To provide project-affected parties with accessible and inclusive means to raise issues and grievances and allow Borrowers to respond to and manage such grievances.

5.2 Identification of Stakeholders

Firstly, the consultant identified organization, groups and individuals considered to be regarded as "stakeholders". This identification was based on each one's roles and their relevance in the proposed development project. Some of the stakeholders such as government authorities, district level, wards and sub-ward level that might be impacted by or have interest in the project or exercise some influence on the project were predetermined as shown under each level in table 5-1 below.

Table 5.1: Stakeholder identification and analysis

LEVEL	STAKEHOLDER	REMARKS
National	-Tanzania Sisal Board -Pangani Basin Water Board	-Director General -Principal Technician
Regional	-Tanga Regional Fire and Rescue Force	Fire Marshall
District	- Mkinga District Executive Director's Office	District Management Team members responsible for: - Agriculture - Land

Local	- Bamba Mavengero Village Executive Officer (VEO) - Mwiduro Ward Executive Officer - Local community members from Bamba Mavengero village	Local government authorities Direct project beneficiaries Communities in the project footprint Project affected persons

5.3 Public Participation Process

Public consultations process was done by consulting district experts, workers and local government officers and members.

Table 5:2: Public participation process

Stakeholder	Date of visit	Venue	Stakeholders consulted	Methodology
Tanzania Sisal Board	2/12/2023	-	1. Director General	-Through Email
Tanga Regional Fire and Rescue Force	14/03/2024	Fire Office	1. Regional Fire Officer	-Interview
Pangani Basin Water Board	14/03/2024	Pangani Basin Office	2. Principle Technician	- Interview
Mkinga District Council	4/10/2023	Agriculture, Irrigation and Cooperative Office Land Office	3. District Agriculture, Irrigation and Cooperative Officer (DAICO) 4. District Land Officer	-Interview
Bamba Mavengero village, Mwiduro ward	4/10/2023	"Bar Mpya'- Mlingoni	1. Village Executive Officer (VEO) 2. Ward Executive Officer 3. Members	- Focus group discussion - Interview - Meeting
Local community members	14/03/2024	Bamba Mavengero village	1. Villagers surrounding the estate	- Focus group discussion Public meeting

5.4 Identification of Issues and Problems

The field visits helped to identify a number of issues, problems and challenges regarding the proposed project. These issues and problems are organized into major categories, issues and problems within this categories and possible sources of data and information.

Table 5.3: Categories of issues and problems

S/N	Category of issues /problems	Issues/Problems	Responsible
1.	Employment opportunities	- Priority to the locals - Gender consideration	Developer
2.	Revenue Generation	- Taxation - Job creations	Developer, TRA,
3.	Waste management	- Solid and liquid waste management	Contractor, Developer, District Environmental Officer
4.	Infrastructure	- Room of improvement in Storm water drainage - Sewerage system improvement - Road network - Upgrades in Workers house	Contractor, Developer, Town planner
5.	Safety of workers	- Provision of PPEs to workers	OSHA, Developer
6.	Environmental and Health issues	- Noise levels - Air quality – dust from the project - Water	OSHA, Developer, Environmental Officer
7.	Corporate social responsibility	- Provision of services and amenities	Developer

5.5 Stakeholders Views and Concerns

Table below summarizes the issues/concerns/views from the stakeholders.

Table 5.4: Stakeholders consulted and their views

SN	NAME & POSITION	ORGANIZATION	VIEWS	RESPONSE
1.	Saddy H. Kambona General Manager	Tanzania Sisal Board	i. The company should consider putting up infrastructure for rainwater harvesting as sisal farming expansion will attract more decortication centers which require enough water for sisal washing and other domestic use. ii. The company should also consider water recycling technology in its decortication centers to minimize water usage. iii. Sisal waste should be used as manure to improve soil fertility and productivity. iv. The company should consider possibility of interfering with corridors of wild animals such as elephants and wild pigs which feed on sisal. v. Proper technology for expelling such animals be put in place to avoid loss to the company. vi. The company should consider coming up with technology that allows use of sisal waste as source of energy to run various operations at the estate. this is because of recent power cut and low voltage which slow down missal production.	Rainwater harvesting will be considered as another source of water for decortication. In the future waste water from decortication will be recycled and used in decortication again. Currently sisal wastes are used as fertilizers by the nearby village farms. There is no animal corridor.

2.	Octavian Adam Moshi District Agriculture,, Livestock and Fisheries Officer	Mkinga District Council	i. The project has both positive and negative impacts; socially, environmentally and economically. ii. For negative impacts the proponent has to provide proper mitigation measures in order to reduce or eliminate the impact.	The company strongly supports social and environment management activities for a better world.
3.	Hayuda Mpumu Igimbi Ass. Land Officer	Mkinga District Council	i. Land taxes are paid each year. ii. There is no land conflict.	
4.	Fire and Rescue Force	Tanga Region	i. The proponent should submit an architectural drawing for approval. ii. The proponent should install fire extinguishers at the strategic locations such as portable fire extinguishers, fire detection systems, fire hydrants, fire horse reels, and fire alarms. iii. There should be a borehole which will be used in case of fire emergencies. iv. Training on fire safety should be conducted for the workers. iii. The building should be inspected by responsible personnel from fire rescue offices and a fire certificate shall be issued.	The proponent will submit architectural drawings for approval Fire extinguishers will be installed, there will also be fire detection, fire alarms. Trainings on fire safety will be provided. Following the completion of the proposed project and prior to the commencement of operations, a necessary inspection by the Fire and Rescue Force will be conducted.

5.	Zania P. Msangi	Pangani Basin Water Board	i. The proponent should apply for water use permit before starting abstraction. ii. The proponent should apply for waste water discharge permit before operation started. iii. The proponent should apply permit for borehole drilling.	Water use permit, waste water discharge permit and boreholes drilling permit will be applied to the Pangani Water Basin.
6.	Village government meeting	Bamba Mavengero village, Mwiduro ward	i. There is a good cooperation between the estate and the village community. ii. METL and other outsourced company should comply with labour law. iii. Workers have expressed concerns regarding salary & holidays, highlighting an opportunity to enhance employee satisfaction and well-being. `	Salaries are being paid as per national standard with performance incentives based on the output generated. METL is fully committed to adhering to all labor laws in its engagements. Working on holidays is based on operational requirements and on mutual consent with payment in accordance with labour law.
7.	Local Community members	Villagers surrounding the estate	i. Contract workers have mentioned some areas for potential adjustment and collaboration between METL and the contract workforce to enhance the overall workplace experience. These suggestions include the implementation of salary increments. ii. The contract workers also mentioned that the dynamics have shifted since the current	Salaries are being paid as per national standard with performance incentives based on the output generated. Items pertaining to METL infrastructure are being assessed.

				contractor has taken over leading to a change in the working conditions and the compensation structure and it is their opinion that it is worth exploring ways to address these changes while ensuring the company's sustainability.	The contractor company has already been given notice and a new contractor is being engaged in its place to ensure proper operations.
			iii.	The contractor management has faced criticism over time for its perceived inefficiencies, leading to a significant turnover of staff as employees seek opportunities elsewhere.	Current compensation structure clearly encourages better payment to those yielding higher output while those not performing as per the workload targets go with minimum wages as per law.
			iv.	There is a perception among workers that the workload exceeds the compensation provided feeling that they need salary raise.	
			v.	Contract workers have identified leave allowances as an area for enhancement, presenting an opportunity to refine these benefits, ultimately leading to improved job satisfaction and well-being.	Leave allowances are being given by the contractor as per operational budget.
			vi.	Workers further mentioned that despite contributions to the National Social Security Fund (NSSF), workers expected improvement in tangible benefits from these contributions.	NSSF is a government body which has visited multiple times for awareness training for the workers.
			vii.	The contract workers have further requested that METL engages the contractor company management to ensure a uniform	Provision of Safety equipment's and first aid measures are already available and this information will

				implementation of the safety equipment and first aid measures. viii. Contract workers have highlighted an opportunity for improvement, suggesting that expanding transportation options for farm commutes would greatly benefit workers, reducing lengthy walks and enhancing their overall experience.	be disseminated by means of regular safety awareness trainings. Transport from designated pickup points and time is available for workers.
8.	Dr. Hashim Ngo'solo Manager- Climatology	TMA	i. ii. iii.	The project is required to use current weather information (temperature, rainfall and relative humidity) from 1991 to 2020 to understand the climatology of the area. As the weather law requires, it requires agricultural stakeholders and other sectors to use weather information in their archives (Act no 2 of 2019). Ensure stakeholder engagement.	Plans are already underway to establish a weather station on site.

CHAPTER SIX

6.0 Assessment of Impacts and Identification of Alternatives

6.1 Overview

Construction and operation of the proposed project is expected to generate a range of impacts in the project impact area. The anticipated impacts will be on a range of biophysical and socio-economic aspects of the environment. Some of the impacts are expected to be positive while others may be negative. The main purpose of this chapter is to identify the potential environmental impacts associated with the project from planning and design, construction, demobilization and operation and maintenance phases; assess their extent and significance; and propose mitigation and enhancement measures to manage the impacts. The positive measures if properly enhanced will contribute towards social and economic development of the area and Tanzania as a whole. The negative impacts will have to be managed to prevent environmental degradation of both the social and physical environment in the project area. Specifically, the chapter is aimed at the following:

a) Predict the potential environmental and social impacts arising from implementation of the project;
b) Assess the possible extent /severity of the predicted impacts (both positive and negative);
c) Assess the significance of the predicted impacts; and
d) Recommend measures for managing the impacts.

6.2 Methodology of impact identification

Impact identification was done by analyzing the project activities and determining their influence on the baseline environmental and social characteristics of the project area. The environmental characteristics of the project include biophysical (topography, soils, climate, rainfall, water resources, flora and fauna) and social characteristics (demography, settlement, land administration and tenure, economic activities, infrastructures and services, water supply and sanitation, healthy and HIV and AIDS). Public consultation complemented the field investigations and literature review. Identification of potential impacts and physical assessment of the following environmental components likely to be impacted was also conducted: a) physical /chemical; b) biological /ecological; c) social /cultural; and d) economic /operational.

Based on the project activities, the approach followed included:

a) Analysis of topographical maps, in order to identify the main environmental and social components of topography, land under cultivation, existing industrial establishments, infrastructure and water resources;
b) Site investigations, focusing particularly on the areas of project influence especially the neighboring designated institutions to identify critical environmental and social elements to be affected including soils, physical developments, social infrastructure, water and sanitation, health, flora and fauna, soils and local economy;

c) Screening of the anticipated potential and significant impacts of the project, in accordance with the project stages of planning and design, construction, operation and maintenance and decommissioning; and
d) Assessment of environmental impacts in order to describe the positive and negative impacts, both direct and indirect as identified at each stage of the project cycle.

The methodology adopted for impact identification mainly considered the environmental impacts at various phases of the project and the activities to be undertaken at each phase. The following phases were considered:

a) **Planning Phase** – Activities during planning and design phase include preparation of building designs, tender process, obtaining building permits and all the approvals necessary for the construction and operation of the project. It is expected that the environmental management measures, which will be proposed for the project will be incorporated into the engineering design of the project.
b) **Construction Phase** – For this phase, the main activities are land clearing; landscaping; grading; excavation; compacting; trenching; construction of service infrastructure such as access roads, construction of temporary structures such as storage, backfilling with compaction consolidation; levelling and earth marking; transportation of building materials; and construction of the worker's house and renovation of factory buildings. Other activities include land cultivation, planting etc.,
c) **Operation Phase** – During operation phase, sisal fibres will be produced. Sisal fibre process include decortication, brushing, drying, grading, balling, storage and market. The impacts were identified by considering project activities including inputs and outputs in the various project phases outlined above and how these would affect various components of the environment. The steps undertaken were:

i. Assessment of baseline conditions

The purpose of assessing baseline conditions was to understand the existing situation as this is the basis for determining changes that may occur as a result of the project.

ii. Assessment of project inputs associated with the project

Project inputs were examined to determine the potential changes and impacts that would be created through the application of project inputs.

iii. Assessment of project activities that will be undertaken

Project activities were examined to identify the impacts that the activities would bring on the environment.

iv. Assessment of project outputs associated with the project

Project outputs were examined to determine the potential changes and impacts that would happen as a result of the outputs.

v. Determination of environmental impacts

Based on the above steps, the environmental impacts of the project were identified.

6.3 Impact Evaluation and Scoring Matrix

After identifying the positive and negative environmental impacts the project will have on the environment, further analysis was conducted to determine the extent and significance of the impacts. The aspects that were considered were magnitude, significance, probability of occurrence and duration of impacts which have been properly explained.

6.3.1 Magnitude

Magnitude is a measure of the general degree, extensiveness, or scale of impacts. The magnitude was scored at four levels i.e., household level, local level, regional level and national level.

6.3.2 Significance

This is a measure of the importance of a particular action on the environmental factor in the specific instance under consideration. This was scored using values ranging from +3 to - 3 with a score of 1 representing a low/minimal impact, 2 moderate impact and 3 representing a high impact. Negative impacts were assigned a minus (-) sign and positive impacts are given a plus (+) sign.

6.3.3 Probability of occurrence

Provides an estimate of the probability of an impact occurring before mitigation is applied. The impacts were considered as:

a) Possible (impact may occur but it is not probable);
b) Probable (the impact is very likely to occur); and
c) Definite (impact is unavoidable).

6.3.4 Duration

Refers to the period of time over which an impact may occur, from once-off to continuous for the life of the project. Duration of impacts was considered as 1 for a low/ minimal impact and the score of 3 for a high impact. Each impact is given a score from 1 to 3 against each of the four attributes. The scores for each impact are added to give a total score for the four attributes, indicating the overall severity of the impact. A high score (3) represents a high impact and a low score (1) represents a low impact. Negative impacts are assigned a minus sign and positive impacts are given a plus sign. Table 6.1 shows the scoring

scale used for evaluation of the impacts. The four rows allow evaluation of impacts in terms of the magnitude, significance, probability and duration. The columns outline the scoring scale; with a score of 1 for a low/ minimal impact and the score of 3 for a high impact. Each impact is given a score from 1 to 3 against each of the four attributes. The scores for each impact are added to give a total score for the four attributes, indicating the overall severity of the impact. A high score (3) represents a high impact and a low score (1) represents a low impact. Negative impacts are assigned a minus sign and positive impacts are given a plus sign. For purposes of this analysis an impact matrix was prepared and is provided in Table 6.1.

Table 6.1: Impact scoring matrix with significant level

Impact	Spatial extent of the impacts	Significance of the impact	Probability of occurrence of the impact	Duration of the impact	Total Score
IMPACTS DURING PLANNING AND DESIGN					
POSITIVE IMPACTS					
Creation of employment	1	1	3	1	6
IMPACTS DURING CONSTRUCTION					
POSITIVE IMPACTS					
Creation of employment	3	3	3	3	12
Creation of a market for local construction materials	3	2	3	2	10
Increase in business	3	3	3	2	11
NEGATIVE IMPACTS					
Impact from exhaust emission	-2	-2	-2	-2	-8
Noise Pollution	-1	-2	-2	-2	-7
Impact from Vibration	-1	-2	-2	-2	-7
Soil erosion	-2	-2	-2	-3	-9
Vegetation disturbance	-1	-2	-2	-3	-8
Impact from solid waste generation	-1	-2	-2	-2	-7
Soil contamination	-1	-2	-2	-2	-7
Increase in accident incidences	-1	-2	-2	-3	-8
HIV/AIDS and other sexually transmitted diseases	-1	-2	-2	-2	-8
Increase in criminal activities	-1	-2	-2	-2	-7

Inadequate waste management	-1	-2	-2	-2	-7
Inadequate sanitation	-2	-2	-2	-2	-8
Gender based violence (GBV)	-2	-2	-2	-2	-8
Labour influx	-1	-2	-2	-2	-7
Child Labour/Forced Labour	-1	-2	-2	-2	-7
Cultural resources impact	-1	-2	-2	-2	-7
Community health and safety impacts	-2	-2	-2	-2	-8
Security (private) personnel and interaction with communities including use of force	-2	-2	-2	-2	-8
IMPACTS DURING OPERATION					
POSITIVE IMPACTS					
Increase in Sisal fibre production	3	3	3	2	11
Increase in revenue to the National and District Government	3	3	3	2	11
Income generation to local communities/ villagers	2	2	3	3	10
Corporate Social responsibility benefits from the Estate	3	2	2	3	10
Creation of employment	3	2	3	3	11
NEGATIVE IMPACTS					
HIV/AIDs, STDs and other diseases (i.e. COVID – 19)	-1	-2	-2	-2	-7
Increased pressure on social services and utilities	-1	-2	-2	-2	-7
Risks of fire hazards	-1	-3	-2	-3	-9
Soil contamination	-1	-2	-2	-2	-7
Impacts associated with Solid waste generation	-1	-2	-2	-2	-7
Ground water and surface water pollution	-1	-2	-2	-2	-7
Impacts on Fauna	-1	-2	-2	-2	-7
GBV/SEA/SH impacts	-1	-2	-2	-2	-7

Increase in Criminal Activities	-1	-2	-2	-2	-7
Cultural resources impact	-1	-2	-2	-2	-7
Security (private) personnel and interaction with communities including use of force	-1	-2	-2	-2	-7
Child Labour/Forced Labour	-1	-2	-2	-2	-7
Impacts associated with wastewater from decortication	-1	-2	-2	-2	-7
Community health and safety impacts e.g., traffic hazards, site access hazards	-1	-2	-2	-2	-7
Impacts on Flora/Vegetation clearance	-1	-2	-2	-2	-7
IMPACTS DURING DEMOLITION					
POSITIVE IMPACTS					
Employment Opportunities	3	3	3	3	12
Rehabilitation	3	2	3	2	10
NEGATIVE IMPACTS					
Soil Erosion	-2	-2	-2	-2	-8
Loss of employment	-1	-2	-2	-3	-8
Loss of income	-1	-3	-2	-3	-9
Impacts associated with solid waste generation	-1	-2	-2	-2	-7
Worker's accidents and hazards during demolition	-1	-2	-2	-2	-7

KEY;

+3	High positive impacts
+2	Moderate positive impacts
+1	Minor positive impacts
-1	Minor negative impacts
-2	Moderate negative impacts
-3	High negative impact

6.4 Construction Phase Impacts

6.4.1 Positive impacts from construction phase

i. Employment opportunities

Some people in the Project area and the neighboring areas will be employed to render both manual and skilled labor during the implementation of the proposed project. As a result, many will benefit from improved livelihood and increased income from employment in the farm. This impact is high, regional and will be long term.

ii. Provision of market for construction materials

The project will require supply of materials for the renovation/construction of some of the facilities required in the estate such as the offices, workers house, factory buildings among others. Some of these construction materials will be sourced locally and from the surrounding areas. These include sand, stones, cement, etc. This will provide a ready market for such construction material suppliers including hardware shops. This impact is high, regional and will be long term.

iii. Increase in business activities within the project area

The presence of construction workers at the project site will create an opportunity for small scale business men and women to sale food stuffs, refreshments and to open barbershops and grocery shops.

6.4.2 Negative impacts from construction phase

i. Noise Pollution

Operation of heavy construction machineries and vehicle movements would generate a lot of noise which could be a nuisance to workers and people staying close to the project site. Noise can create stress and can be a hazard within the project site since it can make it difficult for workers to communicate or hear warning signs. This is a short-terms impact.

ii. Impact from Vibration

One of the most silent 'killer' on construction sites are vibrations which are created and disseminated from construction and excavation equipment and industrial machinery. Construction site vibration can have a tangible negative impact on a number of parties and assets, including communities, surrounding buildings, and the workers operating machines and equipment.

Workers whose hands are regularly exposed to high vibration from tools and machines often suffer from several short- and long-term injuries-including issues with hands and arms, impaired blood circulation and damage to the nerves and muscles.

iii. Impact from exhaust emissions

Potential air emission is from the motor vehicles during vegetation clearance, excavation works and transportation of materials to and from the project sites.

Motor vehicle exhaust is composed of gaseous compounds such as carbon monoxide (CO), Hydrocarbon (HC), Nitrogen Oxides (NOx), Sulfur Oxides (Sox), Lead (Pb) and Solid Particles (PM 2.5 and 10) produced by the combustion of fossil fuel such as diesel by fuel-fired motor vehicles.

The impact of motor vehicle exhaust on the environment includes generation of acid rain, ozone depletion, photochemical smog and global warming. Health impact: exhaust fumes can irritate the eyes and respiratory tract and are a risk to health by breathing in.

iv. Soil erosion

The soil will be exposed once the vegetation has been cleared resulting in soil erosion. The other sources include top soil stripping during land preparation and construction works. It is expected that the impacts will be low, local, and they will occur mostly during the construction stage (short term).

v. Vegetation disturbance at the Proposed Project site

During land preparation, vegetation mainly grasses and trees will be cleared to pave way for the proposed farm. The disturbance of vegetation in the site will affect the biophysical environment however, the proponent is committed to replanting more grass in the unused areas of the farm and planting of more indigenous trees and also living 15% of the farm under tree cover. This impact is direct, moderate, local and will be long-term.

vi. Impacts associated with solid waste generation

Renovation/construction activities create solid wastes that need to be disposed. Such wastes include: plastic containers, cement bags and other packaging materials; and Metal, glass, plastic containers and other unwanted materials.

These wastes may have a direct impact on the neighboring areas, residents and domestic animals. Disposal of the same solid wastes off-site could also be a social inconvenience if done in wrong places. The off-site effects could be un-aesthetics view, pest breeding, unhygienic conditions and pollution of physical environment. Proper waste management will however be taken into consideration and proper dumping done according to the Environmental (Solid Waste Management) Regulations, 2016. This is considered to be of long-term with high significance.

vii. HIV/AIDs, STDs and other diseases (i.e., COVID – 19)

The concentration of too many people in a project site with relatively temporary social facilities is likely to cause increased levels of communicable diseases. During renovation/construction phase about 600 workers

(skilled and unskilled) both local and experts from different areas will be employed hence with the onset of HIV/AIDS in Tanzania, any concentration of people is likely to be the source of the spread of HIV/AIDS, Sexually Transmitted Diseases (STDs) and the risk of spreading COVID - 19. Although for short term only, may complicate the already fragile situation. Therefore, the impact is negative and of high significance.

viii. Incidences of risks, hazards and accidents

Risk is the possibility that something negative will occur; expressed in terms of probability while hazards can cause injury, disease, economic loss or Environmental damage. Risks and hazards are likely to occur during land preparation, cultivation/planting also during construction and renovation. The activities which may lead to OHS risks are working at height, confined spaces, equipment accidents, non-usage of PPEs, welding. The use of machines and equipment's during renovation may cause accidents if not properly managed. The impact is considered to be low, short term and insignificant if properly managed. This impact is moderate, localized and will be long term.

ix. Impacts associated with disposal of sewage

When access to adequate sanitation is limited, it can lead to challenges such as the use of secluded areas for defecation, which may create unsanitary conditions. Management of sewage disposal presents an opportunity to protect underground water resources. With appropriate mitigation the impact is considered to be indirect, short term and insignificant.

x. Labour influx

Labor influx for expansion and rehabilitation works can lead to a variety of adverse social and environmental risks and impacts. Accommodating workers in construction areas can have positive and negative effects, for the workers, the host community, and the environment. The social risk associated with labor influx are such as Risk of social conflict, Increased risk of illicit behavior and crime, Influx of additional population, Impacts on community dynamics.

xi. Child Labour/Forced Labour

There is a risk that some project-related activities could involve child labour - employment of children in project activities depriving children of their childhood and that is mentally, physically, socially or morally dangerous and harmful. The Labour Management Plan may need to be provided that no one under the age of 18 may be employed or engaged in connection with the project. This impact is minor, localized and will be short-term.

xii. Gender based violence GBV/SEA/SH impacts

Large component of workers will be from local area. Some Workforce, largely composed of younger males, may experience a shift in their social dynamics as they navigate new environments and interactions while being away from home. This situation highlights the importance of understanding the complexities of

community relationships, particularly regarding the well-being of women and girls. The influx of male labor can lead to various social challenges. This impact is minor, localized and will be short-term.

xiii. Increase in Criminal Act

The influx of people to the project area may attract people with bad intentions who can create havoc within the project surrounding areas. There may also be conflicts between the migrant workers and the locals that may culminate into violent acts.

xiv. Cultural resources impact

Renovation activities of the sisal estate may have impact on cultural resources through people's interactions. A cultural resource is defined as a site, location or feature of cultural importance to an Indigenous Group and identified as such by an Indigenous Group. Cultural resources may include, but are not limited to; Prayer flags, Trails, Camps, including sites for cultural gatherings, Habitation sites, Spiritual sites, burials.

xv. Community health and safety impacts

Delivery of supplies for construction workers and the transportation of workers can lead to an increase in traffic as well as additional burden on the transportation infrastructure.

xvi. Security (private) personnel and interaction with communities including use of force

Risks to and potential impacts on human security due to the engagement of security personnel can be mitigated through measures set out in procurement documents and other forms of written agreements, as well as in specific management plans.

6.5 Operational Phase Impacts

6.5.1 Positive from Operational Phase

i. Increase in Sisal fibre production

The improvement of Lanzoni Sisal estate will lead into increase of productivity in the sisal fibre as the project aims to capture the ever-increasing demand for sisal products, and hence generate income with a view of providing profitable returns to the shareholders and increase the national outputs. This impact is direct, high, and national and will be long-term.

ii. Increase in revenue to the National and District Government

The operation of the proposed project will result in positive gains for numerous Authorities- The local government, Tanzania Revenue Authority (TRA), Sisal Board etc. through payment of relevant taxes, rates and fees to respective institutions. This impact is direct, high, and national and will be long-term.

iii. Income generation to local communities/ villagers

There would be secondary benefit as money would move into the local communities through selling sisal to the Proponent for production, provision of food supplies, this will increase the income of local communities as well as improving their living standard. This impact is direct, high, and national and will be long-term.

iv. Corporate Social responsibility benefits from the Estate

Corporate Social Responsibility (CSR) is essential towards the success of companies. Its essence is in making companies part of the community in assisting its development through establishing projects, as a way of sharing part of their success to the marginalized communities. It is the proponent's duty to attend such responsibilities and to be socially accountable to itself, its stakeholders, and the public. This impact is direct, high, and national and will be long-term.

v. Employment opportunities

The project will directly and indirectly create employment for a number of workers, especially casual workers within Bamba Mavengero village and other location. Though the employment terms will be temporary or permanent, those who will be employed will earn income hence use the money to satisfy some of their needs. This impact is direct, high, and national and will be long-term.

6.5.2 Negative from Operational Phase

i. Increased pressure on social services and utilities

The presence of the proposed project will increase pressure on social services and utilities such as water, electricity, waste water and solid waste collection facilities, etc. The demands will strain the service delivery system in one way or the other. This impact is considered to be direct, negative, long term and of high significance.

ii. Risks of fire hazards

Fire outbreak is fast propagative and may cause magnitude economic losses to buildings, installation, flora and fauna. If not contained in time fire outbreak may result in injuries, loss of human life and air pollution beyond the boundary of the project area. During operation phase of the estate there some activities which may lead to fire outbreak such as smoking, fuel leaking, improper storage of chemicals etc. This impact is considered to be indirect, negative and of high significance.

iii. HIV/AIDs, STDs and other diseases (i.e., COVID – 19)

The concentration of many people during the project operation with relatively temporary social facilities is likely to cause increased levels of communicable diseases. Currently there about 600workers (skilled and unskilled), more workers will be employed after expansion depending on the season hence with the onset

of HIV/AIDS in Tanzania, any concentration of people is likely to be the source of the spread of HIV/AIDS, Sexually Transmitted Diseases (STDs) and the risk of spreading COVID - 19. Although for short term only, may complicate the already fragile situation. This impact is indirect, negative, long term and of high significance.

iv. Soil contamination

Sisal plants especially during nursery stage are often treated with pesticides to protect them from pests and diseases. However, the use of these chemicals can have negative environmental impacts such as soil and water contamination and harm to non-target organisms.

v. Impacts associated with Solid waste generation

Considerable volumes of solid waste will be generated during operation of the factory and farming activities. There will be solid wastes such as garbage waste like papers, food remains, packaging materials etc. The wastes biodegradable will be kept and used as manure for the farms while the plastic wastes will be collected and given to the plastic recyclers. This waste will negatively impact the aesthetic value of the site and surrounding environments if not properly managed. The impact is direct, long term and significant.

vi. Ground water and surface water pollution

The decortication process presents opportunities for water conservation and pollution prevention, but it also poses risks to water quality if not managed effectively. Wastewater generated during decortication can potentially harm the environment, while pesticides and fertilizers used on sisal plants require careful management to prevent runoff into nearby waterways. Furthermore, chemicals used in processing and cleaning must be handled and disposed of properly to avoid contaminating the water supply. The impact is direct, long term and significant.

vii. Child Labour/Forced Labour

Increased opportunities for the host community to sell goods and services to the incoming workers can lead to child labor to produce and deliver these goods and services, which in turn can lead to enhanced school dropout. This impact is minor, localized and will be short-term. This impact is minor, localized and will be short-term.

viii. Impacts on Flora/Vegetation clearance

The proposed site has some vegetation and greenery areas that blend very well with the surroundings. Sisal farming activities may impact on vegetation of the site. This impact is minor, localized and will be short-term.

ix. Impacts on Fauna

The farming activities would impact the fauna of the site in several different ways. Firstly, there would be

noise associated with the excavation activities. This would frighten many of the larger mammals away from the area This impact is minor, localized and will be short-term.

x. GBV/SEA/SH impacts

Large component of workers will be from local area. Some Workforce, largely composed of younger males, may experience a shift in their social dynamics as they navigate new environments and interactions while being away from home. This situation highlights the importance of understanding the complexities of community relationships, particularly regarding the well-being of women and girls. The influx of male labor can lead to various social challenges. This impact is minor, localized and will be long-term.

xi. Crime

During operation phase, the influx of workers and service providers into communities may increase the rate of crimes and/or a perception of insecurity by the local community. Such illicit behavior or crimes can include theft, physical assaults, substance abuse and exploitation. This impact is minor, localized and will be long-term.

xii. Cultural resources impact

Operations of the sisal estate may have impact on cultural resources through people's interactions. A cultural resource is defined as a site, location or feature of cultural importance to an Indigenous Group and identified as such by an Indigenous Group. Cultural resources may include, but are not limited to; Prayer flags, Trails, Camps, including sites for cultural gatherings, Habitation sites, Spiritual sites, burials.

xiii. Community health and safety impacts e.g., traffic hazards, site access hazards

Delivery of supplies to the factory and farms workers and the transportation of workers can lead to an increase in traffic as well as additional burden on the transportation infrastructure. This impact is moderate, localized and will be long term.

xiv. Security (private) personnel and interaction with communities including use of force

Risks to and potential impacts on human security due to the engagement of security personnel can be mitigated through measures set out in procurement documents and other forms of written agreements, as well as in specific management plans. This impact is moderate, localized and will be long term.

xiv. Impacts associated with wastewater from decortication

Waste water used in decortication can lead to water pollution, they can seep into nearby rivers and streams, contaminating the water supply. They can also be the source of eutrophication since they contain nutrients. This problem has been addressed by provision of waste water stabilization ponds on site.

xvi. Impacts due to mismanagement of hazardous waste like packaging materials for agrochemicals

Mismanagement of Agrochemicals Plastic Packaging Waste (APPW) constitutes a major environmental problem, resulting in the pollution of soil, air and water resources and compromising the agricultural products safety, the protection of the environment and the public health.

Effect on Soil

- They may kill bacteria and other organisms beneficial to the soil
- Increase nitrate content in the soil
- Alter pH levels
- Unnatural growth effects
- Residual effects
- Can bio accumulate; thereby entering the food chain

Effect on Water

- Make water unfit for consumption
- Agrochemicals in water diffuse with larger water bodies to promote the growth of algae – which can cause organisms such as fish to die. (This phenomenon is widely called Fish kills)
- Excess chemicals lead to eutrophication
- Leads to water pollution
- Alters the chemical properties of water

Effect on Air

- Pesticide particles diffuse with air, altering their composition
- Winds disperse polluted air across large areas, spreading their ill effects
- Increases risk of respiratory illnesses

xvii. Soil erosion due to land clearance during farm preparation

Land development projects, such as farming can contribute to soil erosion and sedimentation during farm preparation. Clearing, grading, and other activities disturb the soil surface, remove existing vegetation, and alter topography.

6.6 Decommissioning Phase impacts

6.6.1 Positive Decommissioning Phase Impacts

i. Employment opportunities

Demolition phase will require a number of people in demolishing the existing building and infrastructures, collecting wastes generated and rehabilitating the area. Among others, the following staff will be directly or indirectly linked to the project: Supervising Engineering team, Ecologist, Environmental Officer, Electrical

Engineer, Water Resources and Plumber Engineer, unskilled labour force and other essential services and monitoring personnel from various government institutions (NEMC and OSHA). This is considered to be of short term with high significance.

ii. Rehabilitation

Upon decommissioning, rehabilitation of the project site will be carried out to restore the site to its original status. This will include replacement of topsoil and revegetation that will lead to improved visual quality of the area.

6.6.2 Negative Decommissioning Phase Impacts

i. Loss of employment

Decommissioning will result in the loss of employment for the workers such as farmers, cleaners, guards, specialists, engineers, and managers who were employed. This loss will be significant at individual level and at the national level, especially as national policies seek to create more jobs. This is considered to be of short-term with high significance.

ii. Loss of income

The loss of employment as a result of decommissioning process will impact negatively the lifestyle and quality of life of the people. Mostly affected ones are the workers who were working at the project also, business vendors who were depending on delivering goods such as foods, drinks, and fruits to the workers. Lack of proper measures to deal with the effects of losing job can made life of the workers more difficult socially, psychologically and economically. So the developer has to timely pay pension/terminal benefits of workers. This is considered to be of short term with high significance.

iii. Impacts associated with Solid Waste Generation

Demolition of the proposed development will result of solid waste. The waste will contain the materials used in renovation including concrete, metal, drywall, glass, paints etc. Such waste may lead to release of certain chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste. Hence the impact is considered to be direct and short-term impact.

iv. Dust emission

Large quantities of dust will be generated during demolition works. This will impact negatively on the demolition staff as well as the neighboring residents. The impact is indirect and of short term if there will be proper mitigation measures. This is considered to be of short-term with high significance.

v. Impacts associated with Noise

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise that will be experienced as a result of demolishing the project. This is considered to be of short-term with high significance.

vi. Soil Erosion

Decommissioning will involve demolition of structures, management of spoil material and trucking them from the site. This would require more trucks to do the work, which may result in soil erosion and increased levels of dust. Heavy trucks moving between the site and the dump place may also cause vibration that may result in accelerating soil erosion. This impact is direct, negative, short term and of medium significance.

vii. Worker's accidents and hazards during demolition

Demolition phase of the proposed project requires careful planning and execution to ensure worker safety. We recognize the potential for hazards such as accidents from falls, equipment operation, and hazardous materials, and are dedicated to preventing them through rigorous safety measures and training. With proper mitigation measures the impact is indirect, short term and insignificant. Hence the impact is considered to be direct and short-term impact.

6.7 Project Alternatives

Consideration of project alternatives is crucial in ensuring that the Proponent and decision–makers have a wider base from which they can choose the most appropriate option. In this study, the following alternatives are considered and will be examined in detail during the EIA process.

6.7.1 No Project Alternative

This involves maintaining the current status quo without Expansion of the estate. Accepting this option would mean avoiding most of the negative effects associated with the project and missing all the positive benefits that would occur.

Advantages

- Air pollution from dust as a result of the renovation will not occur.
- There would not be removal of bushing.
- There would be no soil or water contamination.

Disadvantages

- There will be no creation of new employment
- There will be no secondary development as a result of the project
- The factory will not be renovated

6.7.2 Project Alternative

Before the decision of the renovation and expansion, the study was specially made with the aims of analyzing the prevailing cost and benefits of various alternatives. The study was hinged on the following criteria for suitable facility. The project option for the proposed project development is very strategic and will open up other avenues of economy for the community around and in the Region at large. The do the project option is in order to comply and conform to future development as; a new economic regime will emerge. This approach will increase revenue collection for the Mkinga District Council. This option implies that the project will be implemented and once implemented there will be a number of losses and gains that will be realized. We strongly recommend these options as the benefits far outweigh the negative impacts.

Advantages

- There will be creation of employment.
- There will be secondary development as a result of the project.
- The expected income in the form of profits to the Proponent and in the form of taxes to The government will be realized.

Disadvantages

- Air pollution from dust as a result of the renovation will occur
- There will be noise pollution due to renovation activities
- Population influx due to migration of construction workers to the site
- Social disruption and family instability due to influx of people to the area
- Generation of construction waste
- Construction related accidents
- Increased burden on and competition for public service provision

6.7.3 Different Site Selection/ Location

This option involves using another area from the proposed site location.

Selected alternative

Under the proposed development alternatives, the proposed development would create employment; improve people's welfare and so on. Thus, the proposed site provides the optimum alternative for implementing and operating the proposed project subject to the effective implementation of the proposed ESMP and EMP.

6.7.4 Alternative Source of Water

Alternative one: Boreholes

This is the main source of clean and portable water in the area

Alternative two: Recycled water from decortication

Wastewater from decortication process can be recycled and used to run factory activities

Alternative three; Rainwater water harvest. The proponent might use this water for sanitary purposes and decortication

Selected Alternative: From the findings of this study both alternatives can be used however the estate only use water from the boreholes.

6.7.5 Alternative Source of Power

Alternative one: TANESCO

Currently, the proposed site is supplied with electricity from TANESCO and there are high tension lines passing near the proposed site.

Alternative two: Standby Generator

Standby generators will be used as source of energy during power cut.

Alternative three: Solar Energy

This will be another source of Energy in the estate supplying clean solar electricity during the daytime to meet most of the sisal processing factory's energy demand.

Alternative four: Liquefied Petroleum Gas (LPG): The estate may consider the use of LPG from Oryx, Mihan, Taifa gas for cooking activities. LPG is economical and has excellent heating capacity with less cooking time saving you a lot of fuel costs.

Selected alternative: The proposed site will use electricity from TANESCO and standby generator to serve during the power cut. Also, for cooking the use of LPG shall be considered.

6.7.6 Solid Waste Management Alternatives

The proposed project is expected to generate a considerable amount of solid waste on a daily basis. Proper management of this waste will be critical to minimize negative environmental and health impacts. Three primary alternatives for managing the solid waste – landfilling, burning and an integrated waste management approach were identified.

Alternative 1: Landfilling large volumes of mixed, untreated waste results in the loss of valuable resources that could otherwise be recovered through reuse, recycling and recovery (3Rs). It also poses environmental and social risks at the disposal site through pollution of air, soil and water resources from leachate and methane emissions over time. Regular transportation of waste also implies ongoing operational costs and carbon emissions from vehicle movements. As solid waste management is not a revenue-generating

activity, such an approach would become a financial burden on the budget requiring allocation of funds on an indefinite basis.

Alternative 2: Open Waste Burning. Burning waste is usually an environmentally poor waste management option because potential resources are lost and it can cause air, land and water pollution.

Alternative 3: Integrated solid waste management system: An integrated waste management approach is proposed as a more viable long-term solution that addresses waste in a holistic manner from generation to final disposal. The key elements include source reduction and segregation of waste, maximizing reuse and recycling wherever possible. Organic waste would be converted to compost for use on estate. Non-recyclable fractions could be used to generate energy through waste-to energy technologies like biogas. Residual waste after extraction of resources would be temporarily stored on-site before infrequent transportation off-site, minimizing transportation needs and costs.

By adopting the principles of reduce, reuse and recover resources, Alternative 3 offers significant environmental and financial benefits compared to landfilling and open waste burning. It supports the waste management hierarchy and a circular economy model in a sustainable manner suited to the university context. With proper implementation, this integrated approach can holistically address the waste challenges posed by the new development in an environmentally sound and cost-effective way.

6.7.7 Waste Water Management Alternatives

Alternative one: Waste water treatment plant

This can be constructed for the purpose of using chemicals or natural bacteria to treat effluent water to acceptable levels before discharging the water into the open environment. This process is expensive and requires vigilant attention and use of substantial amount of space.

Alternative two: Use of septic tank and soak away pit

This involves the renovation of underground concrete-made tanks to store the sludge with soak pits. Septic tanks and soak pits demand little space compared to other options.

Alternative three: Use of wastewater stabilization ponds.

Ponds are large, shallow ponds designed to treat wastewater through the interaction of sunlight, bacteria, and algae. This process is cheap but require large space.

Selected waste water management alternative

Septic tank and soak away pit will be used to manage waste water for the project. Wastewater from decortication process will be managed by waste stabilization ponds. However later the proponent might opt the use of treatment plant.

6.7.8 Alternative pesticides

Chemical pesticides are used widely in agriculture. They play a significant role in many different types of farming, including Sisal production. However, due to the potential environmental and health risks associated with their use, pesticides are beginning to alarm both consumers and producers alike.

Selected alternative; Integrated Pest Management (IPM) - means considering all available pest control techniques and other measures that discourage the development of pest populations, while minimizing risks to human health and the environment. IPM is the best combination of cultural, biological and chemical measures to manage diseases, insects, weeds and other pests. It takes into account all relevant control tactics and methods that are locally available, evaluating their potential cost-effectiveness. IPM does not, however, consist of any absolute or rigid criteria. It is a flexible system that makes good use of local resources and the latest research, technology, knowledge and experience.

Benefits of IPM

IPM provides multiple benefits for society and the environment. It is vital for the long-term future of the plant science industry.

- Improved crop profitability due to better pest control measures and appropriate use of crop protection products
- Stable, reliable and quality crop yields
- Decreased severity of pest infestations
- Reduced potential for problems of pest resistance or resurgence
- Increased consumer confidence in the safety and quality of food and fiber products
- Sustained market shares and access
- Less risk of restrictions or deregistration
- New opportunities for established and novel products, techniques and services
- Longer product lifecycles
- Decreased resistance of pests to crop protection products and biotech plants
- Increased public confidence in, and credibility of, the crop protection industry

CHAPTER SEVEN

7.0 Impacts Management or Environmental Mitigation Measures

7.1 Overview

This chapter is devoted to describing measures or actions that shall be implemented so as to minimize any of the potential impacts identified. Many of the mitigation measures put forward are nothing more than good engineering practice that shall be adhered to during the design and construction phases. The developer is committed to the implementation of mitigation measures contained in this report.

In order these mitigation measures to be implemented, the safeguards mandatory tools which shall also form part of the tender and bid documents and the contract shall be prepared by the Contractor. These safeguards tools include: ESMP, Contractor's ESMP (C-ESMP); Health and Safety Management Plan (HSMP); Waste Management Plan (WMP); Emergence Preparedness Plan (EPP).

Table 7.1: Impacts Mitigation / Enhancement measures

Positive Impacts – Construction /Renovation Phase		
No	**Impacts**	**Enhancement Measures**
1.	Employment opportunities	• Ensure to set up a formal compliant register system which responds to complaints about nuisances in a timely manner • Adopt policies for recruiting locally and hiring local sub-contractors • as much as possible include local communities in the consultations and participation process throughout the project activities • Ensure high rate of local employment to minimize influx of foreign • workers • Ensure equal employment opportunities • Adhere to prohibition of child labour • Prohibit discrimination in any form or manner such as religion, ethnicity, tribe, creed etc. • Adopt a grievance mechanism to enable the communities and employees to relate concerns that arise from the Project or Contractors
2.	Increase in market for local construction materials	• Purchasing materials from as many local suppliers; and • Hiring trucks to transport construction materials like sand, quarry and cement to the project site
3.	Increase in business activities within the project area	• Designating an area as a market close to the project site

Negative Impacts – Construction /Renovation Phase		
No	**Impacts**	**Mitigation Measures**
1.	Impacts associated with solid waste generation	• Promote recycling and reuse of general refuse • Ensure that disposal of hazardous and non-hazardous waste is carried out in line with relevant national legislative and regulatory requirements; any hazardous waste generated on construction sites must be collected, transported and further management by competent and licensed contractors • Prohibit the burning of refuse on the construction and operation site • Recycle onsite whenever feasible • Fence construction site to prevent flying materials to deposit in • nature • Ensure that vehicles transporting wastes are fully covered • Ensure adequate onsite waste segregation, including segregation at source for all waste streams (hazardous waste, various recyclables etc.) • Adopt good housekeeping practices during all phases of the project • Prohibit all forms of littering on-site
2.	Impacts associated with noise	• Fitting construction vehicles with silencers to reduce the noise; • Servicing machinery so that they can be in good condition at all times; and • Providing ear protection materials for the workers in noisy areas. • Working hours for significant noise generating construction work (including works required to upgrade existing access roads or

		create new ones), will be daytime only; • Equipment should be regularly inspected and maintained to ensure it is in good working order by manufacturers
3.	Impacts associated with vibration	• Conduct regular vibration monitoring tests to assess the frequency and scale of the vibrations on site, and make more informed decisions about the preventive or corrective actions they can take to better protect their people, other stakeholder and the environment.
4.	Impacts associated with exhaust emission	• Improve and implement international standards • Development of alternative fuels such as natural gas and liquefied petroleum gas (LPG) • Raise the public awareness of environmental protection
5.	Impacts associated with disposal of sewage	• The design of the internal sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e., it should have the capacity to consistently handle the loads even during peak volumes; • All drain pipes passing under building, driveway or parking should be of heavy-duty PVC pipe tube encased in concrete surround. • Sanitary facilities should be kept clean always, through regular washing/cleaning; • Frequent monitoring of the internal drainage system; and • Blockages and damages should be fixed expeditiously • Construction of double chambered septic tanks for disposal of liquid wastes; • Regular inspection and maintenance of the septic tank network;

		• Use of improved pit latrines for easy maintenance; • Provision of potable water within the site.
6.	Incidences of risks, hazards and accidents	• Contractor should establish contractual clauses (signed code of conduct) to be embedded in the contracts of the workers and sub-contractors that require adherence to law and international standards to be upheld related to worker. • Contractor should prohibit the use of alcohol or drugs, which could adversely affect the ability the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment. • Contractor and self-employed contractors should assess the H&S risks related with the tasks to be performed during the construction phase. • Pre-employment medical assessments should be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected benefits of conducting pre-employment medical assessments include a safer working environment, reduction in workplace injuries, minimized downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction. • Contractor should ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities.

		• Contractor should implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. • Contractor should develop and implement a Workers Grievance Mechanism for the Project workforce including workers and subcontractors. • Contractor should establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. • Contractor should ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. • Contractor should ensure that its Code of Conduct is followed to regulate the performance and behavior of all workers, including provision for disciplinary action for anti-social behavior and non-compliance with health and safety regulations such as lack of use of PPE. • Contractor should ensure that World Bank Health and Safety guidelines regarding the construction and management of worker accommodation and the provisions of medical facilities at worker accommodation are followed.

		• Contractor should ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation. • Contractor should develop and implement a Traffic Management Plan covering aspect such as vehicle safety, driver and passenger behavior, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations. • Contractor should develop a Waste Management Plan for the construction phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.
7.	HIV/AIDs, STDs and other diseases (i.e., COVID – 19)	• Contractor should establish HIV/AIDS programmes to raise awareness • Put posters with various messages such as "HIV/AIDS kills", "be faithful". • Preventive measures against the spread of COVID – 19 shall be practiced at the project site.
8.	Child Labour/Forced Labour	• Conduct Selection and Qualification of Subcontractors • Awareness-Raising and Training of Internal Inspectors and Local Authorities • Promoting Access to Education
9.	Impacts on Flora/Vegetation clearance.	• Vegetation clearance for temporary infrastructure should be limited to the minimum core area at the site. Areas cleared of vegetation should be re-vegetated to prevent soil erosion. • Re-vegetation is only possible given suitable ground conditions

		(soils, slopes, drainage) moisture, and protection from destruction.
10.	Impacts on Fauna	• Ensure that no flora species classified as Vulnerable on the IUCN • Red List are removed or cleared • No tree greater than 200 mm diameter at breast height should be damaged • Promote plantation of native trees and green corridors along the project facility. • Minimize vegetation clearance • Any hunting activities should be prevented • Ensure to report fauna species of high conservation value
11.	GBV/SEA/SH impacts	• Appoint senior focal points in both clients and contractors with responsibility for ensuring that commitments and policies to prevent GBVH are implemented. • Increase women's representation, including at senior and decision-making levels in engineering, procurement and construction • Put in place monitoring systems at the highest levels for regular reporting on GBVH. • Include requirements around GBVH in codes of conduct, policies and protocols for contractors, including training on policies and procedures once developed. • Ensure codes of conduct are publicly disclosed in local languages and are widely accessible to all workers and all groups of people in project areas. • Build GBVH risk assessments into key processes, including environmental and social impact assessments (ESIAs) and

		environmental and social management plans (ESMPs).
12.	Potential of Criminal act	• The contractor or construction management company should designate an employee as the company crime prevention coordinator. • All assets on a construction site should be identified (marked), inventoried (records), and tracked as closely as practical. A company identification numbering system should be developed. • The company crime prevention coordinator should contact neighbors around the job site residents, businesses, even children and solicit their support and help in maintaining a safe and secure job site • Electronic alarm systems can be an effective means of providing security on the job site, particularly for office and storage trailers or for material storage areas.
13.	Cultural resources impact	• Preparing Environmental Protection Plans which describe the cultural management requirements applicable to their scope of work and work areas; • Compliance with cultural obligations applicable to their scope of work and work areas as set out in the applicable Environmental Protection Plans, including site specific measures; • Compliance with Chance Find Procedures
13	Community health and safety impacts e.g., traffic hazards, site access hazards	• Identify emergency scenarios and develop emergency preparedness and response plans with allocation of responsibilities to local communities and authorities, (where appropriate). • Develop specific stakeholder engagement plan based on

		consultation and participation with government and communities regarding the nature and potential consequences of the risks • Define protocol for community reporting of observed incidents • Maintain community grievance process • Continue safety awareness and education programs for impacted communities, including school programs.
14	Security (private) personnel and interaction with communities including use of force.	• For projects with high security risks, a stand-alone Security Management Plan contains all the procedures and protocols related to security for the project. • While the Security Management Plan should be an actionable and practical document, it is unlikely to be able to address every possible scenario in detail
15	Soil erosion	• Landscape the excavated areas in a suitable way to allow native vegetation to regrow naturally • Suspend activities during extreme rainfall events • Ensure to provide drainage channels and silt traps for all parts of the topsoil storage areas • Ensure to rehabilitate areas with topsoil and revegetate after • completion of activities • Install sediment and erosion controls • Use non-toxic and readily biodegradable chemicals on-site where feasible • Install natural or synthetic liners beneath chemicals storage tanks • Grade unpaved roads

Negative Impacts – Operation Phase		
No	**Impacts**	**Mitigation Measures**
1.	Increased pressure on social services and utilities	• Alternative measures such as the use of modern technology equipment that saves energy. • Also, the proponent should try to reduce amount of waste generation at the source so as to ease the solid waste collection facility. • Proponent should consider installation of solar lighting systems complement electricity supply from the national grid. • The project design includes ventilation systems at the factory that allow for sufficient air circulation and lighting to lower the energy demand for the facility.
2.	HIV/AIDs, STDs and other diseases (i.e. COVID – 19)	• Contractor should establish HIV/AIDS programmes to raise awareness • Put posters with various messages such as "HIV/AIDS kills", "be faithful". • Preventive measures against the spread of COVID – 19 shall be practiced at the project site.
3.	Impacts due to mismanagement of hazardous waste like packaging materials for agrochemicals;	• Use of personal protective equipment to reduce occupational exposure • Safe handling procedures to avoid spills • Respecting an unsprayed buffer zone to reduce exposure of surface water
4.	Soil erosion due land clearance during farm preparation;	• The contractor to confine the activities within the project core impact area and re-vegetation of the cleared area after planting of

		sisal.
5.	Risks of fire hazards:	• There shall be a well- designed and properly laid fire hydrant system effectively fighting fires of various proportions and of all classes of fire risks. • The management will have to ensure high level training for fire unit personnel and ensures periodical grilling of workers to cope with fire emergencies. • Consider using of fire breaks
6.	Ground water and surface water and soil pollution	• To reduce the environmental impact of sisal production on water usage, sustainable farming practices can be introduced, such as utilizing rainwater harvesting techniques. • Sisal manufacturers may also invest in technologies that can reduce water usage, such as treatment plant • Proper sanitary facility should be available at all time throughout the phases. • Advice to people on the importance of using sanitary facility at all-time throughout the phases.
7.	Impacts associated with Solid waste generation	• Provide each section of the facility with sufficient trash bins that promote sorting at source. • Encourage staff to handle waste through the hierarchy of options that including reduction at source, separation of waste to make it easier to undertaking recycling or reuse
8.	Child Labour/Forced Labour	• Conduct Selection and Qualification of Subcontractors • Awareness-Raising and Training of Internal Inspectors and Local Authorities

		• Promoting Access to Education
9.	Impacts on Flora/Vegetation clearance.	• Vegetation clearance for temporary infrastructure should be limited to the minimum core area at the site. Areas cleared of vegetation should be re-vegetated to prevent soil erosion. • Re-vegetation is only possible given suitable ground conditions (soils, slopes, drainage) moisture, and protection from destruction.
10.	Impacts on Fauna	• Any slow-moving fauna, such as tortoises or snakes observed at the site during the renovation/ expansion phase should be removed to safety by the ECO. • In order to reduce collisions of vehicles with fauna, speed limits should apply to all roads and vehicles using the site, a maximum of 40 km/h is recommended. Animals should have right of way. • All cleared areas which do not need to remain clear of vegetation should be rehabilitated or seeded with local species if natural recovery does not take place within a year of being cleared.
11.	GBV/SEA/SH impacts	• Appoint senior focal points in both clients and contractors with responsibility for ensuring that commitments and policies to prevent GBVH are implemented. • Increase women's representation, including at senior and decision-making levels in engineering, procurement and construction • Put in place monitoring systems at the highest levels for regular reporting on GBVH. • Include requirements around GBVH in codes of conduct, policies and protocols for contractors, including training on policies and procedures once developed.

		• Ensure codes of conduct are publicly disclosed in local languages and are widely accessible to all workers and all groups of people in project areas. • Build GBVH risk assessments into key processes, including environmental and social impact assessments (ESIAs) and environmental and social management plans (ESMPs).
12.	Potential of criminal act	• The management should designate an employee as the company crime prevention coordinator. • All assets on a construction site should be identified (marked), inventoried (records), and tracked as closely as practical. A company identification numbering system should be developed. • The company crime prevention coordinator should contact neighbors around the job site residents, businesses, even children and solicit their support and help in maintaining a safe and secure job site. • Electronic alarm systems can be an effective means of providing security on the job site, particularly for office and storage trailers or for material storage areas.
13.	Cultural resources impact	• Preparing Environmental Protection Plans which describe the cultural management requirements applicable to their scope of work and work areas; • Compliance with cultural obligations applicable to their scope of work and work areas as set out in the applicable Environmental Protection Plans, including site specific measures; • Compliance with Chance Find Procedures

14.	Community health and safety impacts e.g., traffic hazards, site access hazards	• Identify emergency scenarios and develop emergency preparedness and response plans with allocation of responsibilities to local communities and authorities, (where appropriate). • Develop specific stakeholder engagement plan based on consultation and participation with government and communities regarding the nature and potential consequences of the risks • Define protocol for community reporting of observed incidents • Maintain community grievance process • Continue safety awareness and education programs for impacted communities, including school programs.
15. 2	Security (private) personnel and interaction with communities including use of force.	• For projects with high security risks, a stand-alone Security Management Plan contains all the procedures and protocols related to security for the project. • While the Security Management Plan should be an actionable and practical document, it is unlikely to be able to address every possible scenario in detail
16.	Impact of waste water from decortication	• Discharge all the liquid waste into a waste treatment plant. • Conduct water quality test before used for irrigation • Frequent monitoring of the treatment ponds system
Positive Impacts – Operational Phase		
No	**Impacts**	**Enhancement Measures**
1.	Increase in revenue to the National and District Government	• In order to ensure that the benefits are sustained, the Government has to improve the collecting authority for taxes (Tanzania Revenue Authority) and strengthen collection mechanisms.

2.	Income generation to local communities/ villagers	• In order to ensure that the benefits are sustained, the Proponent is advised to continue procuring goods from the local communities. • Also, there are should be significant prices of the sisal produced by the out growers.
3.	Corporate Social responsibility benefits from the factory	• The proponent should adhere to Corporate Social responsibility law
4.	Employment opportunities	• The first priority will be given for qualified Tanzanians in Mkinga District and the rest of Tanzania.
5.	Increase in sisal fibre production	• Produce quality fibres
Positive Impacts – Decommissioning Phase		
No	**Impacts**	**Enhancement Measures**
1.	Employment opportunities	• The first priority will be given for qualified Tanzanians in Mkinga District and the rest of Tanzania.
Negative Impacts – Decommissioning Phase		
No	**Impacts**	**Mitigation Measures**
1.	Impacts associated with Noise and vibration	• Restriction of noisy demolition activities during normal working hours (8am - 5pm). • Local residents will be informed via notices and advisories, of pending noisy periods and solicit their tolerance well before the commencement of piling works. • Workers operating equipment that generates noise will be equipped with noise protection gear including ear muffs and plugs. Workers operating equipment generating noise levels greater than 85 dBA continuously for 8 hours or more should use earmuffs whereas those experiencing prolonged noise levels of 70 - 80 dBA

		should wear earplugs.
2.	Loss of employment	• Workers will be provided with skills for self-employment and others with special skills will be availed jobs to other places.
3.	Dust emission	• Access roads and exposed ground will be wetted in a manner and at a frequency that effectively keeps down the dust. • Workers in dusty areas on the site will be issued with dust masks during dry and windy conditions.
4.	Impacts associated with Solid Waste Generation	• A site waste management plan will be prepared by the contractor prior to commencement of demolition activities. This will include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring.
5.	Soil Erosion	• Planting indigenous plants on site to support the disturbed soil; • Backfilling any foundation and trenches by used the top soil onsite so as to stabilize the disturbed area; • Reestablish the original grade and drainage pattern to the extent practicable;
6.	Worker's accidents and hazards during demolition	• Proper signs on site to warn workers safety requirements as regards machines with moving parts and other equipment at site; • First Aid box and have a trained person to handle site emergencies and incidences will be in place; • Site vehicle to specifically transport the injured to hospital will be available; • Providing fire-fighting mechanism at site; • Providing safe scaffoldings and railings at heights;

		• Providing washing (enclosed bathroom) and toilet facilities at site with both drinking and washing water. The number of workers engaged determines the number of the toilets and bathrooms provided; and • Providing safety helmets, safety masks (welders), safety shoes (loaders), uniforms and hand gloves to the workers.

CHAPTER EIGHT

8.0 Environmental and Social Management Plans

8.1 Overview

Environmental and Social Management Plan (ESMP) for developing projects usually provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, the ESMP assigns responsibilities of action to various actors and provides a time frame within which mitigation measures and monitoring can be done. The ESMP is a vital output of a proposed project as it provides a checklist for project monitoring and evaluation. The ESMP outlined has addressed the identified potential negative impact and mitigation measures of the proposed project based on the section of Environment Impact and Mitigation Measures of the Negative Impacts.

8.2 Institutional roles and responsibilities

8.2.1 Financing agency

Mohammed Enterprises Tanzania Limited (METL) is the financing agency for this project. They are responsible for providing funds for implementation of mitigation measures and compliance monitoring.

8.2.2 Implementing agency

The implementing agency for this project is the Mohammed Enterprises Tanzania Limited (METL). The organization holds final responsibility for the environmental performance of the project. The Project will have an Environmental and Social Management Team that oversee environmental and social performance and compliance with legal and policy requirements including the African Development Bank's Guidelines and Policies. The Team will include an Environmental Compliance Officer and a Community Liaison Officer. The Team will be responsible for implementation of the Environmental and Social Mitigation and Management measures as well as oversee performance of contractors as prescribed in the Project's Environmental and Social Management Plan.

8.2.3 Supervision Consultant

The Supervision Consultant is appointed by the implementing agency and is responsible for monitoring and supervision of the renovation works including implementation of ESMP. The Consultant shall appoint a Resident Engineer to oversee the renovation works and monitor the works undertaken by the Contractor and implementation of ESMP to ensure compliance with contract specification and contractual requirements. However, for supervision and monitoring of the implementation of ESMP throughout the renovation phase the implementing agency can engage an Independent Environmental Consultant. The Environmental Consultant shall be responsible for environmental compliance monitoring. This includes

checking, verifying and validating the overall environmental performance of the project through regular audits, inspection and review of project submissions.

8.2.4 Contractor

The Contractor and his team shall be responsible for implementation of renovation works and ensure compliance with environmental requirements. The Contractor shall appoint a Site Engineer who shall be responsible for implementation and management of the ESMP programme and the required environmental monitoring works. Most important will be Occupational Safety and Health of workers.

8.2.5 Local government authorities and local NGOs / CBOs

The involvement of local authorities is crucial for successful implementation of ESMP because some of the mitigation measures are better undertaken by local communities with the support of the Local Government Authorities and NGOs. It is therefore important that the Mkinga District Council be involved in the implementation of ESMP. The respective Local Government Authorities and local NGOs should be well informed and invited to comment on the ESIA report at the design stage rather than when all major decisions have been made. One copy of this report should be sent to Mkinga District Council to ensure that, the Council through its Environmental Management Officer will be involved in monitoring compliance with mitigation measures.

8.2.6 Local communities

In general, the local communities do support the project because they know it is going to benefit them and the nation at large. However, the project can obtain maximum benefit if it involves the local communities and spends some amount of funds for the benefit of the local communities. Table below outlines the environmental and social management plan for the proposed development. The plan considers the development activity, predicted environmental impact, proposed mitigations, actors, timeframe and costs for implementation.

Table 9.1: Shows Environmental and Social Management Plan

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Tshs)
IMPACTS FROM PLANNING AND DESIGN PHASE				
POSITIVE IMPACTS				
1	Creation of employment	• Employment of local consultants	Proponent	N/A
IMPACTS DURING CONSTRUCTION PHASE OF THE PROJECT				
POSITIVE IMPACTS				
1	Creation of employment	• Employing unskilled labours as much as possible from the project area • Giving women equal employment opportunities as men.	Proponent	N/A
2	Increase in market for local construction materials	• Purchasing materials from as many local suppliers • Hiring trucks to transport construction materials like sand, quarry and cement to the project site.	Contractor/ Project manager	N/A
3	Increase in business activities within the project area	• Designating an area as a market within the project site	Contractor	NA

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Tshs)
CONSTRUCTION PHASE NEGATIVE IMPACTS				
1.	Impacts associated with solid waste generation	• Promote recycling and reuse of general refuse • Ensure that disposal of hazardous and non-hazardous waste is carried out in line with relevant national legislative and regulatory requirements; any hazardous waste generated on construction sites must be collected, transported and further management by competent and licensed contractors • Prohibit the burning of refuse on the construction and operation site • Recycle onsite whenever feasible • Fence construction site to prevent flying materials to deposit in • nature • Ensure that vehicles transporting wastes are fully covered • Ensure adequate onsite waste segregation, including segregation at source for all waste streams (hazardous waste, various recyclables etc.) • Adopt good housekeeping practices during all phases of the project • Prohibit all forms of littering on-site	Contractor	5,000,000
2.	Impacts associated with noise	• Fitting construction vehicles with silencers to reduce the noise; • Servicing machinery so that they can be in good condition at all times; and	Contractor	5,000,000

		• Providing ear protection materials for the workers in noisy areas. • Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only; • Equipment should be regularly inspected and maintained to ensure it is in good working order by manufacturers		
3.	Impacts associated with vibration	• Conduct regular vibration monitoring tests to assess the frequency and scale of the vibrations on site, and make more informed decisions about the preventive or corrective actions they can take to better protect their people, other stakeholder and the environment.	Contractor	3,000,000
4.	Impacts associated with exhaust emission	• Improve and implement international standards • Development of alternative fuels such as natural gas and liquified petroleum gas (LPG) • Raise the public awareness of environmental protection	Contractor	5,000,000
5.	Impacts associated with disposal of sewage	• The design of the internal sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e., it should have the capacity to consistently handle the loads even during peak volumes; • All drain pipes passing under building, driveway or parking should be of heavy-duty PVC pipe tube encased in concrete surround. • Sanitary facilities should be kept clean always, through regular washing/cleaning;	Contractor/ Project Manager	10,000,000

		• Frequent monitoring of the internal drainage system; and • Blockages and damages should be fixed expeditiously • Construction of double chambered septic tanks for disposal of liquid wastes; • Regular inspection and maintenance of the septic tank network; • Use of improved pit latrines for easy maintenance; • Provision of potable water within the site.		
6.	Incidences of risks, hazards and accidents	• Contractor should establish contractual clauses (signed code of conduct) to be embedded in the contracts of the workers and sub-contractors that require adherence to law and international standards to be upheld related to worker. • Contractor should prohibit the use of alcohol or drugs, which could adversely affect the ability the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment. • Contractor and self-employed contractors should assess the H&S risks related with the tasks to be performed during the construction phase. • Pre-employment medical assessments should be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected benefits of conducting pre-employment medical assessments include a safer working environment, reduction in workplace injuries, minimized downtime, matching	Contractor/ Project Manager	10,000,000

		the capacity of the employee with the role, and overall recruitment cost and risk reduction. • Contractor should ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities. • Contractor should implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. • Contractor should develop and implement a Workers Grievance Mechanism for the Project workforce including workers and subcontractors. • Contractor should establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. • Contractor should ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. • Contractor should ensure that its Code of Conduct is followed to regulate the performance and behavior of all workers, including provision for disciplinary action for anti-social behavior		

		and non-compliance with health and safety regulations such as lack of use of PPE. • Contractor should ensure that World Bank Health and Safety guidelines regarding the construction and management of worker accommodation and the provisions of medical facilities at worker accommodation are followed. • Contractor should ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation. • Contractor should develop and implement a Traffic Management Plan covering aspect such as vehicle safety, driver and passenger behavior, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations. • Contractor should develop a Waste Management Plan for the construction phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.		
7.	HIV/AIDs, STDs and other diseases (i.e., COVID – 19)	• Contractor should establish HIV/AIDS programmes to raise awareness • Put posters with various messages such as "HIV/AIDS kills", "be faithful". • Preventive measures against the spread of COVID – 19 shall be practiced at the project site.	Contractor	2,000,000

8.	Child Labour/Forced Labour	• Conduct Selection and Qualification of Subcontractors • Awareness-Raising and Training of Internal Inspectors and Local Authorities • Promoting Access to Education	Contractor	N/A
9.	Impacts on Flora/Vegetation clearance.	• Vegetation clearance for temporary infrastructure should be limited to the minimum core area at the site. Areas cleared of vegetation should be re-vegetated to prevent soil erosion. • Re-vegetation is only possible given suitable ground conditions (soils, slopes, drainage) moisture, and protection from destruction.	Contractor	N/A
10.	Impacts on Fauna	• Ensure that no flora species classified as Vulnerable on the IUCN • Red List are removed or cleared • No tree greater than 200 mm diameter at breast height should be damaged • Promote plantation of native trees and green corridors along the project facility. • Minimize vegetation clearance • Any hunting activities should be prevented • Ensure to report fauna species of high conservation value	Contractor	N/A
11.	GBV/SEA/SH impacts	• Appoint senior focal points in both clients and contractors with responsibility for ensuring that commitments and policies to prevent GBVH are implemented. • Increase women's representation, including at senior and decision-making levels in engineering, procurement and construction	Contractor	N/A

		• Put in place monitoring systems at the highest levels for regular reporting on GBVH. • Include requirements around GBVH in codes of conduct, policies and protocols for contractors, including training on policies and procedures once developed. • Ensure codes of conduct are publicly disclosed in local languages and are widely accessible to all workers and all groups of people in project areas. • Build GBVH risk assessments into key processes, including environmental and social impact assessments (ESIAs) and environmental and social management plans (ESMPs).		
12.	Potential of Criminal act	• The contractor or construction management company should designate an employee as the company crime prevention coordinator. • All assets on a construction site should be identified (marked), inventoried (records), and tracked as closely as practical. A company identification numbering system should be developed. • The company crime prevention coordinator should contact neighbors around the job site residents, businesses, even children and solicit their support and help in maintaining a safe and secure job site • Electronic alarm systems can be an effective means of providing security on the job site, particularly for office and storage trailers or for material storage areas.	Contractor/ Project Manager	6,000,000

13.	Cultural resources impact	• Preparing Environmental Protection Plans which describe the cultural management requirements applicable to their scope of work and work areas; • Compliance with cultural obligations applicable to their scope of work and work areas as set out in the applicable Environmental Protection Plans, including site specific measures; • Compliance with Chance Find Procedures	Contractor	N/A
14.	Community health and safety impacts e.g., traffic hazards, site access hazards	• Identify emergency scenarios and develop emergency preparedness and response plans with allocation of responsibilities to local communities and authorities, (where appropriate). • Develop specific stakeholder engagement plan based on consultation and participation with government and communities regarding the nature and potential consequences of the risks • Define protocol for community reporting of observed incidents • Maintain community grievance process • Continue safety awareness and education programs for impacted communities, including school programs.	Contractor/ Project Manager	5,000,000
15.	Security (private) personnel and interaction with communities including use of force.	• For projects with high security risks, a stand-alone Security Management Plan contains all the procedures and protocols related to security for the project. • While the Security Management Plan should be an actionable and practical document, it is unlikely to be able to address every possible scenario in detail	Contractor/ Project Manager	N/A

16.	Soil erosion	• Landscape the excavated areas in a suitable way to allow native vegetation to regrow naturally • Suspend activities during extreme rainfall events • Ensure to provide drainage channels and silt traps for all parts of the topsoil storage areas • Ensure to rehabilitate areas with topsoil and revegetate after • completion of activities • Install sediment and erosion controls • Use non-toxic and readily biodegradable chemicals on-site where feasible • Install natural or synthetic liners beneath chemicals storage tanks • Grade unpaved roads	Contractor	3,000,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Tshs)
IMPACT FROM OPERATION PHASE				
POSITIVE IMPACTS				
1	Increase in revenue to the National and District Government	• In order to ensure that the benefits are sustained, the Government has to improve the collecting authority for taxes (Tanzania Revenue Authority) and strengthen collection mechanisms.	Mohammed Enterprises Tanzania Limited (METL)	N/A
2	Income generation to local communities/ villagers	• In order to ensure that the benefits are sustained, the Proponent is advised to continue procuring goods from the local communities. • Also, there are should be significant prices of the sisal produced by the out growers.	Mohammed Enterprises Tanzania Limited (METL)	N/A
3	Corporate Social responsibility benefits from the factory	• The proponent should adhere to Corporate Social responsibility law	Mohammed Enterprises Tanzania Limited (METL)	N/A
4	Employment opportunities	• The first priority will be given for qualified Tanzanians in Mkinga District and the rest of Tanzania.	Mohammed Enterprises Tanzania Limited (METL)	N/A
5	Increase in sisal fibre production	• Produce quality fibres	Mohammed Enterprises Tanzania Limited (METL)	N/A

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Tshs)
NEGATIVE IMPACTS				
1	Increased pressure on social services and utilities	• Alternative measures such as the use of modern technology equipment that saves energy. • Also, the proponent should try to reduce amount of waste generation at the source so as to ease the solid waste collection facility. • Proponent should consider installation of solar lighting systems complement electricity supply from the national grid. • The project design includes ventilation systems at the factory that allow for sufficient air circulation and lighting to lower the energy demand for the facility.	Mohammed Enterprises Tanzania Limited (METL)	15,000,000
2	HIV/AIDs, STDs and other diseases (i.e., COVID – 19)	• Contractor should establish HIV/AIDS programmes to raise awareness • Put posters with various messages such as "HIV/AIDS kills", "be faithful". • Preventive measures against the spread of COVID – 19 shall be practiced at the project site.	Proponent/ Hospital/Dispensary	5,000,000/-
3	Impacts due to mismanagement of hazardous	• Decontamination at the source: Development of a protocol for rinsing and decontaminating (Agrochemical Plastic Packaging Waste Management) APPW upon	Mohammed Enterprises Tanzania Limited (METL)	5,000,000

	waste like packaging materials for agrochemicals;	preparation of the spray, in order to characterize them as non-hazardous waste. • Development of a secure mechanism to assure the effectiveness of the decontamination method. • Sorting at the source: Sorting of decontaminated, clean APPW to categories of homogenous materials to facilitate their recycling.		
4	Soil erosion due land clearance during farm preparation;	• The contractor to confine the activities within the project core impact area and re-vegetation of the cleared area after planting of sisal.	Mohammed Enterprises Tanzania Limited (METL)	3,000,000
5	Risks of fire hazards:	• There shall be a well- designed and properly laid fire hydrant system effectively fighting fires of various proportions and of all classes of fire risks. • The management will have to ensure high level training for fire unit personnel and ensures periodical grilling of workers to cope with fire emergencies. • Consider using of fire breaks	Mohammed Enterprises Tanzania Limited (METL)	15,000,000
6	Ground water and surface water and soil pollution	• To reduce the environmental impact of sisal production on water usage, sustainable farming practices can be introduced, such as utilizing rainwater harvesting techniques. • Sisal manufacturers may also invest in technologies that can reduce water usage, such as treatment plant • Proper sanitary facility should be available at all time throughout the phases.	Mohammed Enterprises Tanzania Limited (METL)	7,500,000

		• Advice to people on the importance of using sanitary facility at all-time throughout the phases.		
7	Impacts associated with Solid waste generation	• Provide each section of the facility with sufficient trash bins that promote sorting at source. • Encourage staff to handle waste through the hierarchy of options that including reduction at source, separation of waste to make it easier to undertaking recycling or reuse	Mohammed Enterprises Tanzania Limited (METL)	8,000,000
8	Child Labour/Forced Labour	• Conduct Selection and Qualification of Subcontractors • Awareness-Raising and Training of Internal Inspectors and Local Authorities • Promoting Access to Education	Mohammed Enterprises Tanzania Limited (METL)	N/A
9	Impacts on Flora/Vegetation clearance.	• Vegetation clearance for temporary infrastructure should be limited to the minimum core area at the site. Areas cleared of vegetation should be re-vegetated to prevent soil erosion. • Re-vegetation is only possible given suitable ground conditions (soils, slopes, drainage) moisture, and protection from destruction.	Mohammed Enterprises Tanzania Limited (METL)	5,000,000
10	Impacts on Fauna	• Any slow-moving fauna, such as tortoises or snakes observed at the site during the renovation/ expansion phase should be removed to safety by the ECO. • In order to reduce collisions of vehicles with fauna, speed limits should apply to all roads and vehicles using the	Mohammed Enterprises Tanzania Limited (METL)	4,000,000

		site, a maximum of 40 km/h is recommended. Animals should have right of way. • All cleared areas which do not need to remain clear of vegetation should be rehabilitated or seeded with local species if natural recovery does not take place within a year of being cleared.		
11	GBV/SEA/SH impacts	• Appoint senior focal points in both clients and contractors with responsibility for ensuring that commitments and policies to prevent GBVH are implemented. • Increase women's representation, including at senior and decision-making levels in engineering, procurement and construction • Put in place monitoring systems at the highest levels for regular reporting on GBVH. • Include requirements around GBVH in codes of conduct, policies and protocols for contractors, including training on policies and procedures once developed. • Ensure codes of conduct are publicly disclosed in local languages and are widely accessible to all workers and all groups of people in project areas. • Build GBVH risk assessments into key processes, including environmental and social impact assessments (ESIAs) and environmental and social management plans (ESMPs).	Mohammed Enterprises Tanzania Limited (METL)	5,000,000

12	Potential of criminal act	• The management should designate an employee as the company crime prevention coordinator. • All assets on a construction site should be identified (marked), inventoried (records), and tracked as closely as practical. A company identification numbering system should be developed. • The company crime prevention coordinator should contact neighbors around the job site residents, businesses, even children and solicit their support and help in maintaining a safe and secure job site. • Electronic alarm systems can be an effective means of providing security on the job site, particularly for office and storage trailers or for material storage areas.	Mohammed Enterprises Tanzania Limited (METL)/police station	10,000,000
13	Cultural resources impact	• Preparing Environmental Protection Plans which describe the cultural management requirements applicable to their scope of work and work areas; • Compliance with cultural obligations applicable to their scope of work and work areas as set out in the applicable Environmental Protection Plans, including site specific measures; • Compliance with Chance Find Procedures	Mohammed Enterprises Tanzania Limited (METL)	N/A
14	Community health and safety impacts e.g., traffic hazards, site access hazards	• Identify emergency scenarios and develop emergency preparedness and response plans with allocation of responsibilities to local communities and authorities, (where appropriate).	Mohammed Enterprises Tanzania Limited (METL)	5,000,000

		• Develop specific stakeholder engagement plan based on consultation and participation with government and communities regarding the nature and potential consequences of the risks • Define protocol for community reporting of observed incidents • Maintain community grievance process • Continue safety awareness and education programs for impacted communities, including school programs.		
14	Security (private) personnel and interaction with communities including use of force.	• For projects with high security risks, a stand-alone Security Management Plan contains all the procedures and protocols related to security for the project. • While the Security Management Plan should be an actionable and practical document, it is unlikely to be able to address every possible scenario in detail	Mohammed Enterprises Tanzania Limited (METL)	N/A
15	Impact of waste water from decortication	• Discharge all the liquid waste into a waste treatment plant. • Conduct water quality test before used for irrigation • Frequent monitoring of the treatment ponds system	Mohammed Enterprises Tanzania Limited (METL) District environmental Officer	15,000,000

Item	Potential impact	Recommended Enhancement/Mitigation Measure	Responsible Authority	Costs (Tshs)
IMPACT FROM DECOMMISSION PHASE				
NEGATIVE IMPACTS				
1	Soil Erosion	• Planting indigenous plants on site to support the disturbed soil; • Backfilling any foundation and trenches by used the top soil onsite so as to stabilize the disturbed area; • Reestablish the original grade and drainage pattern to the extent practicable.	Mohammed Enterprises Tanzania Limited (METL)	9,000,000
2	Loss of employment	• Ensuring that all employees are members of the security fund and the employer will ensure that the company contributions are made; • Employees will also be prepared for forced retirement by providing skills for self-employment; and • The project will provide relevant skills to workers through on job training to make them marketable after decommission	Mohammed Enterprises Tanzania Limited (METL)	N/A
3	Loss of income	• The developer should ensure that all workers employed are provided with various skills and trainings for self-employment that will help them when they lost their employment position at the facility; • Ensuring that workers are provided with small loans for them to invest in small business that will be their backbone in life once they lost employment.	Mohammed Enterprises Tanzania Limited (METL)	N/A
4	Solid Waste Generation	• A site waste management plan will be prepared by the contractor prior to commencement of demolition activities. This will include designation of appropriate waste storage areas,	Mohammed Enterprises Tanzania Limited (METL)	8,000,000

		collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring; • Trash and waste shall be well collected and removed from the site to district dumpsite; • Reusable materials like doors, windows and timber will be sold to licensed scrap dealers; • Decomposable materials shall be collected and taken to the approved dumpsite outside the park boundary. Plastics and other recyclable materials will be collected and sent out for recycling; and • Making arrangements for the daily collection of litter and demolition debris from the site by a licensed solid waste transporter for dumping at approved site. • Decomposable materials shall be collected and taken to the approved dumpsite outside the park boundary. Plastics and other recyclable materials will be collected and sent out for recycling; and • Making arrangements for the daily collection of litter and demolition debris from the site by a licensed solid waste transporter for dumping at approved site.		
5	Workers accidents and hazards during demolition	• Proper signs on site to warn workers safety requirements as regards machines with moving parts and other equipment at site; • First Aid box and have a trained person to handle site emergencies and incidences will be in place;	Mohammed Enterprises Tanzania Limited (METL)	9,000,000

		• Site vehicle to specifically transport the injured to hospital will be available; • Providing fire-fighting mechanism at site; • Providing safe scaffoldings and railings at heights; • Providing washing (enclosed bathroom) and toilet facilities at site with both drinking and washing water. The number of workers engaged determines the number of the toilets and bathrooms provided; and • Providing safety helmets, safety masks (welders), safety shoes (loaders), uniforms and hand gloves to the workers.		
6	Dust and gases emission	• Covering of all haulage vehicles carrying debris for dumping at approved sites; • Stockpiles of fine materials will be wetted or covered with tarpaulin during windy conditions; • Workers are going to be issued with proper protective equipment.	Mohammed Enterprises Tanzania Limited (METL)	7,000,000

CHAPTER TEN

10.0 Environmental Monitoring Plan

10.1 General Overview

Monitoring is a long-term process, which should start from the beginning of the project and should continue throughout the life of the project. Monitoring involves the continuous or periodic review of Renovation/Upgrading, operation and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established and previously unforeseen impacts can be identified or pre- emptied.

The outcomes of the monitoring will be recorded and assessed by Mohammed Enterprises Tanzania Limited (METL) and their contractual representatives during renovation and operations of the estate so as to either conforms or otherwise with the ESMP. Where non-compliance is observed the necessary corrective actions will be implemented as soon as possible such that the environmental or social impact is addressed and returned to acceptable levels. Corrective actions may include changes to work methods type/condition of plant and equipment and personnel and may also include changes to the frequency and type of monitoring.

There are four types of monitoring that are also relevant to this project. These are:

- 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 renovation, operation and decommissioning phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project.
- Compliance monitoring: Takes the form of periodic sampling and continuous measurement of levels of compliance with standards and thresholds – e.g., for waste discharge and diseases.
- Mitigation monitoring: Aims to determine the suitability and effectiveness of mitigation measures and programs, designed to diminish or compensate for adverse effects of the project.

10.2 Implementation of monitoring plan

The environmental monitoring during renovation phase will be comprised of two activities:

- Review of Contractor's plans, methods statement, and temporary works design and arrangements to ensure that environmental protection measures specified in the contract documents are adopted and Contractor's proposals provide acceptable levels of impact control.

- Systematic observation of all site activities and the Contractor's offsite facilities, including borrow pits and quarry sites areas. To ensure that the contract requirements relating to environmental matters are being complied with, and that no impact foreseen and unforeseen are occurring.

The monitoring activities will be comprised of visual observation during site inspection and will be carried out at the same time as the engineering monitoring activities. Site inspections will take place with emphasis on early identification of any environmental problem and the initiation of suitable remedial action. Where remedial actions have been required on the part of the Contractor, further checks will need to be made to ensure that these are actually being implemented to the agreed schedule and in the required form. All sites where renovation is taking place will be formally inspected from an environmental view point on a regular basis.

The monitoring plan will also be integrated with other renovation supervision and carried out by the Implementing Agency's Engineer. The Engineer will decide on the appropriate course of action to be taken in cases where unsatisfactory reports are received from the field staff regarding environmental matters. In case of relatively minor matters, advice to the Contractor on the need for remedial action may suffice, but in all serious cases, Implementing Agency's Engineer should issue a formal instruction to the Contractor to take remedial action, depending on the extent of delegated powers. Table below providesa variety of tools and methods to be used in the monitoring exercise.

Table 10.1: Monitoring plan for the proposed project

Monitoring tool	Comments
Visual inspection/witness	Inspection of work methods, temporary works site cleanliness, drainage and flooding
Professional certification	Skilled personnel to provide
Method statements	Contractor of renovation will provide overall method statement as well as task specific method statement as instructed
Work schedules	Updates of work schedules showing main activities, planned progress and actual critical path allocation of resources.
ESMP, H & S Plan	The contractor shall take the responsibility of preparing a detailed ESMP and a health and safety plan. These will provide guidelines concerning procedures and documentation and will be used to monitor compliance.

Periodic meetings	Includes project progress meetings, technical coordination meetings.
External audits	Organized by Mohammed Enterprises Tanzania Limited (METL)
Approvals and permits from jurisdictional authorities/agencies	At various points in time, it may be necessary to obtain approvals
Miscellaneous documentation	Various documentations may be requested from time to time to ensure performance and/or compliance such as delivery notes of materials, labour and insurances, equipment performance.
Technical specification and drawings	The contracts documents, including the technical specifications and drawings will provide clear guideline concerning procedures and documentation and will be used to monitor compliance.

Table 10.2: Proposed Environmental and Social Monitoring Plan

Item	Potential impact	Recommended Enhancement/MitigationMeasure	Monitoring Indicator	Means of Verification/ Target level	Frequency of monitoring	Responsible Authority	Costs (Tshs)
IMPACTS FROM PLANNING AND DESIGN PHASE							
POSITIVE IMPACTS							
1	Creation of employment	• Employment of local consultants	No. of local consultants employed	Employment records	Once, on commencement of assignment	Mohammed Enterprises Tanzania Limited (METL)	N/A
IMPACTS DURING CONSTRUCTION PHASE OF THE PROJECT							
POSITIVE IMPACTS							
1	Creation of employment	• Employing unskilled labours as much as possible from the project area • Giving women equal employment opportunities as men.	Number of local people employed Number of women employed	Records	Quarterly	Mohammed Enterprises Tanzania Limited (METL)/ Project manager	5,000,000
2	Increase in market for local construction materials	• Designating a place for the local market close to the site • Purchasing materials from as many local suppliers.	No. of local people supplying materials	Interviews	Quarterly	Contractor/ Project manager	5,000,000

		• Piling trucks to transport construction materials like sand, quarry and cement to the project site	Number of local transporters ferrying material				
3	Increase in business activities within the project area	• Designating an area as a market within the project site	Number of local people selling goods at the project site	Interviews	Quarterly	Contractor/ Project manager	1,000,000
NEGATIVE IMPACTS							
1	Air pollution	• Applying water regularly to civil works and earth roads to suppress dust; • Controlling the speed of construction vehicles to reduce generation of dust.	Measurement of dust particles (PM 2.5 and 10) Measurement of gaseous emission (CO2, CO, NO2, SO2,)	PM 2.5 [WHO:2005] 25 µg/m^3 PM 10 Local standard (TZS: 845:2005)60-90 µg/m^3 PM 10 [WHO:2005] 50 µg/m^3 SO2<0.5 µg/m^3 for 10 mins CO < 150 µg/m^3 for less than 15 mins	Quarterly	Mohammed Enterprises Tanzania Limited (METL)	5,000,000

				NOx< 150 µg/$m^3$for 24 hours			
2	Noise	• Fitting construction vehicles with silencers to reduce the noise • Servicing machinery so that they can be in good condition at all times • Providing ear protection materials for the workers in noisy areas	No. of vehicles fitted with silencers Machines in good condition No. of workers using PPEs inspections	Noise standard level (dBA) 85	Quarterly	Contractor	5,000,000
3	Vibration	• Conduct regular vibration monitoring tests to assess the frequency and scale of the vibrations on site, and make more informed decisions about the preventive or corrective actions they can take to better protect their people, other stakeholder and the environment.	Number of complaints about excessive noise	Tolerance Limits for Whole Body Vibration Daily exposure limit value 1.15 m/s^2 Tolerance Limits for Hand Arm Vibration	Quarterly		

				Daily exposure limit value 5 m/s^2			
3	Soil erosion	• Carrying out construction works out from May – September • Creating drainage channels to direct storm water movement • Creating stone pitching where soils have been excavated • Clearing only those places where buildings will be constructed	Construction period Availability of drainage channels Presence of stone pitching	inspections	Once on commencement	Contractor	3,500,000
4	Soil Contamination	• Construction vehicles should be in good condition to avoid fuel leaks • Servicing areas for vehicles should have impermeable surfaces	No. of vehicles serviced Availability of impermeable surface	Records	Quarterly	Contractor/ Project Manager	5,000,000
5	Increase in accident/ incidences	• Introducing humps on the road to help reduce the speed of the vehicles	No. of humps on the local road	Inspections	Once on commencement	Contractor/ Project Manager	9,000,000

		• Erecting warning signs showing that there is heavy machinery and construction vehicles using that road for people to be alert • Following health and safety regulations • Providing workers with protective clothing • Training workers in the proper use and handling of heavy equipment and machinery • Maintaining a first aid kit at the project site	No. of warning signs erected No. of people using PPEs No. of people trained Presence of a first aid kit				
6	HIV/AIDS and other diseases	• Sensitizing local people and workers at the site on the dangers of unacceptable unions • Distribute condoms to both men and women • Encouraging girls to go to school to avoid early marriages	No. of sensitization meetings No of school drop outs No. of women carrying out businesses	Records	Quarterly	Contractor/ Local leaders/ District AIDS Coordinator	7,000,000

		• Providing women with loans for small scale businesses so that they can be self-sufficient • Develop an HIV and AIDS workplace policy	HIV policy in place Records				
7	Potential of criminal Acts.	• Employ people from the surrounding areas to reduce number of migrant workers • Sensitize the community on the ownership of the project • Introduce community policing in conjunction with the police station • Request for a police unit within the project area	No of criminal incidences No. of local people employed Community policing in place Police unit in place	Police records Records	Quarterly Once on commencement	Developer	5,000,000
8	Inadeqaute waste management	• Provision of dust bins or rubbish pits for the wastes produced • Segregation of wastes by providing different bins for each type of waste	Dust bins for each type of waste in place Dumping site identified	Inspections	Quarterly Once on commencement	Contractor	5,000,000

		• Identification of a dumping site within the project area for various types of wastes • Disposing of wastes at the designated places regularly	No. of times rubbish is removed				
9	Inadequate sanitation	• Provision of pit latrines for workers on the construction site Provision of potable water within the site • Sensitization of workers on the importance of good hygiene practices	Pit latrines in place Potable water in place No. of sensitization meetings	Inspections records	Quarterly Once during commencement	Contractor Project Manager	5,000,000
10	Degradation of land and river banks	• Buying sand and quarry from registered local artisans • Carrying out sensitization of local artisans on good mining practices • Designating places for sand and quarry mining • Assisting communities with afforestation programs for river banks	No. of local registered local artisans supplying materials No. of meetings No of official mining sites	Records	Quarterly	Mines Local communities	8,000,000

		• Introducing alternative income generating activities in the area.	No. of afforestation programs				
11	Risks of child labour on the construction site	• Recruitment of workers through district labour office • Erect sign board "NO CHILD LABOUR" on site	Records of recruitment Presence of sign of "No Child Labour	Signposts Records	Monthly	Ministry of Labour	2,500,000
IMPACTS FROM OPERATION PHASE							
POSITIVE IMPACTS							
1	Creation of employment	• Employing more people from the communities surrounding the project area and other areas within the country for both unskilled and skilled jobs • Giving equal employment opportunities for both men and women	No. of people local people employed No. of women employed	Records	Annually	Proponent	N/A
2	Improved access to social services by the local community	• Providing extra social services that can be accessed by the communities.	Presence of social services	Inspection	Once on	Local communities	N/A

3	Increase in economic activities	• Sourcing funds for operation and maintenance cost • Outsourcing non-core functions • Traders from the project area to be given the opportunity to supply food stuffs for workers meals.	No. of traders supplying goods	Records	Quarterly	Proponent	N/A
4	Increase in revenue by government through taxes	• Remitting taxes to TRA from wages and service contracts in time	Remittances to TRA	Records	Annually	Proponent	N/A
NEGATIVE IMPACTS							
1	Inadequate waste management	• Provision of dust bins or rubbish pits for the wastes produced • Segregation of wastes by providing different bins for each type of waste • Maintaining the dumping site that will be identified during construction • Collecting and disposing of wastes at the designated places regularly	No. of dust bins Presence of dumping site Frequency of waste disposal Presence of hazardous waste disposal site	Inspections Records Inspections	Quarterly Once during operation Quarterly	Estate management/ workers	10,000,000

		• Used chemicals should be disposed in consultation					
2	Inadequate sanitation	• Provision of adequate toilets for workers • Construction of double chambered septic tanks for disposal of liquid wastes • Regular Inspection and maintenance of the septic tank network	No of toilets Presence of septic tank in good condition	Inspections	Once during operation Quarterly	Estate management/ workers	10,000,000
3	HIV and AIDS and other sexually transmitted diseases	• Carry out sensitization meetings for workers and local communities from time to time. • Develop an HIV and AIDS workplace policy; • Distribution of condoms and information materials on HIV and AIDS to workers	No of meetings Policy in place No. of condoms distributed	Records	Quarterly	Local Communities/ Management	3,000,000
4	Potential of criminal acts	• Sensitize the communities and workers on how they can live in harmony	No. of criminal incidences Community policing in place	Police Records Inspections	Quarterly Once during operation	Police Station	2,000,000

		• Sensitizing the community members on the ownership of the estate • Introduce community policing in conjunction with the police station • Request for a police unit within the project area.	Police unit in place				
5	Surface Drainage	• Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface. • Semi permeable materials should be used for construction of pavements. • After completion of construction, the proponent should embark on comprehensive landscaping to increase softscape cover on the plot.	Presence of rain harvesting gutters and storage tank	Inspection	Bi-annual	Estate Management	7,500,000
6	Fire outbreaks	• Hire competent and properly authorized	Presence of fire exit signs	Inspection	Bi-annual	Estate Management	10,000,000

		electrical contractor to do the wiring and other electrical works. • Install fire alarm system for entire project • Install smoke detectors in kitchens. • Installation of firefighting equipment following Country Fire requirements. • Conduct regular firefighting drills within the site. • Develop and adapt an (fire) emergency response plan for the project during and occupation stage. • Ensure that all firefighting equipment are regularly maintained and serviced. • Provide fire hazard signs such as "No Smoking sign", Direction to exit in case of any fire incidence and emergency numbers.	Presence of firefighting equipment and records of servicing Presence of fire hazard signs				

8	Increase in Energy Demand	• Put off all lights immediately when not in use or are not needed. • Use energy conserving electric lamps for general lighting • Make use of alternative source of energy such as solar power. • Solar panels proposed in the project should be fully utilized and timely repaired in case of damage.	Presence of energy conserving electric lamps Availability and condition of solar panels	Inspection	Quarterly	Energy Department	10,000,000
9	Increase in water demand	• Install water conserving taps that turn-off automatically when water is not in use. • Encourage water reuse/recycling during occupation phases. • Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and	Presence of water conserving taps Monthly bills	Inspection	Quarterly	Water department	10,000,000

		water storage facilities) to enhance collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc. • Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. Keep/Leave the Tap Closed etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management					
IMPACTS FROM DECOMMISSIONING PHASE							
POSITIVE IMPACTS							
1	Reduced noise levels	• Removing all working and damaged construction machinery and equipment	All equipment removed	Inspections	Once upon decommission	Contractor Project Manager	N/A

NEGATIVE IMPACTS							
1	Loss of employment	• Informing workers of project duration when employing them • Educating the labour force on the need to save part of their wages • Paying severance benefits to all laid off workers according to the provisions of the labour laws	Severance benefits	Records	Once	Contractor Project Manager	N/A
2	Inadequate waste management	• Disposing of construction wastes at the dumping sites that will be identified during construction phase. • Scrap metals will have to be sold or disposed at a dumping site that will be designated specifically for such wastes. • Trees and grass should be planted in bare areas of the project site as a way of restoring the area.	Site clear of construction wastes and scrap metal Well landscaped premise	Inspections	Once	Contractor Project Manager	N/A

3	Loss of business opportunities	• Informing local traders of the project duration in time • Paying for all materials that were obtained on loan in time • Outsourcing some services for non-core activities for the estate	Materials paid for	Records	Once	Contractor Project Manager	N/A
4	Noise pollution	• Demolition activities to be restricted to daytime i.e., 8am to 5pm • Use of Suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures • Workers in the vicinity or involved in high level noise to wear respective safety & protective gear. • Comply with TBS (Noise and excessive vibration pollution control) Regulations 200	TBS standards	Inspection Observation Routine Maintenance	Daily	Proponent Contractor Workers	

5	Health and safety of workers	• All workers to wear PPEs e.g., helmets. • All workers will be sensitized before demolition begins, on how to control accidents related to construction. • Accordingly, adherence to safety procedures will be enforced. • All workers will be adequately insured against accidents.	No. of warning signs erected No. of people using PPEs No. of people\ trained Presence of a first aid kit	Inspection Observation Routine maintenance	Daily	Proponent Contractor Workers	10,000,000

CHAPTER ELEVEN

11.0 Cost Benefit Analysis

11.1 Introduction

The cost-benefit analysis presents a brief comparison of environmental and social costs of implementing the proposed project versus benefits accrued from the project when implementation of the project has been completed. It is a clear fact that, it is not possible to account for all the impacts accrued from the implementation of the project. This is because some of the impacts are direct while others are indirect; some are short-term while others are long-term, some of the impacts are site specific while others cross the boundaries of the project area to affect a much larger population, though it may not be necessarily a significant impact. Similarly, valuation of these impacts is more or less dictated by the social group biases tied to the environment to which the project has been subjected. Therefore, methodology used in this cost benefit analysis, will base on comparing between the following:

"The total amount of cash that would be spent by the proponent into the local environment" termed as "BENEFIT" **Versus** "The opportunity cost of the items the people and the society will miss when the project is implemented" plus "environmental costs of mitigating any significant impact caused by the project's activities after it is fully implemented to the closure phase". Termed as "COST"

Since this project is expected to exist for many years, with 3 year of development costs and one year of decommissioning, the aspect of "Time Value for Money" will be ignored and all the costs will be considered as "Constant Dollar" with inflation and cost escalation assumed to be zero.

11.2 Benefits Related to the Project

Benefits from the proposed project can be classified as direct benefits and indirect benefits to the estate, neighbour and the government. However, primary benefits of this project is further classified as direct benefits and indirect benefits. Construction activities may generate negative benefits though; they are usually minimal compared to the positive benefits. Some of those impacts are non- quantifiable thus cannot be used in the benefit-cost analysis estimations. Generally, the benefits of the project are experienced in all phases from mobilization, construction, operation to decommissioning phase. To mention few, employment opportunities and public benefits will occur during both the construction and the operation phases. Several benefits are associated with the proposed development both at local and national level in terms of revenue generation and the multiplier effects associated with linkages with local and national economy.

Direct benefits: the proposed project will create many job opportunities, increase fibre production, entrepreneurial opportunities to the surrounding community. Most of the non-quantifiable impacts are directly benefits to the project receptors.

Indirect Benefits: Indirect benefits from a proposed project mainly include increase in government revenue through different sectors like; TANESCO, TRA etc. cultural interactions, infrastructural development, and economic growth. But since the construction project requires inputs from other sectors to produce this output, and the other sectors subsequently require inputs themselves, there will be multiple rounds of interaction among the sectors resulting in additional output from each sector of the economy.

11.2.1 Benefits to METL

The proposed project has positive impacts to METL since its benefit is a lifetime process throughout the project life span. The completion of these projects will be one of the pooling factors for increased sisal fibres production thus in monetary cost its value has potential to increase annually. METL financial capacity and sustainability are going to improve by far. The project will also have several intangible benefits to METL which include improving the estate image.

11.2.2 Benefit to the Neighbourhood

The proposed project meant to increase the capacity of infrastructures and production capacities. This improvement may lead to the increase in staff requirement that is technical, staff employed for land clearance, cultivation, and planting, security man etc., During and after construction phase the project is going to provide additional employment opportunities for people surrounding Lanzoni estate related to operation and maintenance. However, non-skilled labourers will benefit from the daily wages. The estate will also create business opportunities in vicinity of the area. Business opportunities will be supporting government initiatives to create employment opportunities for Tanzanians as advocated by the current Government. Notwithstanding that now salaries are yet to be specified, it is envisaged that from employment, workers will get incomes, which will improve quality of their lives and perhaps improve their lifestyles. However, employment opportunities and income from salaries provided will extend beyond the workers and benefits many other people including dependants.

Moreover, employment opportunities and the benefits therein will depend on whether suitably qualified local personnel that can take up positions are available. Capacity building therefore is a prerequisite for these benefits to be realized. Alongside capacity building, there shall be a need for putting in place deliberate policies that would compel developers in the real estate economic sector to employ local labour with the requisite skills and experience. In addition, the project will also have following economic and social benefits:

a. Utilization of locally available resources;
b. Revenue to the Government will increase through payment of the various taxes (indirect and direct).
c. Contribute to the development of housing and settlements as well as commercial real estate industry in Kilimanjaro region.

d. Boosting the infrastructure and economy of the country and Same district in particular Mienzani ward in which the project is located.

11.2.3 Benefit to the Government

The government will benefit through the increase in revenue to the National and District Government. The local government, Tanzania Revenue Authority (TRA), Sisal Board etc. through payment of relevant taxes, rates and fees to respective institutions.

11.2.4 Costs Related to the Project

The estimated costs for implementing enhancement measures, impact management as well as monitoring process as outlined in Chapters 10. The estimated costs for mitigation do not include the environmental costs, which could not be accurately calculated. Since some of the impacts will only to be realized during construction phase, the costs for these will also be short term, especially if mitigation measures are fully implemented. The construction costs for all the projects are detailed in Bills of Quantities.

11.2.5 Costs to Community

The resulting negative environmental and social impacts and risks such as noise, impairment of air quality, and Safety and health risks due to project activities will be absorbed by the surrounding communities. However, the introduction of mitigation measures will reduce the anticipated impacts. Apart from the above, no any community activities will be disrupted. METL management is committed to mitigate the negative social and environmental impacts.

11.2.6 Costs to Government

METL has secured fund from African Development Bank to increase sisal fibre production through improvement of Lanzoni Sisal Estate by increasing the area for planting sisals, undertake crop rotation, improving sisal processing machineries and other support facilities. Also as already mentioned the Government will directly and indirectly benefit from taxes generated during both phases of the project. Apart from tax generation, the investment will also enhance the economic growth, enhancement of industrialization and businesses.

11.2.7 Environmental Cost

Environmental cost benefit analysis is assessed in terms of the negative and positive impacts. Furthermore, the analysis is considering whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable.

11.4 Project Cost Benefit Analysis

As it has been mentioned in Chapters 6,8,9 and 10 the potential benefits of the project, in terms of financial and social benefit are substantial. The environmental impacts are reasonably mitigatable and the financial resources needed to mitigate negative impacts, when compared to the required investment are relatively small. However, the benefit cost ratio concluded the project to have more benefits compared to the total cost of the project, this implies that the project is viable and the proponent is encouraged to develop it.

CHAPTER TWELVE

12.0 Decommissioning Plan of the Project

12.1 Overview

The minimum lifespan of the proposed project might be more than fifty years though the actual time of decommissioning is uncertain. However, when it comes to decommissioning of the factory, major activities will be carried out to remove unused construction materials including demolition of temporary structures. The developer will have to close the facility and rehabilitate the site back to its original environmental status; the main challenge will be how to deal with the solid waste generated from the demolition of the structure for safe disposal.

Proper handling methods including disposal of solid waste must be followed as outlined in this EIA. Solid waste might be land filled in pits and covered with soil; preferably top soils stored to encourage indigenous trees and grass to regenerate or otherwise indigenous plants must then be planted to ensure the area returns to its original condition. The other challenge is how to deal with laid off labor force and the loss of income that was coming from the estate to the local communities and the national economy. Various mitigation measures are proposed in the previous chapter that will reduce the effect of decommissioning.

A detailed decommissioning plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use. Therefore, what is presented here is just a Preliminary Decommissioning Plan which gives light to what shall be done if the need for decommissioning arises.

12.2 Preliminary Decommissioning Plan

This section provides a brief outline of the works required to demolish the proposed building on the site in case it happens. This Plan will be used as a reference document that provides the framework to ensure that demolition activities on the site do not adversely affect the health, safety, habitat, diversity or the environment at large.

The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the Proponent and relevant Authorities (NEMC) prior to the commencement of works on site.

12.3 Demolition Methods

It is anticipated that the Contractor will prepare a detailed Demolition Plan prior to the commencement of work on site; however, the indicative demolition methodology will be as follows:

- The strip out and removal of non-structural elements will be undertaken utilizing manual labour including excavators and loaders.
- The materials will be removed from site using small to medium sized trucks.
- The structures will be demolished using larger equipment including hydraulic excavators.
- During the demolition process erosion control measures will be established. These will include treatment of dust and potential discharge into catchment area.
- Rehabilitation of the site by planting indigenous vegetation.

12.3.1 Materials Handling

All the debris from the site will be used to backfill the excavated area and the remains taken offsite to the approved dumpsite. The contractor shall submit a Demolition Waste Management Plan to NEMC which outlines the objectives of:

- maximization, reuse and recycling of demolition material
- minimization of waste disposal
- evidence of implementation for specified arrangements of waste management

On-site storage of reusable materials will occur at Site. Recycling and disposal containers will also be accommodated at this location for collection vehicles. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials will be removed in accordance with EMA 2004.

12.3.2 Proposed Sequence

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

- Destruction Survey
- Construction Waste Management Plan
- Demolition Management Plan

Table 12.1: Decommissioning activities plan

S/N	Decommissioning Activities	Impacts	Mitigation Measures	Institution Responsible	Time	Cost (Tshs)
1.	Support maintenance of the inactive facilities of the factory buildings and provides feedback for evaluating and revising, if necessary, the facility's hazard baseline Documentation.	Potential risk to the people due to contaminations	Support maintenance of the inactive facility's safety envelope, and To provide feedback for evaluating and revising, if necessary, the facility's hazard baseline documentation.	Mohammed Enterprises Tanzania Limited (METL)	Depend on decision	4,000,000
2.	All structures will be removed. All machines will be removed and sold to the third user or to recycling industries for iron manufacturing Industries. Soils that will be discovered to be contaminated will be remediated accordingly.	Environmental pollution such as air, soil and noise pollution. Safety risks to people.	The decommissioned area will be fenced. Public notification will be provided. Demolition permit will be provided	Mohammed Enterprises Tanzania Limited (METL)		20,000,000
3.	Filling and plant trees to restore nature condition of the area and at the Industrial premises place, if the area is	Potential risk to human	none	Mohammed Enterprises Tanzania Limited (METL)	After decommissioning	15,000,000

	to be for other uses then it must be designed well to meet the requirement for the new use.					
4.	Loss of employment	Jobless and psychological problems to the workers	Prepare workers for forced retirement by providing skills for self-employment and wise investment of the retirement benefits. Ensure employees are members of security funds such as NSSF Consider redeploying employees in other business	Mohammed Enterprises Tanzania Limited (METL)	After decommissioning	17,000,000

CHAPTER THIRTEEN

11.0 Conclusion and Recommendations

11.1 Conclusion

From the environmental assessment conducted for the project, it is clear that the project potentially has some negative impacts which relate to the surrounding environment. The impacts relate to issues pertaining to risk of pollution of the environment in case of improper solid and liquid waste disposal; and general nuisance during construction. Sanitation has to be appropriately considered with adequate safety measures in case of bursting of sewage pipes which may pollute the immediate environment. It should be noted, however, that despite the above potential impacts, it is possible with adequate design and implementation measures advanced in this report to mitigate the environmental effects and reduce them to acceptable levels. It is recommended that strict monitoring measures will be instituted both from an engineering and environmental point considering the sensitivity of the site. This will ensure that the project adheres to acceptable practices and standards. The project will increase sisal fibre production through improvement of LANZONI Sisal Estate by increasing the area for planting sisals, undertake crop rotation, improving sisal processing machineries and other support facilities.

11.2 Summary of Positive and Negative Impacts

11.2.1 Summary of key positive impacts

A summary of the key positive impacts identified in the ESIA study are indicated below:

i. Creation of employment
ii. Creation of a market for local construction materials
iii. Increase in business
iv. Increase in Sisal fibre production
v. Increase in revenue to the National and District Government
vi. Income generation to local communities/ villagers
vii. Corporate Social responsibility benefits from the Estate

11.2.1 Summary of key negative impacts

The following is a summary of the main negative impacts and recommended measures to minimize or eliminated the impacts:

i. Impact from exhaust emission
ii. Noise Pollution
iii. Impact from Vibration
iv. Soil erosion

v. Vegetation disturbance
vi. Impact from solid waste generation
vii. Soil contamination
viii. Increase in accident incidences
ix. Increase in the spread of HIV/AIDS and other sexually transmitted diseases
x. Potential of criminal activities
xi. Inadequate waste management
xii. Inadequate sanitation
xiii. Gender based violence (GBV)
xiv. Risks of fire hazards

11.3 Overall Recommendation

It is the consultant's view that the project be allowed to proceed on condition that the measures proposed in this ESIA Report and in particular in the ESMP are fully implemented. Recommendations for the prevention and mitigation of adverse impacts are as follows:

i. Promote recycling and reuse of general refuse
ii. Ensure that disposal of hazardous and non-hazardous waste is carried out in line with relevant national legislative and regulatory requirements; any hazardous waste generated on construction sites must be collected, transported and further management by competent and licensed contractors
iii. Fitting construction vehicles with silencers to reduce the noise;
iv. Servicing machinery so that they can be in good condition at all times; and
v. Providing ear protection materials for the workers in noisy areas.
vi. Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only;
vii. Equipment should be regularly inspected and maintained to ensure it is in good working order by manufacturers
viii. Conduct regular vibration monitoring tests to assess the frequency and scale of the vibrations on site, and make more informed decisions about the preventive or corrective actions they can take to better protect their people, other stakeholder and the environment
ix. All drain pipes passing under building, driveway or parking should be of heavy-duty PVC pipe tube encased in concrete surround.
x. Contractor should prohibit the use of alcohol or drugs, which could adversely affect the ability the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment

xi. Appoint senior focal points in both clients and contractors with responsibility for ensuring that commitments and policies to prevent GBVH are implemented.

xii. All assets on a construction site should be identified (marked), inventoried (records), and tracked as closely as practical. A company identification numbering system should be developed.

xiii. Alternative measures such as the use of modern technology equipment that saves energy.

xiv. Also, the proponent should try to reduce amount of waste generation at the source so as to ease the solid waste collection facility.

xv. Sisal manufacturers may also invest in technologies that can reduce water usage, such as treatment plant

xvi. Proper sanitary facility should be available at all time throughout the phases.

xvii. Advice to people on the importance of using sanitary facility at all-time throughout the phases.