UNITED REPUBLIC OF TANZANIA

NATIONAL FOOD RESERVE AGENCY

ENVIRONMENTAL IMPACT STATEMENT ON GRAIN STORAGE FACILITIES EXPANSION ON PLOT NO. 49 - INDUSTRIAL AREA AT MAJENGO WARD IN MAKAMBAKO TOWNSHIP COUNCIL, NJOMBE REGION

PREPARED FOR:

National Food Reserve Agency (NFRA)
Mbozi Road, Chang'ombe Plot No. 35
P.O. Box 5384, Dar es Salaam, Tanzania
Tel: +255 22 2862134; Fax: +255 22 2864069
Email: ceo@nfra.go.tz/ info@nfra.go.tz Web: www.nfra.go.tz

PREPARED BY

Beyond Nature Limited
P.O. Box 31178
Dar es Salaam, Tanzania
Tel: +255 789 289074/ +255 755 333734
Email: info@beyond.co.tz
Web: www.beyond.co.tz

SUBMITTED TO:

National Environment Management Council
35 Regent Street
P. O. Box 63154
11404 Dar es Salaam, Tanzania
Tel: +255 22 2774889
Direct Line: +255 22 2774852
E-mail: dg@nemc.or.tz and secretarydg@nemc.or.tz
Website: www.nemc.or.tz

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Declaration

This Environmental Impact Statement (EIS) has been prepared in accordance with the Environmental Management Act Cap 191 of 2004 and the Environmental Impact Assessment and Audit Regulations G.N. No. 349 of 2005. The following Experts prepared this Environmental Impact Assessment Report.

NAME	POSITION	SIGNATURE	DATE
Peter Helpeter Luena	Team Leader and EIA Expert		
Stella M. Senkoro	Ecologist and EIA Expert		
Rosemary Nyirenda	Rural Sociologist and EIA Expert		
Evans M. Kimbi	Civil Engineer and EIA Expert		
Prof. Aida Cuthbert Isinika	Agricultural Expert		

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Lastly, the Developer offers its regards and blessings to consultant *Beyond Nature Limited* and specifically the Team Leader, Mr. Peter Helpeter Luena and his associates as well as all those who supported it in any respect up to completion of this study. For all whom we have not mentioned herein should know that their contribution was of great help towards the completion of our Environmental Impact Statement (EIS). However, we remain responsible for the errors and omission of this work.

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List of abbreviation and acronyms

AQRB	Architect and Quantity Registration Board
ARN	Application Reference Number
CBD	Convention on Biological Diversity
EAC	East Africa Community
EMA	Environmental Management Act
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Plan
EPRP	Emergency Preparedness and Response Plan
ERB	Engineers Registration Board
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
G. N	Government Notice
Ha	Hectare
HIV/AIDS	Human Immuno Virus/Acquired Immunodeficiency Syndrome
HT	High Tension
HSE	Health, Safety and Environment
Kg	Kilogrammes
kWh	Kilo-Watt Hour
kVA	Kilo-Volt Ampere
LDCs	Less Developed Countries
MAKUWASA	Makambako Urban Water Supply And Sanitation Authority
MC	Moisture Content
MDGs	Millennium Development Goals
MTC	Makambako Town Council
MT	Metric Tonnes
NEAP	National Environmental Action Plan
NCC	National Construction Council
NEP	National Environmental Policy
NEMC	National Environment Management Council
NFRA	National Food Reserve Agency

NGOs	Non Government Organizations
NSEGRP	National Strategy for Economic Growth and Reduction of Poverty
OSHA	Occupational Safety and Health Authority
POPs	Persistent Organic Pollutants
PPE	personal protective equipment
QS	Quantity Surveyors
RCC	Refuse Collection Charges
R. E	Revised Edition
RH	Relative Humidity
SCEP	Storage Capacity Expansion Project
SGR	Strategic Grain Reserve
SIDP	Sustainable Industrial Development Policy
SPM	Suspended Particulate Matter
STDs	Sexually Transmitted Diseases
SUMATRA	Surface and Marine Transport Regulation Authority
TAC	Technical Advisory Committee
TANESCO	Tanzania Electric Supply Company Limited
TDV	Tanzania's Development Vision
TOR	Terms of Reference
TTCL	Tanzania Telecommunication Company Limited
TZS	Tanzania shillings
US$/USD	United States Dollar
URT	United Republic of Tanzania
VCT	Voluntary Counseling and Testing
WDC	Ward Development Committee
WFP	World Food Programme

EXECUTIVE SUMMARY

Introduction

The National Food Reserve Agency (NFRA) is one of the public institutions established as an Executive Agency under the Ministry of Agriculture Food Security and Cooperatives (MAFC) of the United Republic of Tanzania for the purpose of guaranteeing national food security. The National Food Reserve Agency aims at guaranteeing national food security by addressing food shortages through procuring, reserving and releasing food stocks efficiently and effectively.

The Agency was established by the Executive Agencies Act No. 30 of 1997 and came into effect on the 1st day of July, 2008, through the Executive Agency (The NFRA) (Establishment) Order 2008, Government Notice No. 81 published on 13th June 2008. The governance, responsibilities, powers accountability and other matters relating to the National Food Reserve Agency remains with the Executive Agencies Act 1997 and the framework documents contained in the Minister's Order of 2008.

Government of The United Republic of Tanzania has received a Polish credit (tie-up soft loan) toward the cost of the Storage Capacity Expansion Project (SCEP). This project is being implemented by the National Food Reserve Agency (NFRA) which was established by the Executive Agencies Act No. 30 of 1997 and came into effect on the 1st day of July, 2008. The overall purpose of NFRA is to meet food emergency in the country for post disaster needs and improve the efficiency of grain storage management. Currently NFRA is planning to develop an improved silo storage system to store grain through the construction of modern grain storage silos at eight selected strategic sites and Makambako is among them.

Due to complexity and sensitivity of the project, NFRA is carrying out Environmental and Social Impact Assessment (ESIA) for the Expansion of grain storage facilities at Makambako in Njombe district, Njombe region and has commissioned Beyond Nature Limited *"Consultant";* certified and registered firm of experts by National Environment Management Council (NEMC) and according to Environmental Management Act Cap 191 of 2004 (EMA, 2004) and the Environmental Impact Assessment and Audit Regulations G.N. No. 349 of 2005. This ESIA study was conducted between January 2017 and April, 2017.

Project Description

The proposed site for the expansion of grain storage facilities (construction of Silos and Warehouse) is located at Latitudes S08.84500 and Longitude E034.81395 with an elevation of 166 metres above the mean Sea level at Majengo Street in Majengo Ward, Njombe district – Njombe region. The land size to be covered by the proposed project is 0.5 hectare (Ha). The physical area that will be impacted by this project is the plot itself and the nearby areas. The area is planned for the development of industries; however, the area is very potential for residential, commercial and/ or social activities especially for medium income earners.

The site area has not undergone any construction apart from the survey study, which has been done at the site in which the whole project area has been surveyed. Existing project facilities include administration block, Weigh Bridge and parking yard. To the west of the site there a number of residential houses at about 100 metres from the proposed project area.

Currently, this proposed project is expected to accommodate among other things the following;-

- Silos and warehouse
- Internal roads (hardstand) pavements,
- Drainage system
- Office
- Control room
- Washrooms
- Canteen and
- Stores

Policy, Administrative and Legal Framework

Tanzania is committed to attaining sustainable development goal. A few policies and legislation that have a close bearing to urban development are but not limited to National Environmental Policy (NEP) of 1997, Construction Industry Policy (2003), National Land Policy (1995), National Human Settlement Development Policy (2000), National Gender Policy (2002), Environmental Management Act Cap 191 of 2004, The Urban Planning Act (2007), Land Act No. 4 of 1999, Occupational Health and Safety Act (2003), The Contractors Registration Act (1997), The Architects and Quantity Surveyors Act (1997), The HIV and AIDS (Prevention and Control) Act of 2008, The Local Government Laws (Miscellaneous Amendments) Act (1999), The Tanzania 2025 Development Vision and Environmental Impact Assessment and Audit Regulations (2005).

Stakeholders Consultations and Public Involvement

Generally most of stakeholder's views and concerns support the proposed project. All the comments received from the stakeholders were compiled, summarized and sorted to identify issues that should be addressed in the full and detailed EIA. A matrix with planned schedule of visits was prepared to guide the team to consult all stakeholders that were identified. Stakeholders were identified using simple methods such as networks, literature review and interviews.

This process allowed the creation of a channel of communication between the Project and the public. The stakeholders identified include but not limited to Development and Environment Committee of Mtaa wa Majengo Office, Ward Development Committee of Majengo Ward, Makambako Town Council, Makambako Urban Water Supply and Sanitation Authority, Regional Commissioner's Office – Njombe Region, District Commissioner's Office – Njombe District among others.

The major issues and concerns raised were;

- Employment opportunities
- Waste disposal and management
- Adherence of health, safety and security
- Increased Government revenue
- Aesthetic consideration
- Awareness HIV/AIDS and Health programs

Assessment of Impacts

Impact identification in this EIA aimed at ensuring that all potential significant impacts were identified and addressed. The EIA team used tools to identify various impacts particularly adverse impacts. These impacts we identified during the stakeholders' consultative meetings, interview, literature review and observation. Some of the issues/impacts identified were thus regarded as possible impacts.

(a) Construction phase

Positive Impacts identified that will occur during construction are creation of employment opportunities, increased benefits to community and local economy, economic growth and increased business opportunities

Negative impacts identified that will occur during construction phase are Loss of vegetation cover, Noise and Vibration, Air quality deterioration including dust pollution, Soil erosion, Safety hazard and public health, Aesthetic value, Social conflict due to labour from outside, Water availability and consumption as well as Residual and Cumulative impacts

(b) Operation phase

Positive Impacts that will be associated with Operation phase include increased benefits to the government, employment opportunities, business opportunities, improved living standards.

Negative impacts identified that will occur during operation phase are safety hazards and public health impacts, impacts from ancillary activities, reduced air quality, soil and water contamination, increased electricity consumption, noise and vibration, increase in vehicular traffic, damage to infrastructure and reduced aesthetic value.

(c) Decommissioning phase

Positive Impacts associated with Decommissioning phase will be Rehabilitation of the project site after demolition and creation of short term Employment Opportunities. And the Negative environmental impacts, which will be associated with this phase, include generation of solid wastes, generation of dust, increased noise and vibration generation and loss of employment.

Mitigation Measures

Many of the mitigation measures put forward are nothing more than good engineering practices that shall be adhered to during all the project phases. Other major mitigation measures to be observed include:-

- The contractor will ensure that the noise from the construction site and camps complies with the national standards
- Vehicular traffic through communities will be avoided as far as possible. Project routes will be authorized by the Supervision consultants
- Vehicle speed will be kept low, and horns will not be used while passing through or near the communities.
- Vehicle will have exhaust silencer to minimize noise generation
- Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution

- Working hours for construction activities within/near the communities will be limited to between 8 am to 6 pm.
- Liaison with community will be maintained. Grievances redress mechanism will be put in place to address the community complaints.
- Workers will use safety device for protection of ears (earmuffs and ear-plugs etc) following OSH Act of Tanzania.
- Silo facility foundation shall be designed to minimize vibration effect.

Environmental and Social Impact Management

The Environmental and Social Management Plan is presented in Table 17. The ESMP during the implementation of the project is important in order to measure the success of the mitigation measures. The contractor shall implement components relevant to the actual construction and operation phases. NFRA shall be responsible for overall implementation of the ESMP.

The estimated costs for implementing the mitigation measures are just indicative. Additionally, the ESPM include an estimate of the costs of the measures so that the project proponent can budget the necessary funds. Appropriate bills of quantities should clearly give the actual figures. In any case, the consultant used informed judgment to come up with these figures.

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

Furthermore, Developer shall ensure availability of resources which are required for implementation of its environmental management plan. The plan shall also be monitored to ensure that environmental objectives are met. NFRA shall carry out routine auditing and communicate the audit report to the top management so as to ensure continued sustainability of the environmental management system.

Resource Evaluation

The cost of this proposed project expansion of grain storage facilities at Makambako is US$ 6,969,246.31 and it will cover costs of plant and machinery; civil and building; electrical and ICT;

and cross cutting issues (viz. environmental and social impact assessment, project coordination and management). The estimated costs for mitigation are not included the environmental costs, which could not be accurately calculated. Since some of the impacts will only be realized during construction phase, the costs for these will also be short term; especially if mitigation measures are fully implemented the project benefits outweigh the project costs by far.

Decommissioning

As decommissioning will take in the remote future, the specific conditions for mitigation are generally inherently uncertain. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty

Summary and Conclusion

The proposed project will have enormous social and economic benefits to both people of Tanzania, the nation and the international community at large. The project entails minimal adverse environmental impacts of which adequate mitigation measures have been taken and incorporated in the project design

Based on the above, it can be concluded that the proposed project after completion will entail no significant impacts provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation regime laid down in this EIS. The proponent is committed in implementing all the recommendations given in this EIS and further carrying out the environmental auditing and monitoring schedules.

CHAPTER ONE

INTRODUCTION

1.1 Background and Justification of the project

Agriculture is the mainstay of the Tanzanian economy contributing about 26.8% of GDP in the year 2012, 30.9 % of export earnings and employs about 75% of the total population. Over the past decade, the agricultural sector grew at an average rate of 4.4%. The rate of growth in agriculture is higher than the average annual population growth rate of 2.9%, implying growth in incomes. Tanzania agriculture is dominated by subsistence farming with low capital investment that operates under rain-fed conditions and farm sizes of between 0.2 to 2.0 hectares. Despite the high potential area for irrigation development, which is 29.4 Million hectares, only 363,514 hectares under irrigation are provided with improved irrigation infrastructure, despite the fact that the total area under irrigation including the traditionally irrigated areas is 450,392 hectares as of June 2013.

The commercial large scale sub-sector is very small and produces some of the export crops in the country. Farming operations such as weeding techniques (manual, chemical, mechanical), fertilization (types, application methods, rates), pesticide use (types, application methods, storage, transport, disposal), mechanized farming practices (type of machine, tillage, harvesting), crop management practices, upland farming practices, bottom valley cultivation, crop storage may have potential negative environmental impacts if not practiced in an environmental friendly manner. A multiplicity of such negative environmental impacts has forced many countries to formulate policies to safeguard the environment.

Tanzania has formulated a number of policies to protect the environment. The policies include both sectoral and cross sectoral. The crop sub sector Environmental Impact Assessment Guidelines provide guidance to EIA practitioners so that proposed agricultural projects comply with both national and international environmental requirements.

Environmental Impact Assessment (EIA) is an important procedure for ensuring that the likely effects of a project or development on the environment are fully understood and taken into account before the development is allowed to go ahead. The EIA is a formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects. The EIA provides a unique opportunity to demonstrate ways in which the environment may be improved as part of the development process.

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1.2. Objectives of an EIA

EIA identify, predict and evaluate adverse significant impact of the proposed development projects in relation to social, physical, economic and cultural environment with which the proposed project interacts. Information provided guide decision-making and promote sustainable development.

EIA promote transparency and enhance sustainable development through stakeholder consultation, obtaining local and traditional knowledge that may be useful for decision-making, ensuring that important issues are not overlooked, reduce conflicts through early identification of the problems and ensuring that benefits are maximized, and informing the community on the proposed project and let them take part in the improvement of the project design.

EIA promote sustainable development while ensuring biodiversity conservation, proper use of its components and equitable sharing of its benefits. These is done by identifying adverse impacts of the proposed project to the ecosystem by addressing all issues that will have adverse impact

and provide mitigation measures. Thus ensuring safeguard of threatened species, endemic species, keystone species, umbrella species, charismatic species, habitat quality, habitat diversity and other components of ecosystems while take into account socially end economic.

EIA ensure that potential impacts are foreseen and addressed during the project's planning and design, implementation, and decommissioning stages. It is expected that the EIS will contribute to decision-making about this project and shape the project so that its benefits can be achieved and sustained without causing problems to Dodoma Urban District, nearby districts and regions and the nation in general

1.3 Objective of this EIA study

Various operations associated with the expansion of grain storage facilities have impacts to the communities in the surrounding areas. Equally well the communities have impacts on the proposed project as well, therefore further weighty studies of the existing situation, intended operations and the likely impacts are desired to ensure enhancement of public health and environment. In this respect the objectives of the study are stipulated hereunder;-

i. Delineating, evaluating and presenting the environmental characteristics of the study area on the aspects of biophysical, socio-economic, political, institutional and cultural.
ii. To identify and analyzing the existing policies and policy instruments that govern the environmental management
iii. To ensure that environmental consequences are identified as early as possible and taken in consideration during construction, operation and decommission of the entire project.
iv. Analyzing significant impacts and determining whether they are positive or negative, direct or indirect, short-term or long-term, reversible or irreversible. Also analyzing cumulative impacts on a regional scale based on acceptable environmental standards and recommending the most appropriate measures to mitigate/reduce them.
v. Decreasing and avoiding any environmental effects by mitigation and development of an Environmental Management Plan and Environmental Monitoring Plan

1.4 Study Methodology

The methodology adopted in carrying out the EIA study entailed physical observations, interviews with relevant stakeholders and review of existing legislation and literature pertinent to the proposed project. The EIA study was carried out by first conducting a preliminary meeting between Consultant and the Project facilitators and Dodoma Zonal Manager of National Food

Reserve Agency (NFRA) to deliberate on the proposed project. The next step was a site survey involving physical observations within the projects' area and areas of influence. Interviews and administration of checklists to relevant stakeholders was also undertaken. These include; government officials and the local communities in the area. Secondary data were collected from different sources including literature surveys in libraries and documentation centres, government documents, national archives, and NGOs office. The EIA study team being a multidisciplinary field involved a team of experts the key ones being EIA Expert (Team Leader), Ecologist, Rural Sociologist, Civil Engineer and Agricultural Expert.

The Terms of Reference that are attached in **Appendix 1** of this EIS guided this EIA. In undertaking this EIA, the first stage was scoping that intended to determine the scope and boundary of the study, familiarize with the study, define the methodology used and focus the study in terms of avoiding unnecessary data collection, costs and subsequent production of unhelpful report. More specifically, scoping included the following activities:

- Identification of main problems, constraints and issues associated with the project;
- Determination of spatial, temporal and institutional boundaries of the project;
- Development of appropriate study methods;
- Identification of stakeholders and refining the key stakeholders;
- Identification of the likely positive and negative impacts of the project;
- Identification and discussion of project alternatives;
- Identification of data requirements; and
- Development of terms of references for undertaking a full EIA

In considering project alternatives, special attention was given to what would happen without the project. This information is useful in determining what the impacts of the project would be if the project is not developed or if it is developed. The study provided an opportunity to identify and involve relevant key stakeholders likely to affect or be affected by the project. Stakeholders here refer to all those people and institutions with interest in the successful design, implementation and sustainability of the project.

1.5 Method of stakeholder Involvement

Stakeholder interviews and consultations were the main methods followed in the scoping and full EIA exercise when involving the identified stakeholders. Alongside consultation, physical visits were made to the site to assess the vegetation types, wildlife resources in the area to

gauge the level of impacts to physical and biological resources the project will have. The aim was to give them an opportunity to air their views regarding the proposed project as well as building their capacity with regard to the project implementation. Further consultations and visits were conducted in Dar es Salaam by visiting and discussing with key stakeholders in the Ministry of Agriculture, Livestock and Fisheries and Occupational Safety and Health Authority. The list of stakeholders consulted in this EIA is included in **Appendix 2** and their views and concerns are summarized and presented in **Chapter 5** of this EIS.

The study then identified the potential impacts of the project, predicted them and evaluated their significance. Impact identification was done by simple checklist of issues/impacts correlated with various activities of the project in different phases of the project. Evaluation of impact significance was done using a range of methods including matrices and collective and extensive discussions involving the team; bearing in mind stakeholder concerns and a set of criteria that included the magnitude and likelihood of the impact and its spatial and temporal extent; the likely degree of recovery of the affected environment; the value of the affected environment; and the level of public concern as well as political repercussions of a proposed development.

Impacts were considered to be significant if they met the above criteria as well as if they:

- Are extensive over time and space;
- Are intensive in concentration or proportion to assimilative capacity;
- Exceed environmental standards or thresholds;
- Do not comply with policies, land use plans and sustainability strategy; and
- Adversely and seriously affect the environment and the public.

Mitigation measures and enhancement options were proposed for impacts that were rated at Medium and above as well as Low and below. The report provides information on mitigation and monitoring plan with details of responsibilities to ensure effective implementation of the mitigation measures as required by the Environmental Management Act Cap 191 of 2004.

1.6 Project Objectives and Rationale

The proposed project is intended to expand grain storage facilities both Silos and Warehouses and its main objective for its establishment is to set a comprehensive, high standard grain storage facilities, infrastructure services, utilizing its competent professionals, modern equipment and machinery. The initial planning and operational stage has successfully managed to build up an impressive reputation creating a food security in line with its vision of “developing

and transforming the Agency to a level where it could confront challenges related to food shortage in the country, explicitly stated as "***An institution capable of responding to food Shortages in Tanzania by 2020''***. The proposed project will be in line with various policies of Tanzania that encourage the State to invest in major project and seeks to assist efforts to promote the economy and livelihood of the people, and contribute to poverty alleviation through encouraging the development of sustainable and quality food storage and supply services that is culturally and socially acceptable, ecologically friendly, environmentally sustainable and economically viable.

CHAPTER TWO

PROJECT DESCRIPTION

2.1 Site location, land size and land use

The proposed site for the construction of Silos and Warehouse is located at Latitudes S08.84500 and Longitude E034.81395 with an elevation of 166 metres above the mean Sea level at Majengo Street in Majengo Ward, Njombe district – Njombe region. The land size to be covered by the proposed project is 0.5 hectare (5000m^2). The area is planned for the development of industries; however, the area is very potential for residential, commercial and/ or social activities especially for medium income earners.

Figure 1: Location of the proposed project area at Makambako NFRA Office

Source: NFRA, 2017

2.2 Project components

2.2.1 Existing project components

The site area has not undergone any construction apart from the survey study which has been done at the site in which the whole project area has been surveyed. The following are the existing project facilities:

- Storage facilities
- Administration Block
- Weigh Bridge and Parking yard

2.2.2 Proposed project components

The proposed project is expected to accommodate among other things the following;-

- Silos and warehouse
- Internal roads (hardstand) pavements,
- Drainage system
- Office
- Control room
- Washrooms
- Canteen and
- Stores

2.2.3 Project design

As stated above in section 2.2.1, there are facilities already in place operated by NFRA with the capacity to store 34,000 Metric tonnes of grains but the Proponent wishes to expand the facility in order to increase the capacity of storage of grains from 34,000 Metric tonnes to 54,000 Metric tonnes of grains that will be used in future particularly during food shortages. The building rules and regulations will be in accordance with legislations, policies and regulations of Tanzania.

Proposed facilities shall be used for the purpose of storing grains that will be used in future particularly during food shortages. The building rules and regulations will be in accordance with Tanzania government specifications and the planning regulations of Tanzania. The following are the design criteria that have been followed during the design of the building:-

- Easy vehicular access to and from the project site
- Enough car parking to accommodate a large number of Trucks i.e., 50 Trucks/day
- Short internal working distances provided with all weather walking paths
- Ensure easy flow of clean air
- Ensure that the building is friendly user to all workers including disabled
- Aesthetic values added
- Proper orientation to reduce indoor discomfort and minimize the effect of the Sun
- Ensure coherence, diversity compatible uses and scale in the context

2.2.4 Specification of the materials and the Capacity of Silos

The Silos will be constructed by using Steel materials. Steel to be used will be Gulfan, a Swedish technology with minimum cracking bend compared to galvanized steel for 6 silo bins in

Dodoma and its associated components. A total of six (6) bins will be constructed with a capacity of 3,350 MT each, this will sum to 20,000 MT for the proposed storage facility. Constructional features of a Silo complex is appended in this report (*See Appendix 2*).

2.3 Current description of NFRA operation

2.3.1 Operational area and facilities

The NFRA operates in all regions in Tanzania Mainland with strategically located seven zonal offices in Arusha, Kipawa, Dodoma, Makambako, Shinyanga, Songea and Sumbawanga. Each zonal office is serving at least one region, hence the number of regions served by the zonal offices differ in both number and size e.g. population and grains production factors.

2.3.2 Procurement of food stocks

Procurement of food stocks normally starts in July and ends in December with a peak in October. The Agency uses different methods to procure its food stock, which include tendering, use of agents, use of farmers groups and buying centers. Provided the grain meets the minimum requirements, it will be purchased at a pre-determined price based on prevailing market price and unit cost of production.

At present NFRA has about 60 permanent buying centers at the village level located in seven NFRA zones. Care is taken to limit the number of buying centers so that private sector traders are not discouraged from entering the market as well as minimizing operational costs. In 2016/2017 the Agency intended to increase the number of buying centers to 62 so as more farmers can have direct access to sell at buying centers.

2.3.3 Stock storage, maintenance and quality control

Food grain purchased at buying centres is transported to the storage facilities, where it is inspected, cleaned, bagged in 90 kg bags, stacked, fumigated and stored. Fumigants and agrochemicals mostly used by the Agency are as indicated in table 5 below. Inspection in the warehouses is done regularly to ensure that its condition remains within specification and that it is not subject to pest and rodent attack. Responsibility for frequent inspections and taking the necessary corrective actions rests with the quality control staff.

Table 1: Fumigants and Agro-chemicals mostly used by NFRA

S/No.	Purpose	Chemical name	Trade name
1.	**Fumigation**	Aluminium Phosphide (Tablets)	Detia X. T
			Phostonix – T
		Aluminium Phosphide (Packets)	Detia Ex Packets
			Bulphos
2.	**Spraying**	Pirimiphos Methyl 50 EC	Acteric 50 EC
		Dichlorovos 500 EC	Nuvan 500 EC
3.	**Dusting**	Pirimiphos Methyl dust 2%	Acteric Super dust
			Bulphos Dust
4.	**Rat control**	Bromadialine	TCI Pellets
5.	**Termite control**	Chloropyriphos 45%	Dasban

Source: NFRA, 2016

2.3.4 Food stock releases

Releases from the reserve are made to counteract food shortages determined from time to time by the Food Security Department of the Ministry of Agriculture, Livestock and Fisheries in collaboration with the Local Government Authorities. This is done by carrying out vulnerability assessment studies which determine among others; target groups and recommends amounts of food releases in the form of food aid. Usually the releases are sanctioned by the Tanzania National Disaster and Relief Committee (TANDREC) under the chairmanship of the Prime Minister's Office (PMO). Distribution of the released food to the target groups is the responsibility of the Local Government Authorities. PMO has put in place guidelines to be used during distribution process at local levels. The Agency from time to time may release part of the food stock to the market for the purpose of stabilizing food supply, but this is only when demand is higher than supply.

2.3.5 Food stock recycling

To maintain the food reserve in good condition, it is necessary to periodically rotate the food stock, which has not been required for relief programs and is still held in the reserves. The procedure is for NFRA to hold stock for not more than three years, after which it will be difficult for the said stock to be stored in good condition. Normally NFRA releases stocks that have been held for more than one year. The Agency targets to dispose at least 30% of the annual stock each year.

2.3.6 Private sector Involvement

NFRA involves private sector in procurement and transportation of food stocks. Farmers and traders are the main sources of the grain for the national reserve. Private transporters play an important role in stock relocation and in moving purchased food commodities from the buying centres to the storage facilities at the zone headquarters. Most of the goods and services required for smooth operations of the Agency are procured from the private sector.

2.4 Project Description and Materials

NFRA is planning to develop an improved silo storage system to store grain through the construction of modern grain storage silos and warehouses.

2.4.1 Process description

The proposed project will be in Majengo area – Makambako Town Council in Njombe Region. The proposed development will be constructed in a way that its structures and operations will be designed to have a minimal impact on the environment. Proposed designed concept focuses on scheme that will not allow environmental pollutions and/ or degradation, underground seepage, using materials and styles which are compatible with the proposed project and the surrounding environment. Figure 2 contains the description of each project components.

2.4.2 Mobilization phase

This phase this will involve recruitment of labour force for construction, site preparations, as well as buying and transportation of working equipment, preparations of temporal places for material storage, guide house and temporal washroom and preparation of health and safety as well as building permits sign board.

2.4.3 Construction phase

The main activities during construction phase for this project will involve mobilization of construction equipment; excavation and earthworks (such as site clearance, over site excavation, excavation for foundations and structure, soil sterilization, disposal of surplus excavated materials, disposal of water, planking and strutting and hardcore); concrete works (such s steel reinforcement, bending and fixing of reinforcement and wrought formwork, mixing of concrete, distribution of concrete and placing of concrete etc), block works; metal works; floor, wall and ceiling finishing; painting; drainage and external works. Other activities will be the disposal of construction wastes and other wastes from the site after construction activities. However, additional effort will be made to protect the environment.

The following structures will be constructed for the proposed project:-

- Silos and warehouse
- Internal roads (hardstand) pavements,
- Drainage system
- Office
- Control room
- Washrooms
- Canteen and
- Stores

Other components required in the silo complex from grain intake to grain storage will include intake unit, Bins, Cleaning and drying unit, bulk Conveyance unit (Conveyors and elevators), Bulk storage unit (prefabricated grain storage and Bagging Bin), aeration system, and Instrumentation.

2.4.4 Operation phase

This phase will follow after the construction phase. The main activities during this phase will involve storage of grains, operation and maintenance of equipment as well as safety condition of the area.

2.4.4.1 Electricity Requirement

Generally, the proposed project is connected to a national grid system supplied by Tanzania Electric Supply Company Limited (TANESCO) and the estimated power requirement for the Silos facility is 800kW (around 1MVA). The electricity to the proposed site can be easily made available from the nearest High Tension (HT) lines adjacent to the boundary limits of the site. Currently proposed site has small sized transformer that is not capable to supply the required power for the proposed silos complex. This transformer is located outside the boundary limits of the existing site and is shared with other customers. Additionally, there will be an electrical power back up facility, a standby Generator with a capacity of 725 kVA.

2.4.4.2 Drainage and Sewer system

The area has no centralized sewerage system and depends only on on-site sanitation facilities mainly septic tanks and soaks way pits. Liquid waste generated from the proposed project will

be channeled to the septic tanks/soak pit system before their final disposal as per LGA direction and guidelines. Also drainage system will be constructed to curb water pollution through run-offs especially during rain seasons. Examples of these wastes include used oils and grease from machines and equipment, run-offs and oil spills. Containment structures shall be constructed to avoid pollution and storm water drainage system shall be controlled by periodic maintenance through the manholes covered with removable lids.

2.4.4.3 Solid waste management system

The project will provide facilities for handling solid waste generated within the operating facilities. These include dust bins/skips for temporarily holding of solid waste within the premises before final disposal at a designated dumping site of Kipagamo.

2.4.5 Decommissioning phase

Decommissioning is the process that takes place when the project comes to an end. Although there is no specific time frame that is set for decommissioning of the proposed project, there will be a time when a project will come to an end where the proposed facility and its associated infrastructures would be demolished. This will involve removal of water supply systems, energy supply systems, removal of shading roof and dismantle of office buildings and floor slab. It will also involve site clearance and transporting all wastes and demolished materials/debris to disposal site. Eventually, site restoration will be done.

Table 2: Project activities

PROJECT PHASES	ACTIVITIES
Mobilization phase	• Detailed study to complete a scoping or pre-feasibility study • Environmental & social impact studies. • Recruitment of labour force for construction • Site preparations for material storage, guard house and temporal washroom etc.
Construction phase	• Application for permits to operate in the proposed area. • Surface preparation • Site clearance • Development and erection of the building
Operation phase	• Procurement of grains • Storage of grains • Sales and Marketing • Project Monitoring and Evaluation
Decommissioning phase	• Dismantling of infrastructures • Rehabilitation of the site area

Source: Beyond Nature Limited, 2017

2.5 Materials Requirements

2.5.1 Construction phase

During the construction phase of the project, most of the materials to be used will be obtained in Tanzania as described in (Table 3). However, some of construction materials and equipment might be imported from outside the country. These materials to be used for construction of the silo complexes and the warehouse and its associated structures include but not limited to sands, gravel, cements, cement blocks, timber, corrugated iron sheets, glass, steel bars, Aluminium sheets; others are plumbing accessories and chemicals such as paints to mention a few. Equipment and machinery to be involved during construction phase include concrete mixer machine, bulldozers, excavators, generator, pick up, Trucks, wheel barrow, Hammers and protective gears to mention a few. Materials to be obtained locally will be transported to the site by Lorries or trucks or railway while those obtained oversea will be shipped to Dar es Salaam Port and later transported to Makambako with a trucks and Lorries or railway.

Table 3: Types, amount and sources of project requirements during the construction

Requirements	Type	Quantity	Source
Raw materials	Aggregates	>10,000m^3	Makambako
	Sand	>20,000m^3	Makambako
	Cement	>1,000,000 bags	Mbeya
	Water	100,000 Ltrs/day	Makambako (MAKUWASA)
	Reinforcement/Steel bars	1,200,000 Kg	Dar es Salaam
	Corrugated iron sheets	100 tonnes	Dar es Salaam
	Glass	>200m^3	Dar es Salaam
	Aluminium sheets	>1,000m^3	Dar es Salaam
	Timber	600m^3	Makambako
	Paints	>1,000 Litres	Dar es Salaam
Manpower	Skilled	20 People	Contractors
	Unskilled	80 People	Local people
Equipments	Tippers	3	Contractor
	Water Boozer	1	Contractor
	Excavator	1	Contractor
	Bull dozer	1	Contactor
	Motor grader	1	Contractor
	Roller compactor	1	Contractor
	Plate compactor	1	Contractor
Energy	Electricity	725 kVA	Generator at site

Source: NFRA and Beyond Nature Limited, 2017

2.5.1.1 Aggregates, Stones and Sands for construction works

Constructions materials such as gravel, stones and sand will be obtained from approved borrow pits in Makambako. The contractor may obtain crushed rock aggregates from existing quarries or may choose to develop small quarry sites especially for the project depending on the location and availability of aggregates from existing sources. These areas will have to be approved by the District Engineer of local authorities.

Safe transportation of materials to the site will be an important prerequisite. All access or private roads used for transportation of materials shall be properly maintained. The contractor shall prepare and subsequently implement rehabilitation plans for borrow pits and quarries during the decommissioning stage. Rehabilitation plans shall include demolition of temporary structure, and blending and filling of cuts to minimize risks for mosquito breeding and human or animal accidents, especially to children. This Environmental and Social Impacts Assessment study did not establish the specific borrow pits and quarries to be used as a source of materials.

2.5.1.2 Water for construction works

Water in terms of volumes will also be required for works. Water is expected to be drawn from Makambako Water Supply and Sanitation Authority (MAKUWASA) who sources water from River Fukulwa and there are all important facilities on site. This Authority was consulted during the ESIA study and they confirmed that for NFRA project, they have enough water to supply to meet their requirements since the requirement of NFRA during construction phase is 100m^3 (100,000 Litres) particularly for fire hydrants.

Table 4: Types, amount and sources of project requirements during demobilization

Requirements	Type	Quantity	Source
Manpower	Skilled	20 People	Contractor
	Unskilled	80 People	Contractor
Equipment	Tippers	3	Contractor
	Bull dozer	1	Contractor
	Motor grader	1	Contractor
	Plate compactor	1	Contractor
	Roller compactor	1	Contractor

Source: Primary data, Beyond Nature Limited 2017

2.5.2 Operation phase

During this phase, the material types, amounts and sources of the project requirements are shown in the Table 4 and Equipment and machinery to be used are shown in Table 5. A Silo with a capacity to store 20,000 Metric Tonnes (MT) of grains and a Warehouse to store 20,000 Metric Tonnes (MT) of grains will be operating.

Table 5: Types, amount and sources of project requirements during the operation phase

Requirements	Type	Quantity	Source
Raw materials	Water	100,000 Litres/day	MAKUWASA
	Energy	120kWh per day	TANESCO (National Grid)

Source: Beyond Nature Limited, 2017

Table 6: List of equipment and Machinery to be used during operation phase

S/N	Component	Equipment	Number
1	Reception	Moisture meter	3
2	Weighing zone	Weighbridge 100 T	1
		Digital scale	3
3	Cleaning	Manual Sieve	30
		Electrical Sieve	1
4	Stacking	Elevators	4
		Electrical Sewing	6
5	Machinery	Fork lift	1
		Tractor	1
		Trailer	1

Source: NFRA, 2017

2.6. Waste Generation and Environmental Impacts

In the course of development, various types of wastes will be generated. Wastes anticipated to be generated in respective phases are discussed below:-

2.6.1 Mobilization Phase

Under this phase the following activities will be accomplished;-

- Recruitment of construction workers and transportation of materials to the site mainly by road

- Materials storage and materials preparation
- The project procured construction materials from licensed suppliers

There will be no any significant generation of wastes during this phase.

2.6.2 Construction Phase

During the construction phase, various wastes are generated. Table 6 shows the types and amounts of wastes generated and their treatment during the construction phase.

Table 7: Type, amounts and treatment/disposal of wastes during construction phase

Waste	Type	Amount	Treatment/disposal
Solid waste (degradable)	Rubbles (mainly blocks)	3500m^3	Salvaged materials were sold to recyclers -other wastes were collected in the skip bucket positioned at the site
	Food remains, cardboards and papers	30kg/day (based on generation rate of 0.3kg/day/person and 100 people)	Collected in the waste bins at site ready to be disposed at the dump site to be located by Makambako Town Council (MTC)
Solid waste (non-degradable)	Demolition waste	90m^3	To be sold to recyclers
	Spoil soil	1200m^3	This soil shall be stock pilled along the foundation trenches. The soil shall be used to reinstatement site at the end of the project
	Scrap metals, drums	100kg	To be sold to recyclers
	Tins, glasses and plastics	50kg	To be sold to recyclers
Liquid waste	Sewage	3.2m^3/day (based on 100 people, water consumption rate of 40 L/capital/day and waste water discharge factor of 80%)	To be directed to the septic tanks
	Oil and greases	Few (service and maintenance of vehicles will be done at designated garages)	Sold to recyclers

Source: Beyond Nature Limited, 2017

2.6.3 Demobilization phase

Demobilization of temporary structures will be carried out for proper restoration of the site. Other activities include rehabilitation of the project area, at least to the original condition, clearance of all sorts of wastes including used oil, sewage and solid wastes (plastics, wood, metal, papers etc) and deposit all wastes to the authorized dumpsite.

2.6.4 Operation Phase

During this phase, the solid wastes such as papers, tins, glass, food wastes are expected to be produced. About 0.5 ton is expected to be produced per day. Collection within the buildings shall be the responsibility of the NFRA. A skip bucket shall be positioned at a strategic point within the premises of the site to collect all the waste originated from the buildings. The skip buckets shall be emptied by designated authority once a week. All liquid wastes from toilets, kitchen, bathrooms etc. will be collected and directed to the Septic tanks.

2.6.5 Decommissioning Phase

During the decommissioning phase, various wastes will be generated. These covers the demolition wastes and worn out equipments which have to be replaced by new ones during refurbishment phase. During decommissioning phases the demolition shall dominate. Detailed information regarding decommissioning of the proposed project is discussed in Section 11.1 and Table 20 of this report.

2.7 Safety

The site shall be installed with all safety equipment to combat fire and have an emergency preparedness plan. There shall also install control mechanism for all materials which will be utilized in the building operations. Safety gears and proper supervision in utilizing shall be of highest priority.

CHAPTER THREE

POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK

3.0 Overview

National Food Reserve Agency (NFRA) is needed to ensure that its activities are in line with relevant national policies, legislations, regulations, guidelines and standards' operating in Tanzania and those of International scale of which Tanzania is a party. This section provides a summary of the various national and sectoral legal frameworks that govern the environmental and social issues pertaining to the planning and implementation of the proposed project.

There are a number of national policies and laws that govern the proposed project. This EIA has observed all relevant policies and laws that are relevant to the project or have common interest and or affects in one way or another, the policy or law focus, strategies and objectives. This section has also considered various levels of administrative issues under which the project falls. The policies and laws that are relevant to this project are explained hereunder.

3.1 Policy Framework

3.1.1 Gender and Development Policy, 1992

The Gender and Development policy's overall objective is to promote gender equality and equal participation of men and women in economic, cultural and political matters. Also focuses on - fairer opportunities for women and men and access to education, childcare, employment and decision-making. Developer of the proposed project will consider equal opportunity between men and women and other disadvantageous groups such as disabled people during employment and other pertinent issues.

3.1.2 The National Land Policy, 1995

The National Land Policy advocates the protection of land from degradation for sustainable development. The policy addresses several environmental issues; of relevant to this project is the provision on land use. The policy states that, land use should take into consideration the land capability to ensure proper management of the land to prevent erosion, contamination and other forms of degradation. This proposed project will abide to all requirements of the land law. The project management will ensure protection of existing social services and also proper disposal of solid wastes, especially within the campsites.

3.1.3 The National Investment Promotion Policy, 1996

The Policy is promoting investment opportunities that public and private sectors 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 programme that promotes the role of the private sector in economic activities in Tanzania. The Policy encourages public and private sector investments whilst also taking into account environmental consideration so as to ensure investment yield the expected benefits. The company is a result of this policy, promoting the role of the private sector in economic development. This EIA has assessed the contribution of the agriculture sector to improvement of social welfare through employment and economic growth.

3.1.4 The National Sustainable Industrial Development Policy, 1996

The Sustainable Industrial Development Policy (1996–2020) (URT, 1996a) is a framework for Tanzania's industrialization process with short-term, medium-term, and long-term perspectives. The main objectives of the SIDP include human development and creation of employment opportunities; economic transformation for achieving sustainable economic growth; external balance of payments; environmental sustainability; and equitable development (URT, 1996a:3). The SIDP outlines several strategies for achieving its mission and objectives and a range of activities that are to be implemented within short-term, medium-term, and long-term priority activities. The focus is privatization of public industries. The proposed development may stimulate industrial growth in Dodoma by securing food availability particularly grains.

Section 3.5.3 of the policy calls for promotion of environmentally friendly and ecological sustainable industrial development; this intends to minimize further cumulative impacts that might arise due to existence of proposed project in nearby areas. Therefore this EIA among other things assessed how environmental issues have been integrated taking into account cumulative impacts arising from the operations of the propose project. This EIA is therefore in line with the SIDP.

3.1.5 Community Development Policy, 1996

The Community Development Policy (URT, 1996b) underscores the problems that communities in Tanzania are facing, including underdevelopment. The policy notes that people must be enabled to develop their capacity to identify problems and develop ways of tackling them. It calls upon donors, NGOs, and others to support community efforts to develop in accordance with the policy objectives.

Various economic development projects and activities are underway in Makambako, but they have not evolved strong linkages with local economies. The proposed development will have major implications on community development in terms of stimulating growth in various sectors of the economy and social development. However, the opportunities emerging from the proposed development may not benefit the local communities if the people are not sensitized, prepared, and enabled (empowered) to take advantage of changes that are likely to take place. NFRA will provide education to the nearby communities particularly on Environment, Health and safety.

3.1.6 National Environmental Policy, 1997

This policy provides a legal framework for making fundamental changes that are needed to bring environmental consideration into the mainstream of decision making, provide policy guidelines, plans and give guidelines to the determination of priority actions and provide for monitoring and regular review of policies, plans and programmes. The policy purpose is the prevention, reduction and control of pollution to the environment. In this case the National Environmental Policy of 1997 with respect to Industries requires that;

a) Industries should be planned in a manner that minimizes adverse effects on the environment at all stages (i.e. location, effluent discharge, waste disposal, use and disposal of products).
b) Industrial emissions shall be controlled
c) Environmental impact assessment as an essential element in industrial planning and development should be applied to determine all the potentially harmful activities on the environment.
d) Environmental Audits should be carried out for both new and existing industries for pollution control and waste minimization
e) Installation of resource-saving and waste recycling facilities, use of cleaner technologies and production of safe and less toxic products shall be promoted and supported
f) Workers health should be adequately protected from environmental health hazards.
g) Permissible noise levels in noise prone industries should be prescribed.

This EIA has assessed the requirements of this policy and the developer will comply with the national environmental policy objectives in areas such as workers health and social issues, health and safety issues, noise levels, air pollution among others.

3.1.7 The National Employment Policy, 1997

The National Employment Policy (1997) aims at promoting employment opportunities through identifying potential areas for employment and to lay down strategies of how to utilize such areas in promoting employment in the country, to identify and elaborate on the status of and roles of the Government, private sector, society in general, NGOs, local and foreign donors in promoting and sustaining employment. It is expected that the project will provide employment to a number of Tanzanians; this in turn will support their livelihood as well as the national employment policy. The policy mentions promotion strategies for some special groups such as women and youths. This project therefore will support the national employment policy.

3.1.8 The Mineral Policy of Tanzania, 1997

The Mineral Policy of Tanzania (URT, 1997b) provides policy guidance in the development of the mining sector in Tanzania by outlining main objectives and the strategies of implementing the objectives. The policy recognizes that Tanzania has a rich and diverse mineral resource base with high economic potential. However, the country has yet to realize a benefiting contribution from the vast mineral endowment (URT 1997b:1). The policy identifies the following challenges that it seeks to address:

- Raise significantly the contribution of the mineral sector in the national economy and increase Gross Domestic Product (GDP);
- Increase the country's foreign exchange earnings;
- Increase government revenues;
- Create gainful and secure employment in the mineral sector and provide alternative source of income to the rural population; and
- Ensure environmental protection and management (URT, 1997b:8).
- Several objectives, as stated in the policy.

Quarrying and mining of construction materials that is likely to occur because of increased urbanization and construction are relevant to the proposed construction development. The policy recognizes the need to ensure environmental protection and management, and the current EIA is addressing this issue.

3.1.9 National Human Settlements Development Policy, 2000

This policy aims at harnessing existing initiatives in shelter delivery and infrastructure investment by various actors in the public, private, informal and community sectors as well as guides the rapid urban growth and the transformation of the settlement pattern. The ultimate

and future vision of this policy is to have well organized, efficient, health, safe and aesthetic sustainable human settlements. In particular, the future vision of this human settlement development policy is to have human settlement where everyone has adequate and affordable shelter which is durable, health, safe and legally secure, accessible and which matches with the culture and living habits of the occupants. Such shelters or housing includes all the basic services, facilities and amenities. It should be free from all forms of discrimination. Moreover, human settlement should offer equal socio-economic opportunities to all members of the society for their material, social, spiritual and cultural advancement. Promotion of the development of equitable, safe and sustainable human settlements is a means to engender greater freedom, democracy, peace and stability in the country. The proposed project will ensure that all requirements of this policy are considered because the policy recognizes the impacts of human activities near the proposed project area. Since the project is proposed near human settlements, Project Management will be required to ensure environmental protection within human settlement.

3.1.10 The National Water Policy, 2002

The national water policy provides an overview about water resources management, rural water supply and urban water supply and sewerage. This policy recognizes that, urban areas in Tanzania are experiencing rapid expansion of (both human settlement and industrial developments) which is exerting enormous strain on the delivery of various services including water and sanitation services. The specific objectives of the policy in the context of developing and managing urban water supply and sewerage services are: (i) to guide the development and management of efficient, effective and sustainable water supply and waste water disposal systems in urban centers. (ii) To create an enabling environment and appropriate incentives for the delivery of reliable, sustainable and affordable urban water supply and sewerage services. (iii) To develop an effective institutional framework and ensuring that water supply and sewerage entities are financially autonomous, (iv) To enhance an effective system of income generation from sale of water and wastewater removal. (v) To enhance water demand management and waste water disposal. This EIA has considered the policy during the study and Developer will comply by ensuring that the water consumption is sustainable and does not cause pollution to water sources.

3.1.11 Construction Industry Policy, 2002

Among the major objectives of the policy, which supports a sustainable building development sector, include the promotion and application of cost effective and innovative technologies and

practices to support socio-economic development activities such as buildings, road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health. This project is in-line with this policy as ultra-modern technology shall be used during construction and its operation. NFRA shall give priority to local people, consultants and contractors. It will also use locally available materials and ensure delivery of good quality materials for the development of the storage infrastructure.

3.1.12 The National Health Policy, 2003

The aim of the National Health Policy is to ensure access to quality of primary health care for all; universal access to clean and safe water; gender equality and empowerment of women in all health issues. This focus is mainstreamed in policy objectives that intends to reduce the burden of diseases, maternal and infant mortality, increase of life expectancy through improvement on health services, sanitation services, nutrition and disease control; ensure availability of medical supplies and infrastructures; Ensures health services accessibility to all the people, sensitize the community on common preventable health problems and improve capacity at all levels; to take appropriate action and encourage community involvement; promote and sustain public-private partnership in the delivery of health services. NFRA will comply with the policy by providing health services to its workers by giving them Health Insurance and putting in place good sanitation services and disease control measures during all phases of the proposed development project.

3.1.13 National Policy on HIV/AIDS, 2003

The main aim of this policy is mainly on the prevention of HIV/AIDS. Key objectives of this policy are: i) to create and sustain an increased awareness on HIV/AIDS infections through targeted advocacy, education and trainings for behavior change at all levels by all sectors. This hinges on effective community involvement and empowerment to develop appropriate approaches in prevention of HIV infections, care and support to those infected and affected by the disease including widows and orphans. The policy requires the developer to work in line with these objectives to contribute in the fight against HIV through sensitization and awareness rising among staffs and workers within the company.

HIV/AIDS is a cross cutting issue that affects all sectors. It affects development issues and its control is complex, difficult and costly, and need strong determination and practical intervention. One of the principles to guide the national policy on HIV/AIDS calls for all members of the

community to have individuals and collective responsibility to actively participate in prevention and control of HIV/AIDS epidemics. Developer will comply with this policy by addressing this issue and ensure that all provisions of this policy are taken into account.

3.1.14 National Energy Policy, 2003

This policy aims at ensuring availability of reliable and affordable energy supplies and their use in a rational and sustainable manner in order to support national development goals. The national energy policy, therefore aims to establish an efficient energy production, procurement, transportation, distribution and end- use system in an environmentally sound and sustainable manner. The policy recognizes manufacturing sector as among the energy consumers, particularly electricity and petroleum. It also recognizes that in most areas energy is used inefficiently due to old equipment and outdated technologies as well as capacity under-utilization. Therefore because of massive energy losses, there is necessity to promote energy audits and encourage energy efficiency and conservation measures in order to serve resources and the environment. NFRA will use energy from National Grid and in order to ensure proper use of energy, the company will install new machines which uses modern technology thus energy efficient. Therefore, it is expected that the proposed project will ensure efficient use of energy resources and use more efficiently in an environmentally sound manner.

3.1.15 National Forestry Policy (1998)

The National Forest Policy, 1998, identifies four main policy areas (forest land management, forest-based industries and products, ecosystem conservation and management, institutions and human resources) and present policy statements and instruments/directives to be applied to each of these. In accordance with the policy, "EIA will be required for the investments which convert forest land to other land use or may cause potential damage to the forest environment." Since various types of investment project in forest areas may cause adverse environmental impacts. EIA must therefore be incorporated in the planning and decision making process in order to ensure that unnecessary damage to the environment is avoided and possible mitigation measures are identified. This proposed project is in line with this policy.

3.1.16 The National Irrigation Policy (2010)

The National Irrigation Policy provides the basis for a focused development of the irrigation sector in Tanzania. The Policy covers the activities and interventions required for the sector to effectively contribute towards enhancement of production and productivity in agricultural sector. The main objective is to ensure sustainability of water for irrigation and its efficient use for

enhanced crop productivity and profitability in order to contribute to food security and poverty reduction.

3.1.17 National Agricultural Policy (2013)

The Policy recognizes the dependence of agriculture on environmental resources such as land, water, forest, and air. Sustainable utilization of these resources is vital for the growth and sustainability of the sector. Intensification of agriculture, unsustainable farming methods and systems (including deforestation, land clearing and bush fires) exerts pressure on natural resources hence increasing contribution to climate change. Therefore, the agriculture policy objectives promotes integrated and sustainable use and management of natural resources, ensures basic food security and improves standards of nutrition as well as the standard of living in rural areas, promotes access by women and youth to land, credit, education and information. The policy also promotes agricultural practices that sustain the environment and also identifies the need for developing mechanism for linking agriculture sector with other relevant ministries and stakeholders in protection and enhancement of the environment.

3.2 Regulatory Framework

3.2.1 The Architects and Quantity Surveyors Act (1997)

Similarly require architects and quantity surveyors (QS) to be registered with the board before practicing. Foreign architects and Quantity Surveyors should abide with the law. The proponent shall engage the work to registered Architects and quantity surveyors.

3.2.2 The Land Disputes Courts Act No. 2 of 2002

Under the Land Disputes Court Act No. 2 of 2002, every dispute or complaint concerning land shall be instituted in the Court having jurisdiction to determine land dispute in the given area (Section 3). The Courts of jurisdiction include:

1. The Village Land Council
2. The Ward Tribunal
3. District Land and Housing Tribunal
4. The High Court (Land Division)
5. The Court of Appeal of Tanzania.

The act gives Village Land Councils powers to resolve land disputes involving village lands (Section 7). If the council fails to resolve the dispute, the matter can be referred to the Ward Tribunal as established by the Land Act (1999) and the Village Land Act (URT, 1999c). If any dispute arises because of this project, the provision of this act shall be observed.

3.2.3 The Land Act No. 4 of 1999

Tanzanian land falls under three categories:

- **Reserved Land** is set aside for wildlife, forests, marine parks, etc. The ways these areas are managed is explained in the laws that protect each sector (e.g., Wildlife Conservation Act, National Parks Ordinance, or Marine Parks and Reserves Act). Specific legal regimes govern these lands under the laws that established them.
- **Village Land** includes all land inside the boundaries of registered villages, which the village councils and village assemblies have the power to manage. The Village Land Act details of how this is done.
- **General Land** is neither reserved nor village land and is therefore managed by the Commissioner. The Land Act governs general land.

The Land Act of 1999 (URT, 1999b) provides basic law in relation to land other than village or reserved lands, the management of land, settlement of disputes, and related matters. Since it excludes village land and the project activities fall in the urban centre, it is not, strictly speaking, relevant to NFRA's project. However, the Act lays down key fundamental principles for occupying and using land. Among them is the principle that any land user shall ensure that land is used productively and that any such use complies with the principles of sustainable development. This principle applies to all three categories of land.

3.2.3 Surface and Marine Transport Regulation Authority (SUMATRA) Act, 2001

This is an Act to establish a regulatory authority in relation to the surface and marine transport sectors, and to provide for its operation in place of former authorities and for related matters. According to this Act, it shall be the duty of the Authority that in carrying out its functions; it shall strive to enhance the welfare of Tanzania society by:- Promoting effective competition and economic efficiency; Protecting the interests of consumers; Protecting the financial viability of efficient suppliers; Promoting the availability of regulated services to all consumers including low income, rural and disadvantaged consumers; enhancing public knowledge, awareness and understanding of the regulated sectors including as to - (i) the rights and obligations of consumers and regulated suppliers; (ii) the ways in which complaints and disputes may be initiated and resolved; (f) taking into account the need to protect and preserve the environment. Other functions of the Authority include (a) to perform, the functions conferred on the Authority by sector legislation; (b) subject to sector legislation - (i) to issue renew and cancel licenses; (ii) to establish standards for regulated goods and regulated services; (iii) to establish standards for the terms and conditions of supply of the regulated goods and sources; (iv) to regulate rates and

charges; and (v) to make rules. (c) To monitor the performance of the regulated sectors, in relation to- levels of investment; availability, quality and standards of services; the efficiency of production and distribution of services, and other matters relevant to the Authority. NFRA will comply with this Act particularly on the transportation of materials during all phase of the proposed project.

3.2.4 Workmen's Compensation Act No. 20 of 2001

The provisions of this Act stipulates on compensation issues at workplace in case of occupational injuries, accidents and occupational diseases. The provisions of the Act also describes for compensation for death at work. Furthermore, the workmen compensation Act requires the employers to purchase workmen's compensation insurance for their employees. Therefore the proposed project will take into consideration this Act in order to comply with our national laws.

3.2.5 Local Government (Urban Authorities) Cap 288 R.E 2002

This Act outlines responsibility for urban authorities on administration of day-to-day activities. Urban authorities are mandated to take measures to safeguard and promote public health and maintain clean and sanitary conditions in their areas of jurisdictions by preventing the occurrence of or for remedying or causing to be remedied any nuisance or condition likely to be harmful or dangerous to health. The site under discussion is located within Makambako Town Council; therefore, the provisions under this Act are relevant.

The project will involve construction activities and other related functions, therefore in this regards the management shall abide to the relevant provisions given in the Act. This include ensuring the provision of comprehensive, functional and sustainable public health services to the general public as specified in the Act. Developer shall also observe the following Regulations and By-laws:-

1. **Validity of building permit (CAP 288(137)**: erection of the approved building shall commence within six calendar months on the date of the Building Permit failing to do so, the permit shall be deemed to have lapsed.
2. **Commencement notice (CAP 288(130):** Before you begin to erect the approved building, you must deliver or send to the authority upon the form to be obtained from the authority seven days previous notice in writing of the date on which such erection shall commence.

- Notify the TANESCO and the Telecommunication Company should the Electric wires or Telephone Cables in the street be accessible from any portion of such building when erected (Cap. 131)
- You must provide sufficient and convenient latrine accommodation for workmen to the satisfaction of the authority
- You must erect sign in accordance with the contractors Registration Board's directives.

3. **Approved plan (CAP 288(126) (135):** the erection of the building is required to be done in accordance with the approved plans. No subsequent modification or alteration shall be made until the authority has approved it.
4. **Regular inspection (CAP 288(131) (133) (138):** the covering of sewer, drain, foundation, column, beam floor, roof for the purpose of this part there shall be inspected by the Architects.
5. **Supervision of construction:** Act No. 14 & 16 of 1997 (ERB) Amendment 2010 – GN 25) & Act No. 4 of 2010 (AQRB): A qualified Architect and Structural Engineer, whose qualifications are recognized by their respective boards, must be involved in the supervision.
6. **Certification of occupation:** CAP 288 (134)(140)(141): No person shall occupy new building until such building has been certified by the authority to be in their opinion in every respect fit for occupation or in the case of a domestic building for human habitation.

3.2.6 Fire and Rescue Services Act, R: E 2002

This Act provides for the better organization, administration, discipline and operation of fire and rescue brigade services. The Act established national fire brigades for the United Republic of Tanzania which shall be known as the Fire and Rescue Services to provide fire brigade services for the public. The developer is advised to install fire prevention systems such as fire hydrant system, fire alarms, fire water tank, etc in order to ensure prompt management of fire incidences. On the other hand the Developer is required to support this Act by taking actions to minimize risks of fire and their preparedness to such events. This EIA has taken into account the provisions of this Act related to proposed project.

3.2.7 The Tanzania Bureau of Standards Act, R: E 2002

This Act provides requirements for product specifications, codes of practice, sampling methods, product standards, and recommends various test methods. It provides testing methods for

commodity produced raw materials, machinery, and instruments used directly or indirectly in the provision of the services. Therefore the implementation of this proposed project will abide to all relevant Tanzania Standards.

3.2.8 The Occupation Health and Safety Act, 2003

The Occupational Health and Safety Act, makes provision for safety; health and welfare of persons at workplaces. Also, it provides for the protection of persons other than at work against hazards to health and safety arising out of or in connection with activities of persons at work. Relevant sections of the ordinance to this project include part IV section 43 (1) - Safe means of access and safe working place; part IV 44 (1) - precaution where dangerous fumes are liable to be present (especially from the energy generators); and part 50 (1) – prevention of fire. Other relevant sections of the ordinance include part V on health and welfare provision. This EIA requires the investor to comply with the provisions of this Act in all phases of the project. The Act also needs contractors to register the construction site to OSHA during construction phase as stated in section 16; as well as to prepare written construction occupational health and safety policy for the proposed workplace as stipulated in section 96 of the Act and section 24 requires a thorough medical examination for the fitness of employees. The pre-replacement and periodic medical examination will help in monitoring the health of the employees. This EIA has assessed the provisions of this Act and advice the developer to take into account all the provisions to comply with the national laws.

3.2.9 Employment and Labour Relations Act, 2004

The employment and Labour Relations Act, describes for the fundamental labour rights at workplace. It further emphasizes 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. However, Part II the Act provides for fundamental rights and protections for child labour, forced labour, discriminations and freedom of associations. Part III provides for employment standards, which include issues like Hours of Work, Remuneration, Leave, Unfair Termination of Employment and Other Incidents of termination. The proposed project will abide to the provisions of this Act in order to comply with our national laws. The EIA has assessed workers welfare issues and their rights to verify the support it provides in accordance to this Act.

3.2.10 The Environmental Management Act Cap 191, 2004

The Environmental Management Act[1] provides comprehensive environmental framework for management of the environment in Tanzania. The EMA makes EIA mandatory and outlines projects that are subject to EIA prior to commencement. The Act also gives the National Environment Management Council more powers to ensure compliance of the EMA of 2004 in collaboration with various stakeholders. According to the EMA section 9 and the First Schedule of the Regulations for EIA and Audit 2005 the proposed projects falls under type 'A' projects that requires EIA (mandatory EIA list).

This EIA is therefore responding to the requirement of this Act, and it addresses the environmental implications of the proposed development in Makambako Town Council.

EMA Cap 191 imposes obligation to the project developer;

- As land user and occupier to protect, improve and nourish the land and using it in an environmentally sustainable manner (s.72)
- To abstain from discharging any hazardous substances, chemicals, oils or their mixture into waters or into any segment of the environment (s.110)
- To comply with environmental quality standards (s.141)
- As a corporate body to comply with license conditions including the EIA certificate (s.201)
- To control manage and dispose in a sound manner waste including litter, liquid, gaseous and hazardous wastes (Part IX)

Project proponent is complying with all the provisions of this Act and has complied to conduct this EIA study before the commencement of the proposed project.

3.2.11 The Land Use Planning Act, 2007

The Land Use Planning Act provides procedures for the preparation, administration and enforcement of land use plans; The Act repeal the National Land Use Planning Commission Act. Section 3 gives effect to fundamental principles of National Land Policy and the Human Settlements Development Policy which all persons and authorities exercising powers under, applying or interpreting this Act through land use planning among other things to:–

[1] URT, 2004

- Improve the level of the provision of infrastructure and social services for sustainable human settlements development;
- Facilitate the creation of employment opportunities and eradication of poverty;
- Promote and include the participation of the private and popular sectors, Community Based Organizations, Non-Governmental Organizations, cooperatives and communities in land use planning;
- Protect the environment of human settlements and of ecosystems from pollution, degradation and destruction in order to attain sustainable development; Fundamental principles of land use

The objectives of land use planning which is stipulated in section 4 includes

- Facilitate efficient and orderly management of land use;
- Empower landholders and users to make better and more productive use of their land;
- Promote sustainable land use practices;

Section 22 of the Act gives power to the village council to secure orderly and environmental sustainable development in the village and to preserve village land resources including forest and wildlife. The proposed infrastructure development is supporting the Land Use Plan Act.

3.2.12 Urban Planning Act (2007)

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters. Expropriation of land for water infrastructure development and associated activities in urban areas shall comply with the provisions of this law. Under Section 3, among others the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development. Provision of water to urban residents to be achieved by this project is thus in compliance with the Urban Planning Act.

3.2.13 Contractors Registration Act of 2007

This is an Act to amend the Contractors Registration Act, with a view to provide provisions for effective regulation of activities and maintenance of professional conduct and integrity of contractors and for related matters. Section 3 of this Act defines a contractor as any person who for himself as a developer or investor, undertakes to carry and complete construction works of

any structure for public or private use or other works connected there with, where such person undertakes to do any such works- (i) himself supplies the labour necessary for the works or is authorized to exercise control over the type, quality or the use of material supplied by any other person; or (ii) himself authorized on behalf of the person for whom the work is undertaken or any other person, to employ or select for employment workmen to assist him in the execution of the work. This EIA has taken into account the provisions of this Act simply because the undertakings of this proposed project shall involve various construction works and services and therefore the proponent shall assign all the works and services to a registered contractor.

3.2.14 Engineers Registration Act of 2007 amended in 2010

This an Act to repeal and re-enact with modifications the Engineers (Registration) Act, 1968, to establish a Board to regulate the conduct of engineers, to provide for their registration and for related matters. In this Act, the functions of the Board include but not limited to the following; (i) to maintain and keep a register of engineers, including consulting engineers or firms providing engineering services; (ii) to promote and maintain professional conduct and integrity of the engineering profession; (iii) to monitor the conduct and activities of engineers, including consulting engineers or firms, and (iv) to carry out such other functions as the Minister may, from time to time direct after consultation with the Board.

In section 13 of this Act, the laws states that (1) No person other than a registered engineer shall engage in professional engineering work or services; and (2) For the purposes of this section and section 13 of this Act, "professional engineering work" includes professional service consultation, investigation, evaluation, planning, designing or responsible supervision of construction or operation in connection with any public or privately owned public utilities, buildings, machines, equipment, processes works or projects where public interest and welfare, or the safeguarding of life, public health or property is concerned or involved, and that requires application of engineering principles and data; "professional engineering services" means consultancy or advisory services relating to any professional engineering work and includes selling or supplying for- gain or reward any plan sketch, drawing, design, specification or other document relating to any professional engineering work. And section 14 of this Act states subsection (1) No person shall employ or continue to employ professional engineer, any person who is not a registered engineer. Therefore, the proponent shall commission all engineering works to registered Engineers so as to comply with the requirements of this Act.

3.2.15 The Roads Act, 2007

This is an Act to make provisions for road financing, development, maintenance, management and other related matters. This Act mentions various issues such as use of road reserve, protection of environment, road furniture, speed limit and safety of road users. Section 29 (1) states that the road reserve is exclusively for the use of road development and expansion of any other road related activities. However in sub-section (2) road authority may, in writing, permit any person or authority to use the road reserve temporarily under its jurisdiction for utilities such as placing of public lighting, telegraph, adverts, telephone, electric supplies and posts, drains, sewers and mains, only in cases where such use or uses do not hinder any future use of the road reserve by the roads authority. (3) The authorized user of the road reserve shall be allowed to use the road reserve, upon such terms and conditions as the road authority may impose and shall be bound to remove such utilities and their related developments and make good the area at his own cost without any compensation in case the said road reserve is required for road expansion, development or maintenance or any other road related activities by the road authority.

Furthermore, this Act stipulates that any authorized user of the road reserve which involves or is likely to cause damage to the road, road furniture, road asset or the surrounding environment shall restore the damaged road, road asset or road asset to its original state ad condition in accordance with the road technical specifications and standards; in case the damage is done to the surrounding environment of the road reserve, restore it to its previous state and condition in accordance with the environmental engineering practice authorized by the Ministry responsible for environment.

3.2.16 Public Health Act, 2009

Public Health Act provides for the promotion, preservation and maintenance of public health with a view of ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for the other related matters. This act also provides powers to the authority (a Medical Officer of Health, District Medical Officer, Environmental Health Practitioner or any appointed Public Medical Officer) to perform and undertake services such as keeping and maintenance of dumping sites, management of solid and liquid waste as well as to undertake studies e.g. Part IV, Section 76 (3), the act stipulates that, The Authority shall ensure that industries provide adequate space and facilities for managing all solid waste generated from the industry and in the premises prior to its collection for disposal; and waste bays or areas designated by the industries for the collection of solid

waste are clean at all times and protected from vectors, animals and scavengers. This EIA has taken into account the provisions of this Act.

3.2.17 The Water Resources Management Act 2009

Developer shall observe and abide to the provisions of this Act when discharging effluent water to ensure that they do not damage underground and surface water. The Act is the main legislation overriding the utilization and pollution control of the water resources. The provisions of this Act requires the water user to prevent accumulation in any river, stream or watercourse of silt, sand gravel, stokes, sawdust, refuse, sewerage, or any other substance likely to affect injuriously the use of such water by other users. Compliance with the effluent standards provided in the Tanzania Standards is crucial and must be adhered. Therefore, this proposed project will adhere to the provisions of this Act.

3.2.18 Water Supply and Sanitation Act No.12 Of 2009

This is also a new legislation that 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 services providers. The main aim of this law is to ensure the right for every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking in to account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interests 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. The proposed building shall use water supplied by Makambako Urban Water Supply and Sanitation Authority (MAKUWASA), which was established by this law.

3.2.19 Mining Act No. 14 of 2010

The Mining Act is the principle Legislation for conducting mining activities in Tanzania. The Act has a number of sections that are meant to protect the environment in the different phases of mining project from prospecting to decommissioning. This an Act to regulate the law relating to prospecting for minerals, mining, processing and dealing in minerals, to granting, renewal and termination of mineral rights, payment of royalties, fees and other charges and any other relevant matters. Some of the construction materials will come from mines or quarrying sites, thus the provisions of this Act has been assessed and this project is in line with this Act.

3.2.20 Plant Protection Act (Cap. 133) R. E 2002

The Plant Protection Act was enacted to prevent the introduction and spread of harmful organisms to ensure sustainable plant and environmental protection, to control the importation and use of plant protection substances, to regulate import and export of plants and plants products and ensure fulfillment of international commitments, to entrust all plant protection regulatory functions to the Government and for matters incidental thereto or connected therewith. It provides for safeguards against pollution of groundwater and the natural environment by plant protection substances. This proposed project has assessed all the provision of the Act and shall adhere to.

3.2.21 Seed Act (Cap. 308) of 2003

This Act provides for the control and regulation of standards of agricultural seeds and for matters incidental thereto. The Act regulates importation, exportation, manufacturing, processing and sale of agricultural seeds. Where seeds production is under extensive farming it is a condition requirement that the owner or developer of such project to ensure compliance with the other environmental related legislation. For instance, under the provisions of the Seeds Regulations, 2007, every person dealing with seed processing project, depending on the nature of the undertaking, may be required to conduct Environmental Impact Assessment before starting such project. This proposed project has assessed all the provision of the Act and shall adhere to.

3.2.22 Fertilizers Act (Cap. 378) of 2009

This Act makes provision for regulation of manufacturing, importation, exportation, sale and utilization of agricultural fertilizers and to repeal the Fertilizers and Animal Food Stuffs Act, Cap.378. It prohibits the use, storage, discharge, release, placing or cause to be placed any fertilizer or fertilizer supplement in a manner likely to have adverse effect on human health or environment. This proposed project has assessed all the provision of the Act and shall adhere to.

3.3 Regulations

3.3.1 Environmental Impact Assessment and Audit Regulations of 2005

Alongside the Environmental Management Act Cap 191 of 2004, the Government has also prepared Regulations for Environmental Impact Assessment and Environmental Audit (URT, 2005). These regulations list potential projects that shall require mandatory EIA that includes decommissioning and defines projects that require Environmental Audit. The Regulations further

outlines how EIA can be done. This EIA has been conducted according to the requirements of these Regulations.

3.3.2 The Environmental (Registration of Environmental Experts) Regulations of 2005

Section 83 of the EMA (2004) stipulates that EIA shall be conducted by experts or firms of experts whose names and qualifications are registered as such by NEMC. The NEMC maintain a registry of EIA experts. These regulations also set code of practice of the experts for which the EIA experts for this project subscribe. This EIA has been conducted by certified and Registered Environmental Experts from a registered firm of Environmental experts as per EMA 2004.

3.3.3 The Environmental Management (Air Quality Standards) Regulations, 2007

The Environmental Management (Air Quality Standards) Regulations aims at setting baseline parameters on air quality and emissions based on a number of practical considerations and acceptable limits as well as enforcing minimum air quality standards as prescribed by the National Environmental Standards Committee. The regulations guide the developers to keep abreast with environmentally friendly technologies and ensure protection of human health and the environment from various sources of pollution. Part II section 4 (1) describes various responsibilities that should be performed by the National Environmental Standards Committee in setting the minimum standards of air quality which includes (a) setting criteria and procedure for measurement for air Quality (b) setting up ambient air quality standards (c) ascertain occupational air quality standards (d) establish emission standard for various sources of air pollution (e) prescribe stack heights of chimneys for purposes of these. Regulations (f) prescribe criteria and guidelines for air pollution control for both mobile and stationary sources (g) prescribe any matter touching or affecting air emission quality standards. Section 8 of this act oblige no body to emit or release any hazardous substance, chemical, gas or mixture containing gaseous and hazardous substances into the environment unless such emission or release is permitted under these Regulations or any other written law. This EIA has taken into consideration the Environmental Management (Air Quality Standards) Regulations during the assessment.

3.3.4 The Environmental Management (Water Quality Standards) Regulations, 2007

This Regulation aims at protecting human health and conservation of the environment; enforcing minimum water quality standards prescribed by the National Environmental Standards Committee, and to enable the National Environmental Standards Committee to determine water usages for purpose of establishing environmental quality standards and values for each usage

and ensuring all discharges of pollutants take account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned. This EIA has assessed the provisions of this Regulation.

3.3.5 The Environmental Management (Soil Quality Standards) Regulations, 2007

The objectives of this Regulation is to set to but not limited to limits for soil contaminants in agriculture and habitat, enforce minimum soil quality standards prescribed by the National Environmental Standards Committee, prescribe measures designed to maintain, restore and enhance the sustainable productivity of the soil; prescribe minimum soil quality standards to maintain restore and enhance the inherent productivity of the soil in the long term, prescribe measures and guidelines for soil management and ensure compliance with any such measures and guidelines for soil management that may be prescribed by the Minister. This EIA has assessed this Regulation and the Developer carried out Geotechnical study to establish the soil bearing capacity of the soil before construction so as to ensure soil management.

3.3.6 Environmental Management (Fees and Charges Regulations), 2016

Environmental Management (Fees and Charges Regulations) of 2016 stipulates that; “annual charges for environmental compliance monitoring and audit”, are payable to the Council by all proponents whose projects have been issued with environmental certificates. Failure to comply with this regulation is an offence according to the Environmental Management Act, Cap 191 of 2004, the EIA and Audit Regulations, 2005 and the Environmental Management (Fees and Charges) Regulations, 2016. This EIA therefore advises NFRA to enforce the requirement of this regulation by paying annual charges for environmental compliance monitoring and audit after the issuance of EIA Certificate by the Council.

3.3.7 National Strategy for Economic Growth and Reduction of Poverty 2010

The National Strategy for Economic Growth and Reduction of Poverty II (NSEGRP II) emphasizes on accelerating economic growth and fighting poverty of the people of Tanzania. The NSEGRP II is expected to last for five years from 2010/11 to 2014/15 and focus on the Tanzania’s Development Vision 2025 (TDV 2025) and Millennium Development Goals (MDGs) by transforming Tanzania to be characterized by high quality livelihood, peace, stability and unity, good governance, a well-educated and learning society, and a strong and competitive economy.

Therefore, the strategy has three main objectives that are its main focus. These are (i) Accelerating economic growth and Reduction of income Poverty (ii) Improvement of Quality of Life and Social well-being and (iii) Good governance and accountability. Among the various growth factors emphasized in NSEGRP II is scaling up the role and participation of the active private sector in priority areas of growth and poverty reduction through employment generation and creation, strengthening business climate for efficient use of factors of production, investing in people and infrastructure development and sustaining the already achieved socio-economic progress (NSEGRP II, 2011). Also, the NSEGRP II calls for consideration of environmental insinuation of the development processes while recognizing the connection between poverty and environmental degradation. NFRA is responding to this national strategy by investing in agricultural Sector that is potentially driving development and contributing to economic growth.

3.3.8 Tanzania Development Vision 2025

The National Vision 2025 foresees the alleviation of widespread 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 the increasing involvement of the people in working for their own development. The thrust of these objectives is to attain sustainable development of the people.

The vision articulates the desirable condition or situation that is envisaged by the government and people of Tanzania. The vision 2025 seeks to mobilize the people and resources of the nation towards achievement of shared goals and achieving a sustainable semi-industrialized middle market economy by 2025. NFRA will implement this national vision by contributing to alleviation of poverty and involving people in working for their own development.

3.4 International Conventions

3.4.1 International Conventions Relevant to Environment and Agriculture

Integrating environmental concerns into the agricultural policies, strategies and programmes is very important as it aims to head off the risks of environmental degradation and enhancing the sustainability of agro-ecosystems. Since the Earth Summit of 1992 which gave rise to the Rio Declaration on Environment and Development, both at the international and national level, the dominant theme of the environmental protection movement are achievement of sustainable development.

According to the National Environmental Action Plan (NEAP), the key policy instruments and strategies for achieving sustainable development are environmental impact assessment, environmental legislation, economic instruments, environmental indicators and standards, and public participation. It is a moral and ethical obligation to make sure that business and economic activities do not destroy the human and natural environment for both present and future generations of Tanzanians.

Tanzania has signed different International Instruments in order to take onboard environmental concerns in agricultural activities, strategies, programmes and plans for sustainable development. These are as explained below;

3.4.1.1 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Chemicals in International Trade

The Rotterdam Convention, 1998 is an international treaty in the field of chemicals management as entered into force on February 24th, 2004. The objectives of the Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemical, in order to protect human health and environment from potential harm and contribute to their environmentally sound use, by facilitating information exchange about the characteristics of such chemicals, by providing for a national decision- making process on their import, export and by disseminating these decisions to Parties. Tanzania is among the first few countries that signed the convention in 1998 and ratified in 2002. After being signatory to the convention activities were initiated leading to fulfillment to the national obligations.

3.4.1.2 FAO Code of Conduct on the Distribution and Use of Pesticides

The FAO Code of Conduct on the Distribution and Use of Pesticides as adopted in 1985 and revised in 2002 serves as a guiding normative framework on the subject of the pesticides. The Code established voluntary standards of conduct for all public and private entities engaged in, or associated with, the distribution and use of pesticides, including governments, the pesticides industry and international organizations. The Code serves as predecessor of the Rotterdam Convention and its key feature is that it provides specific guidelines on the development of national laws to address pesticides.

3.4.1.3 Stockholm Convention on Persistent Organic Pollutants

Stockholm Convention on Persistent Organic Pollutants, 2000 is also an international treaty designed to address international efforts on preventing harms and risks of chemicals and

pesticides, it sets forth obligations to reduce and/or eliminate the production and use of certain listed pesticides and industrial chemicals that are persistent organic pollutants (POPs). It specifies specific procedures relating to import, export and use of those substances.

3.4.2 Conventions Dealing with Protection of Biodiversity

3.4.2.1 Convention on Biological Diversity 1992

The Convention on Biological Diversity (CBD) is one of the international legal instruments that have effect on innovation in agriculture. The Convention aims at the conservation of biological diversity, the sustainable use of its components, and fair and equitable distribution of benefits accruing from such utilization. Among others, CBD provides a framework for biosafety regulation. For instance, Article 8 (g) of CBD requires each Contracting Party as far as possible and as appropriate to establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health. CBD has been domesticated to the Tanzanian legislation through EMA, 2004.

3.4.2.2 Cartagena Protocol on Biosafety

The Cartagena Protocol on Biosafety often referred to as the Biosafety Protocol is the first international agreement regulating trans-boundary trade of genetically engineered organisms. The main objective of the Cartagena is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on trans-boundary. Cartagena Protocol is one of the environmental related instruments which provide guidance on the management of Living Modified Organisms and Genetic Modified technology in all sectors including agriculture.

3.4.2.3 Ramsar Convention

The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands i.e. to stem the progressive encroachment on and loss of wetlands, now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

3.4.3 Convention Dealing with Waste Management

3.4.3.1 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The Basel Convention is an environmental set up obligations for State Parties with a view to: (a) reducing trans-boundary movements of wastes subject to the Basel Convention to a minimum consistent with the environmentally sound and efficient management of such wastes,(b) minimizing the amount and toxicity of hazardous wastes generated and ensuring their environmentally sound management (including disposal and recovery operations) as close as possible to the source of generation; (c) assisting developing countries in environmentally sound management of the hazardous and other wastes they generate.

3.4.3.2 Bamako Convention

The Bamako Convention (Bamako Convention on the ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa) is a treaty of African nations prohibiting the import of any hazardous (including radioactive) waste.

Impetus for the Bamako Convention arose from the failure of the Basel Convention to prohibit trade of hazardous waste to Less Developed Countries (LDCs), and from the realization that many developed nations were exporting toxic wastes to Africa. The Bamako Convention uses a format and language similar to that of the Basel Convention, but is much stronger in prohibiting all imports of hazardous waste. Additionally, it does not make exceptions on certain hazardous wastes (like those for radioactive materials) made by the Basel Convention. This convention is most relevant on the environmental protection as far as agricultural activities are concerned.

3.4.4 Regional Instrument

3.4.4.1 East African Community Treaty (1999)

The promotion of sustainable utilization of the natural resources of the Partner States and the taking of measures that would effectively protect the natural environment of the Partner States is part of commitments of the EAC as stated under Article 5(3) (e) read together with Chapter 19 of the Treaty. The Treaty states categorically that the Partner States recognize that development activities may have negative impacts on the environment leading to the degradation of the environment and depletion of natural resources and that a clean and healthy environment is a prerequisite for sustainable development.

As far as agricultural and food security are concerned, the EAC Treaty elaborates under its Article 109 (d) that Partner States shall adopt and promote the use of environmentally safe methods of land use. Furthermore through Article 112(1) (e) the Partner States undertake to co-operate in the management of the environment and agree to integrate environmental management and conservation measures in all developmental activities such as trade, transport, agriculture, industrial development, mining and tourism in the Community.

3.5 Institutional Framework for Management Of environment

The Tanzania EIA practice gives different functions and responsibilities to all parties involved in the EIA process of any proposed development undertaking to which EIA is obligatory. Table 7 provides key institutions to the proposed project.

The Environmental Management Act Cap 191 of 2004 gives mandate to NEMC to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision-making, exercise general supervision and coordinating over all matters relating to the environment. The Act empowers NEMC to determine whether a proposed project should be subjected to an EIA, approves consultants to undertake the EIA study, invites public comments and also has the statutory authority to issue the certificates of approval via the Minister responsible for the Environment. NEMC is currently the designated authority to carry out the review of EIA including site visit and handling TAC meeting, monitoring and auditing of environmental performance of the project (periodic and independent re-assessment of the undertaking).

Table 8: Key Institutions to the EIA Process

Level	Institution	Role and Responsibility
National level	Vice President's Office (NEMC, Division of Environment,)	• 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 Agriculture, Livestock Development and Fisheries	• Issuing policy guidance • Providing legal frameworks • Issuing licenses, provisions of certificates of compliances • Enforcement of laws and regulations • Setting operation standards for mines and quarries • Project monitoring.

Level	Institution	Role and Responsibility
	OSHA	• Safe working permit, • Provisions of certificates of compliances on Occupational safety and health in the plant • Enforcement of laws and regulations • Project monitoring on water issues.
	NFRA	• EIA study • Resettlement /Compensation (if any) • Project implementation • Project monitoring and internal auditing
Regional level	Njombe Regional Commissioner' 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 level	District Commissioner' 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
	Makambako Town Council	• Enforcement of Laws and Regulations on water and Sewage system and solid waste management in the proposed project site • Enforcement of Laws and Regulations on Urban Planning and land use
	Land and Environment Department	• Provides guidelines for management of land within project area and area of influence, • Land use planning • Environment management • Land valuation and compensation procedures
Ward Level	Ward Development Committees – (Ward Councilor, Ward Executive Officer, Ward Development Committee	• Oversee general development plans for the Ward. • Provide information on local situation and Extension services • Technical support & advice • Project Monitoring
Community level	Village Councils (Chairman Environment Committee): and Other leaders (Religious, Education, Elders etc.)	• Information on local social, economic, environmental situation • View on socio-economic and cultural value of the sites and plant operations. • Rendering assistance and advice on the implementation of the project • Project Monitoring (watchdog for the environment, ensure wellbeing of residents and participate in project activities
Nearby Institutions and residents		• Information on local socio-economic, environmental situation • View on socio-economic and cultural value of the sites and on proposed bus depot operations.

Source: Primary data – Beyond Nature Limited2017

CHAPTER FOUR
BASELINE CONDITIONS

4.1 Introduction

This chapter provides the baseline environmental condition of the project that will make a reference frame to mark out the potential environmental impacts that might arise after implementing the proposed project. The affected environment includes the social, economic and biophysical environment that could be affected by, or could affect the development.

Locating the storage and logistics is extremely important to minimize cost, causing minimum environmental disturbance, and losses, to reach target beneficiaries and to ensure effective and timely distribution. Use of food stocks in the case of emergencies and disasters would require that distribution can be done promptly, leaving more time available for transporting or for restocking. In order to locate the public silos at the best location considering, logistics, availability of grains, distribution and constructability, etc. The methods used in obtaining baseline information include literature review, surveys, interviews and focus groups discussion. Others were observation, measurements of environmental parameters such as noise levels and water quality and capture of photographs using a Digital Camera.

4.2 Environmental Aspect of the Site

4.2.1 Site Description

The proposed project site belongs to the National Food reserve Agency Office of Makambako. The location of the Makambako site is about 400 metres from Makambako to Tunduma road, about 600 metres of Tanzania Zambia Railway Authority. The area is planned for the development of industries; however, the area is very potential for residential, commercial and/ or social activities especially for medium income earners.

4.2.2 Geographical Location, Administration and Demography of the project area

The proposed site for the construction of Silos and Warehouse is located at Latitudes S08.84500 and Longitude E034.81395 with an elevation of 166 metres above the mean Sea level at Majengo Street in Majengo Ward, Makambako Town Council – Njombe region. The land size to be covered by the proposed project is 0.5 hectare (5,000m^2).

The proposed project area falls within Majengo Street in Majengo Ward, Makambako Town Council – Njombe region. The total population of the Majengo Street is 1,980 of which 930 are males and 1,050 are females. The overall population of the Ward which comprises of

Kilimahewa and Majengo streets is 3,528 of which 1,678 are males and 1,850 are females. The total workforce of the Ward is 880 of which 395 are males and 485 are females (Ward Office, 2017).

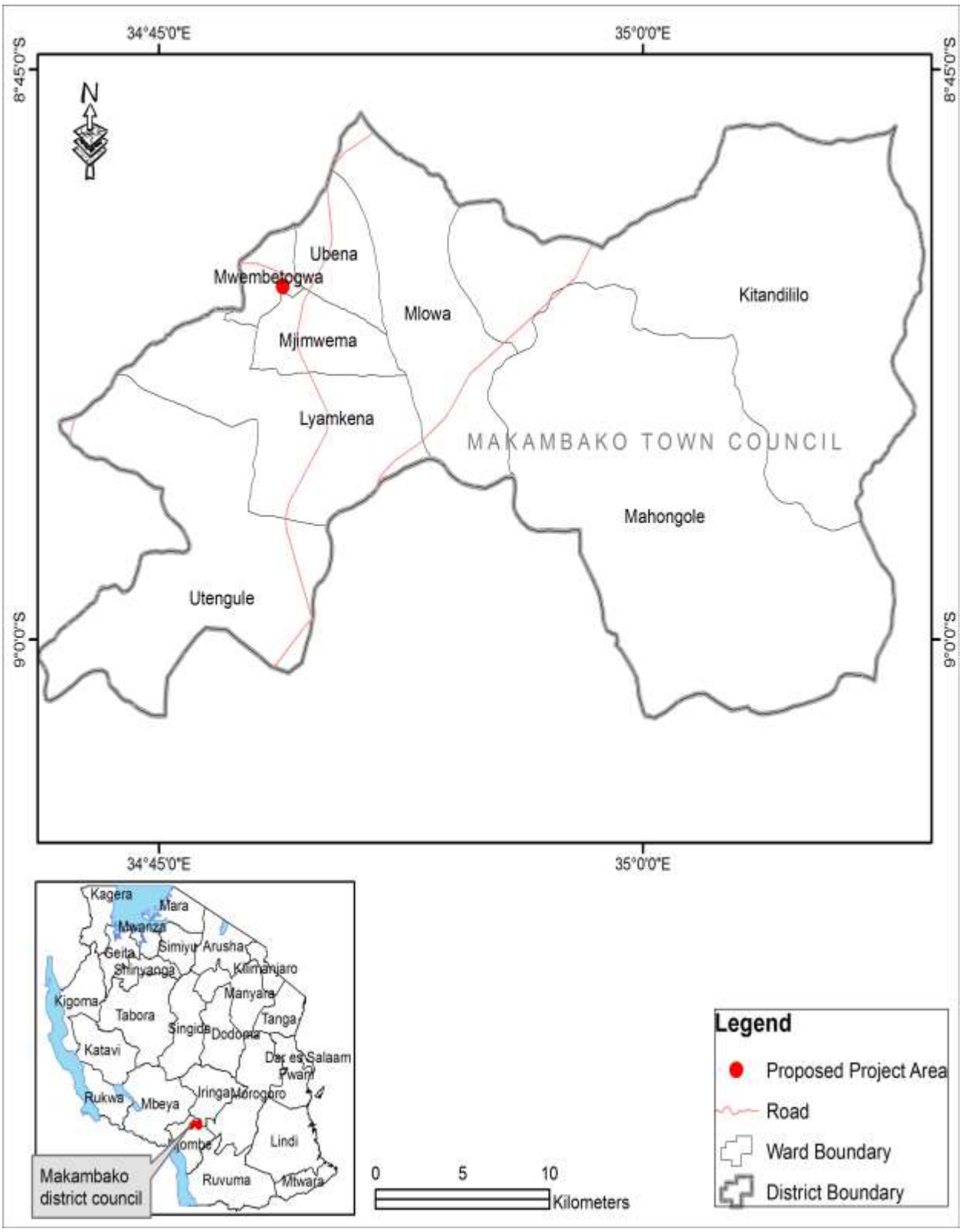

Figure 2: Map showing the location of the proposed project area

Source: Beyond Nature Limited, 2017

4.3.2 Project boundaries and adjacent land uses and economic activities

The proposed project area is surrounded by various facilities. To the east there is a railway line at about 600 metres, to the west there is an access road and a Rice Milling Factory and Storage warehouse; to the north the site is bordering the current NRFA Offices which comprise of one storage facilities, Administration block, Weigh Bridge and a parking yard and to the South there are various trees and ongoing construction of storage warehouse. The proposed project area is a bare land and there is no development done so far. Previously land was used for farming and storage of Wood timber for the purpose of drying them. Currently, the planned land use of the proposed project area is industrial. Major economic activities of the proposed project area are farming, livestock rearing, business and transportation.

4.3.3 Physiography, Geology & Topography of the site

The project area falls within warm and temperate area of the Southern highland part of Tanzania. Makambako site is having a total area of 2.9965 hectares and it was acquired by the Government of Tanzania for use by the National Food Reserve Agency (NFRA). The soils of proposed site are well drained, moderately deep or deep, reddish and yellowish sandy clay loams and sandy clays with lighter textured topsoil and a low natural fertility. They are complex of Ferralsols, Acrisols, Cambisols and Luvisols[2].

4.3.4 Existing Structure

The existing Makambako site has one go-down for food grain storage. This godown is in a good condition. Beside this, the campus has an office building/Aadministration Block, sanitary facilities, Weigh Bridge and parking yard.

4.3.5 Transportation link

There are interior roads and also a link road (6m width) from the Makambako – Mbeya Highway up to the entry of the surrounded campus. The lane width (one way-two lanes) of the road outside of the site that connects the highway is about 200 metres. The vehicles that ply over this road are trucks, human hauler, Buses, motorbike and bicycle. An initial traffic survey was carried out at this road in the daytime of the weekday. The identified peak rate of traffic flow was 136 vehicles per hour.

[2] National Soil Service. Taro – Agricultural Research Institute, Mlingano Tanga – Tanzania. 1987

4.3.6 Utility (Power, Water & Gas) Supply at the Site

The source of power supply is National Grid from Tanzania Electric Supply Company Limited (TANESCO). An 11KV transformer was seen at about 400 metres away from the proposed project site. Frequent power cuts have been a continuous problem for the proposed project site. Water supply is available for the existing facility and it is supplied by Makambako Urban Water Supply and Sanitation Authority (MAKUWASA). There is no gas supply at Makambako site, in future the project proponent might opt to use gas.

4.3.7 Hydrology and drainage

Water usually accumulates up to 7m (average) in the low land area/ditch during rainy season. Existing Makambako food grain storage facilities have one (1) go down which is well protected from flood and constructed on high land (sand fill). The new proposed silo construction site is mainly on the same land but not connected with natural drainage system by central drainage/sewerage system. The groundwater depth is over 20m below the existing ground. There is no sewerage and drainage system. Natural drainage system was found.

4.3.8 Air quality

There is no official record of secondary air quality data due to non-availability of a regular air quality monitoring program for ambient conditions or emissions. The main sources of air pollutant emissions are the dust from food grains while handling, limited number of heavy trucks that carry food grains in the area. Air quality was measured under this project. The samples were collected at the boundary of the north and south side of the site. The present condition of the air quality is presented in Table 8. From the test results, it is found that SPM, CO, SOx and NOx of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial area.

Table 9: Air Quality Monitoring Data

Date Dd/mm/yy	Sampling point	Duration	SPM µg/m^3	CO µg/m^3	SOx µg/m^3	NOx µg/m^3
30.01.2017	South end	8 hours	266	602	21	32
30.01.2017	North end	8 hours	248	621	32	37
Tanzania Standards for Industrial area (TBS)			**500**	**5000**	**125**	**150**

Source: Beyond Nature Limited, 2017

4.3.9 Water quality of the proposed project site

Water samples were collected from one sampling point in the area at about 100 metres from the project site located at Latitudes S08.4382 and Longitude E034.81192. This is a community Borehole and during consultation, people were concerned about the proposed project that it may cause water pollution thus the Team of consultant collected sample of water for measurements. The present situation of the water quality is presented in Appendix 8. The sample was collected on 31st January, 2017.

4.3.10 Noise quality

Noise pollution in the subproject area occurs mainly from the movement of heavy trucks/vehicles that carry food grains to and from the CSD. It is found from the initial screening that the place is very calm. The construction work may create noise pollution. For the baseline environmental data, noise levels were measured at the center of the sub project area which is presented at the following Table 9.

Table 10: Noise Quality Monitoring Data

Date Dd/mm/yy	Location	Time	dBA	
			Highest	lowest
31.01.2017	Makambako site	0830	66.3	62.4
		0900	72.2	68.2
		0930	68.4	68.2
		1000	64.1	62.8
		1030	67.2	66.4
		1100	66.1	65.9
		1130	65.7	66.2
		1200	66.1	66.1
		1230	68.1	67.8
		1300	68.7	68.7
		1330	67.4	67.1
		1400	66.4	66.2
		1430	66.6	66.2
		1500	71.6	69.7
Tanzania Standards as per Tanzania Bureau of Standards (TBS) 85dBA				

Source: Beyond Nature Limited, 2017

4.3.11 Terrestrial ecology

The terrestrial floral habitats in the project area include various types of exotic trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, and within premise and in open spaces. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

4.3 Location of Makambako, area and Population

Makambako is a medium-sized town and ward in the Njombe Region of the Tanzanian Southern Highlands, located roughly 40 miles north of Njombe city by road. It is located at junction of the A104 and B4 roads between Njombe, Iringa, and Mbeya. It is bordered to the north and east by Mufindi District, to the south by Njombe Rural District and to the west by Wanging'ombe District. According to the 2012 Population and Housing Census, the Makambako Town Council has a population of 93,827 people of which males are 44,031 and 49,796 are females with a growth rate of 4.3% (NBS, 2012)[3].

4.4 Climate

Climate in Tanzania varies from tropical along the coasts to temperate in highlands. With Njombe region in the highland it is subjected to temperate climatic conditions. The mean rainfall at Makambako is 1,300 mm per year. There is typically high rainfall from December to April and very low rainfall from November to January. Seasonal variation in temperature at Makambako is typically between 11 ºC and 16 ºC, (Njombe Region Profile, 2013).

4.5 Landscape and physical features

The project area has uplands landforms and forms about 100% of the site, with dominant gradient of less than 0.051 (5.1%) sloping western part of the site, with very small storm water gullies. The area is not covered by large vegetation, but with few shrubs. The predominant soil type in and around the Makambako Project area is mostly reddish brown in color and has textures ranging from sandy loams to sandy clay loams or clays. They are generally moderately deep to very deep and imperfectly to poorly drain. The topsoil is hard when dry but friable to very friable when moist and slightly sticky or sticky and plastic when wet.

[3] NBS, 2012

4.6. Socio Economic Condition and Infrastructures

4.6.1 Population and demographic issues

According to the 2012 Population and Housing Census, the Makambako Town Council has a population of 93,827 people of which males are 44,031 and 49,796 are females (NBS, 2012) with a growth rate of 4.3%. Makambako has an area of 883.4km^2 and the population density is estimated at 106.2 persons per square kilometre. The rapid population increase is influenced by both natural causes and immigration (birth rates and net immigration rates respectively).

The residential portions within the area include residential and commercial houses and very few institutional areas. The area mainly accommodates most of the normal residents and businessmen. In addition, the area accommodates incoming population (e.g. shoppers, workers, traders, students, etc) of which can raise the daytime population.

4.6.2 Employment

Most of the people in the area are employed in the formal sector, including government civil servants and businessmen. Few people are employed in informal sector as another component, which provides employment opportunities to a number of people. The informal sector includes but not limited to petty commodity production and trading, poultry keeping, vendors, shop keepers, carpentry and mason. On the other hand, in its effort of recognizing and respecting the economic contributions of petty traders. Other business activities which provide employment to the residents in the area include both wholesale and retail enterprises. Also there are a number of other business activities which provide employment to the residents; these include retail shops, wholesales, bars and groceries, guest houses and few hotels.

4.6.3 Waste Management Issues

4.6.3.1 Domestic Waste water

Like many other unplanned settlements in the country, Majengo ward where the proposed project is located, also has no central sewerage system. Therefore, the sanitation system used by most households is onsite disposal facilities such as septic tank system and pit latrines. Normally, households living on the same household share a common pit latrine which has a considerable contribution to the cause and spread of incidences of water borne diseases.

4.6.3.2 Solid Waste

Solid waste collection in Makambako is carried out by some private companies, community based organizations and informal sectors. Apart from collection activities, the Makambako Town

Council is also responsible for supervising the franchisees involved in solid waste management. However, the residents cooperate in the waste management programs through keeping their surroundings clean wherever they and dispose them by throwing in pits or burning them and paying their refuse collection charges (RCC).

4.6.4 Water Supply

Makambako site is connected to water supply network from Makambako Uban Water Supply and Sanitation Authority; however water cut off happens in 2–3 days a week, and creates water shortage. The site is populated with about 1000 laborers during peak season and water shortage impairs their hygiene and health conditions. For the existing facilities, Toilets for laborers are adequate to accommodate all users.

4.6.5 Social Services

***Transportation*:** Being located along Makambako to Tunduma Road, the area has a low traffic of both private and public transport.

***Telecommunication*:** Like many residents of Makambako, Majengo dwellers use both land line and mobile phones. The landline facilities are supplied by the Tanzania Telecommunication Company Limited (TTCL) which also offers fax and internet services. The mobile phone companies include Vodacom, Tigo, Airtel, Zantel, and Halotel.

***Electricity*:** The area depends on different sources of energy, such as electricity, kerosene, charcoal, fire wood, solar, etc. The main source of power for lighting and business is electricity, which is generated, transmitted and supplied by a sole utility agent, Tanzania Electric Supply Company Limited.

***Education*:** Majengo ward has both secondary schools and primary schools. The area also has a number of privately owned nursery schools, the media of instruction being both Swahili and English languages.

***Health*:** No public health facility is situated near the proposed project area. Most residents have to seek health services in other parts of the town. The magnitude of the HIV/AIDS pandemic in the area could not easily be assessed but it is being addressed nation-wise by government and Non Governmental Organizations (NGOs).

Road network of the area: The area has relatively high levels of infrastructure services including good internal circulation that has been influenced by the geography of the area and government investment. The road network in the project area is determined mainly by existing roads.

CHAPTER FIVE

STAKEHOLDERS CONSULTATIONS AND PUBLIC INVOLVEMENT

5.0 Overview

Stakeholder involvement is an important step in the EIA process. The Environmental Management Act Cap 191 of 2004[4] and EIA and Audit Regulation 17 of 2005[5] provide details and procedures for public participation in the EIA process. Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively[6]. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses[7]. Stakeholder involvement refers to active participation of all those who might be affected or affect the project in the planning process, decision and management of the proposed development. Stakeholders in this assignment include different individuals, groups of individuals, government agencies, beneficiaries, commercial companies, and all other formal or informal groups associated with the project.

5.1 Method of stakeholder involvement

A matrix with planned schedule of visits was prepared to guide the team to consult all stakeholders that were identified. Stakeholders were identified using simple methods such as networks, literature review and interviews. The network method involved consulting one stakeholder who led the team to another and then another one forming a chain like system whereby several of them were identified and consulted. In addition to consultation through meetings, interview and discussions; physical visits were made to selected stakeholders.

5.2 The Stakeholders consulted

Stakeholder consultations carried out during the EIA stage to identify and respond to project issues of concern to stakeholders. This process allowed the creation of a channel of

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[4] EMA, 2004

[5] EIA and Audit Regulations, 2005

[6] International Finance Corporation. 2007. Stakeholders engagement: A Good practice Handbook for companies doing business in Emerging Markets, USA

[7] International Finance Corporation. 2007. Stakeholders engagement: A Good practice Handbook for companies doing business in Emerging Markets, USA

communication between the Project and the public. The stakeholders identified include but not limited to:

- National Food Reserve Agency (NFRA) – Makambako Office
- Ward Development Committee of Majengo Ward
- Development and Environment Committee of Mtaa wa Majengo Office
- Makambako Town Council
- Makambako Urban Water Supply and Sanitation Authority (MAKUWASA)
- Regional Commissioner's Office – Njombe Region
- District Commissioner's Office - Njombe District
- Occupational Safety and Healthy Authority (OSHA)

5.3 Stakeholders' views and concerns

Generally most of stakeholder's views and concerns support the proposed project. All the comments received from the stakeholders were compiled, summarized and sorted to identify issues that should be addressed in the full and detailed EIA. Below are summary of views and concerns from various stakeholders consulted but details of these views are appended in Appendix 2 of this EIA report.

5.3.1 The investor

The proposed project will cover an area of 0.5 hectare on Plot No. 48 and it will be located at Majengo ward in Makambako Town Council. The land use plan of this area is industrial. It is suitable and large enough to meet our needs and the Agency has considered several things while planning this project. These include:

- Efficient use of space
- Agency' schedule of operation.
- Financial resources
- Plans to manage and operate the facilities

The facilities to be constructed include Silos and warehouse, internal roads (hardstand) pavements, drainage system, office, control room, washrooms, canteen and stores. Other components required in the silo complex from grain intake to grain storage will include intake unit, Bins, Cleaning and drying unit, bulk Conveyance unit (Conveyors and elevators), Bulk storage unit (prefabricated grain storage and Bagging Bin), aeration system, and Instrumentation. All these will be constructed in a way that blends with the natural features or habitat of the proposed project area.

5.3.2 Ward Development Committee of Majengo Ward

The Leaders and Ward Development Committee (WDC) of Majengo ward were happy and accepted the proposed project and advised the proponent to ensure environmental conservation particularly on solid and liquid waste management because there is a water source used by the community members. The Committee is expecting to benefit from the proposed project thus the developer must ensure that the project offers supports to the community and the local government as well as the people who are living near the proposed project site. Furthermore, the investor must ensure that employment opportunities priorities are offered to local experts and residents; developer is advised to harvest rain water and comply will all relevant legislations especially Occupational Safety and Health and Labour and Employment Act. Before and during the commencement of construction phase, the developer and all his contractors must report to local authorities for introduction.

5.3.3 Mtaa Environment and Development Committee of Majengo in Majengo ward

The Leaders and Mtaa Environment and Development Committee of Majengo in Majengo ward were happy and accepted the proposed project and advised the proponent to ensure proper management of solid and liquid wastes because in the area management of these waste is done in small scale and thus the Agency will be responsible for collection, storage, transportation and disposal of their own wastes at Kipagamo dump site. Other views and concerns were:-

- Developer must ensure that their water source down the proposed are is not polluted
- The Committee is expecting to benefit from the proposed project thus the developer must ensure that the project offers supports to the community and the local government as well as the people who are living near the proposed project site.
- Developer has to be specific on how the transmission of HIV/AIDS is going to be mitigated
- Investor must ensure that noise, soil erosion, infrastructure destruction and dust are well mitigated during all phases of project development.
- Investor must ensure that employment opportunities are offered to local residents
- Developer is advised to harvest rain water and comply will all relevant legislations especially Occupational Safety and Health and Labour and Employment Act. Before and during the commencement of construction phase, the developer and all his contractors must report to local authorities for introduction.

5.3.4 Makambako Urban Water Supply and Sanitation Authority (MAKUWASA)

The office of the Manager of MAKUWASA was happy with the project and the office accepted it, because Makambako is among the major food storage sites in Tanzania. Since the water demand of NFRA is low, the authority is willing to offer the service to them and the quality of water (Physical, Chemical and Biological parameters) is good to serve the purposes of the proposed project. Septic tanks can be used for good management of wastewater because infrastructure for the management of sewerage is not yet in place.

5.3.5 Makambako Town Council

Makambako Town Council accepts the proposed project, and enough land is available for this type of project because Makambako is becoming a Centre of the Big Four and as a stakeholder, we will cooperate and assist the project proponent whenever necessary but all legal procedures have to be adhered to and the proponent should offer job opportunities to local residents and must ensure protection of the environment particularly during construction phase. Developer must obtain all relevant permits from the Council such as Building permit.

5.3.6 Office of the District Commissioner – Njombe District

The District Commissioner's Office accepts the proposed project and as a stakeholder, we will cooperate and assist the project proponent whenever necessary. NFRA is encouraged to offer education to farers on how to store their cereal produce particularly the Surplus and employment opportunities to local people. Lastly, we advice the consultant and the project developer to work on all views and concerns given by all consulted stakeholders and must be addressed in the Environmental Impact Statement (EIS).

5.3.7 Regional Commissioner's Office – Njombe

The Regional Commissioner's Office accepts the proposed project because production of cereal crops is very high in our area as we are big producers and we always get surplus so the project is very important for us. Management of NFRA has to speed up the development of the project and we are ready to offer any assistance needed from our office.

5.3.8 Occupation Safety and Health Authority (OSHA)

The project is good and we think it will stimulate and promote agriculture industry and development in the proposed area and impact the nearby communities. However, during all phases of the proposed project, the developer and his project management team must ensure the following:

a. **Registration of the proposed project**: This must be done during construction phase before the construction is started, and it is always done by a Contractor. The investor must give support to his contractor and he must ensure compliance. Also during operation phase, investor must register the project and comply with all the requirements of the legislation (OSHA, 2003) for operation of his activity.
b. **Training**: During construction and operation phases of the project, all workers must be trained on Occupational safety and health. Induction training is very important before construction phase commences, this is because it helps to raise awareness among the workers thus minimize/reduce or avoid accidents and injuries. During this training, all employees must sign in a paper as evidence when the inspection is conducted.
c. **Provision of Personal Protective Equipment (PPE)**: During all phases, PPE must be provided to all workers and if necessary to all visitors to ensure their safety and health at workplace. Such PPE include but not limited to the following safety boots, Helmets, Hard hat, gloves, nose mask, earmuffs, safety overall and safety harness. Contractor and investor must ensure appropriate use of personal protective equipment.
d. **Maintain First Aid**: The investor and project management team including contractors must ensure that First Aid Kit and service is available all the time in the proposed project site. This is among the most important requirements in occupational safety and health issues.
e. **Emergency Preparedness Plan (EPP) and Risk Assessment (RA)**: There should be an emergency preparedness plan and pre-start operation risk assessment. This is to be conducted by the investor to ensure compliance with the Occupational Safety and Health Act of 2003.

The investor must also ensure that there is proper management of waste in the proposed project site and if possible waste management plan must be established which will act as the directive for the contractor and the project management team.

5.3.9 Ministry of Agriculture, Livestock and Fisheries

The office is accepting the proposed project since it will bring some benefits to the ministry as well as to the local communities and we are sure that NEMC will collaborate with us in ensuring that all impacts are well observed and that all legal procedures are followed before the implementation of the proposed project. However, we do advice the proponent to abide to all legal procedures so as to increase the chance of having more benefits without any obstacles from relevant authorities governing the proposed project.

5.4 Stakeholders comments and response

Significant issues raised by the stakeholders have been covered in various sections of this report as detailed in Table 10.

5.4.1 Employment opportunities

The proposed project is envisaged to create direct and indirect employment opportunities to the surrounding communities and nationwide in general. The respondents indicated that the project will provide employment opportunities during proposed project cycle from mobilization to operation and eventually during decommissioning phase. However, it was strongly emphasized and recommended the first priority in employment should be given to local residents and contractors where construction activities will be carried out.

5.4.2 Waste Disposal and Management

Most of the respondents felt that waste management issues should be addressed to avoid groundwater pollution, land pollution, oil spillage into surface and air pollution. Hence they suggested that Developer should careful handle all wastes from the activities which might contaminate the environment, also he should put ways to handle waste garbage to ensure efficient removal and disposing of both solid and liquid wastes.

5.4.3 Adherence of Health, Safety and security

Many of the stakeholder consulted they insists on the safety by ensuring that awareness and personal protection equipment are given priority in order to avoid death, accident and near miss in the workplace during project cycle. They advised developer to provide personal protection equipment, periodic training, conducting of risk assessment during and after the completion of the project.

5.4.4 Increased revenue and Government Tax

Development of that project will increase the revenue and tax income to the government and Municipal as the developer is required to pay the dues as per various local and central Governments By-laws and legislations. This is beneficial other than the land being empty. Local people’s income is also envisaged to increase as a result of this project. People will sell food and other products to project workers and during construction of project supporting facilities materials like sand and aggregates will be sourced from quarrying sites existing in the area.

5.4.5 Aesthetic Considerations

Site clearance, tree felling, presence of construction materials/machinery and construction activities may potentially affect the aesthetic value of the area. Also residents raised concerns towards the building that will be erected. Most of the respondents advised developer to erect a building which will match the existing buildings with a modern design and must be in a way which will blend to existing condition of the place.

5.4.6 Awareness on HIV/AIDS and Health Programs

Some of the residents consulted complain about lack of education and awareness about the project. It was raised that they know little about the project negative and positive impacts and ways to avoid and protect them. It was suggested that the project proponent should provide awareness creation along with HIV/AIDS, safety and health programs to the community since the project will involve people from different background of which might lead to occurrence of the diseases in the community.

Table 11: Stakeholders issues Response Table

S/No.	Comments	Response
1.	Employment opportunities	6.2.1, 6.2.2, 6.2.3, 6.4.1.1, 6.6.1.2, 7.1.1.1 and 7.2.1.2
2.	Waste disposal and management	6.2.2, 6.4.2.2 and 7.1.2.4
3.	Adherence of health, safety and security	6.2.1, 6.2.2, 6.4.2.6, 6.4.2.7, 7.1.2.7 and 7.2.2.1
4.	Increased Government revenue	6.2.1, 6.2.2, 6.4.1.3, 7.1.1.2, 7.1.1.3, 7.1.1.4, 7.2.1.1 and 7.2.1.3
5.	Aesthetic consideration	6.4.2.9, 6.5.2.10 and 7.1.2.9
6.	Awareness HIV/AIDS and Health programs	6.4.2.11, 6.5.2.6, 7.1.2.11 and 7.2.2.6

Source: Beyond Nature Limited, 2017

CHAPTER SIX

POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND ALTERNATIVES

6.0 Overview

The project comprises of the following phases: mobilization, construction, demobilization, operation and decommissioning. These phases will have some impacts on certain aspects of the biophysical and social-economic environment either positively or negatively and sometimes neutral.

A checklist was used to assess the effects of the project on the topics grouped into landform, water resources, ecological resources, aesthetic values, cultural environment, public health and safety and socio-economic factors. These impacts are substantiated during consultations. The impacts can be local, regional or international nature, thus boundaries need to be defined.

6.1 Project Boundaries

Identification of boundaries within which the EIA process would be undertaken was an important component of this exercise. This exercise focused and delimited the project within an area where impacts both positive and negative would be felt on the environment, to the economy and to the local community. There are three types of boundaries that were considered during scoping and the EIA in general, these constitute: institutional, temporal and spatial boundaries.

6.1.1 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. The project development is expansion of grain storage facilities at Makambako in Njombe region. This project development touches the interest of many institutions and administrative units in relation to several policies, laws, regulations and plans in Tanzania and several sector ministries.

6.1.2 Temporal boundaries

Temporal boundaries refer to the life span and reversibility of impact. For example, the impact of construction activities for the facility may be short-lived, but the presence of the facilities both Silos and Warehouses in the selected area may have implications that stretch 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 facilities. Therefore, some of the impacts that may occur during construction, e.g. noise

caused by construction activities will disappear as soon as construction is finished. Increased wastes generation, increased pressure on social services and utilities and health and safety risks due to fire hazards may arise as problems during operation phase unless measures are taken to ensure Occupational Safety and Health Act and other Regulations are respected and strictly adhered to.

6.1.3 Spatial boundary

It is crucial to decide whether impacts are likely to occur at local, regional, national or international level. Expansion of grain storage facilities both Silos and Warehouses may have wide ranging implications that could be felt locally, regionally or from outside Tanzania. The completion of this project will increase the capacity of the NFRA to store large amount of food materials particularly grains. However, in determining the spatial dimension of the project, it is important to consider impacts in a form similar to a contour layout, starting with the core impact area (the area where the project is located and, which would bear the most impact than the rest). In this case, the core impact area for the project will be Dodoma and Singida Regions, the nearby districts and regions where the impact of food shortages may be felt. However for Makambako project area, the major buying Centers at village level are Njombe, Makambako, Ludewa, Iringa, Songwe and Mbeya. It also receive grains particularly maize relocated from Sumbawanga warehouse.

The core impact area refers to the area where physical structures for the project will be located. This core impact area is surrounded by an immediate impact area, an area that is outside but plays an important role or bears relatively some of the impacts (positively or negatively). Other areas include the recipient of the dust and traffic congestion during operations.

The area of influence refers to the greater area that is not subject to direct contact with the development but may be indirectly affected by the project, for example sourcing of construction materials and labour, benefiting from the development which includes the Majengo ward, and other areas of Makambako and Njombe Councils and the country as a whole.

6.2 Possible Impacts Identification

The process of impact identification in this EIA aimed at ensuring that all potential significant impacts were identified and addressed. The EIA team used various tools to identify impacts. Several issues (impacts and concerns) were identified during the stakeholders' consultative

meetings, interview, literature review and observation. Some of the issues/impacts identified were thus regarded as possible impacts.

This Section identifies both positive and negative impacts associated with the proposed project. These impacts are hereby identified at three distinct phases of the project i.e. Construction, Operation and decommissioning phases although another study shall be carried out during the project's decommissioning phase.

6.2.1 Impacts associated with Construction Phase

Positive Impacts

- Creation of Employment Opportunities
- Increased benefits to community and local economy
- Improving growth of the economy
- Increased business opportunities

Negative Significant Impacts

- Loss of vegetation cover
- Noise and Vibration
- Air quality deterioration including dust pollution
- Soil erosion
- Safety hazard and public health
- Aesthetic value
- Social conflict due to labour from outside
- Water availability and consumption
- Residual and Cumulative impacts

6.2.2 Impacts associated with Operation phase

Positive Significant Impacts

- Increased benefits to the government
- Employment opportunities
- Business opportunities
- Improved living standards
- Project Benefits

Negative Significant Impacts

- Safety hazards and public health
- Impacts from Ancillary activities
- Air quality
- Soil and water contamination
- Electricity consumption
- Noise and vibration
- Vehicular traffic
- Damage to infrastructure
- Aesthetic value

6.2.3 Impacts associated with Decommissioning phase

Positive environmental impacts

- Rehabilitation
- Employment Opportunities

Negative environmental impacts

- Generation of Solid wastes
- Generation of Dust
- Increased Noise and vibration generation
- Loss of employment

6.3 Impact Evaluation and Identification

The criteria for determining significance are generally specific for each environmental and social aspect but generally the magnitude of each potential impact is defined along with the sensitivity of the receptor. Generic criteria for defining magnitude and sensitivity are summarized below.

6.3.1 Magnitude

The assessment of magnitude has been undertaken in two steps. Firstly, the key issues associated with the Project are categorized as beneficial or adverse. Secondly, potential impacts have been categorized as major, moderate, minor or negligible based on consideration of the parameters such as:

- Duration of the potential impact;
- Spatial extent of the potential impact;
- Reversibility;

- Likelihood and
- Legal standards and established professional criteria

The magnitude of potential impacts has generally been identified according to the categories outlined in Table 12.

Table 12: Parameters for Determining Magnitude

Parameter	Major	Moderate	Minor	Negligible/Nil
Duration of potential impact	Long term (more than 35 years)	Medium Term Lifespan of the project (5 to 15 years)	Less than project lifespan	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond immediate project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions	Occurs under worst case (negative potential impact) or best case (positive potential impact) operating conditions	Occurs under abnormal, exceptional or emergency conditions	Unlikely to occur

Source: Beyond Nature Limited, 2017

6.3.2 Sensitivity

The sensitivity of a receptor has been determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area. Criteria for determining sensitivity of receptors are outlined in Table 13.

Table 13: Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very high	Vulnerable receptor (human or terrestrial) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
High	Vulnerable receptor (human or terrestrial) with little or no capacity to absorb proposed changes or limited opportunities for mitigation.
Medium	Vulnerable receptor (human or terrestrial) with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low/Negligible	Vulnerable receptor (human or terrestrial) with good capacity to absorb proposed changes or/and good opportunities for mitigation

Source: Beyond Nature Limited, 2017

6.3.3 Assigning Significance

Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor has been determined and the significance of each potential impact established using the potential impact significance matrix shown in Table 14.

Table 14: Assessment of Potential Negative Impact Significance

Magnitude of potential impact	Sensitivity of receptors			
	Very high	High	Medium	Low/Negligible
Major	Critical	H	M	O
Moderate	H	H	M	O
Minor	M	M	L	O
Negligible	O	O	O	O

Source: Beyond Nature Limited, 2017

6.4 SIGNIFICANT IMPACTS DURING CONSTRUCTION PHASE

6.4.1 Significant Positive Impacts

The potentially positive impacts likely to be generated by the construction activities include the following:

6.4.1.1 Creation of Employment Opportunities

One of the main positive impacts during the project construction phase will be the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production. Apart from casual labour, semi skilled and unskilled labour and formal employees are also expected to obtain gainful employment during the period of construction.

6.4.1.2 Increased benefits to community and local economy

The proposed project will provide a number of benefits to the local communities both short and long-term benefits. Those benefits include employment as discussed above. Apart from employment other benefits will include creating a market for local construction materials and services such as construction materials and food services to laborers. The project requires that all construction materials to be obtained from the local source except for those which are not available in the local market. This will significantly benefit directly the local communities for instance the Makambako where construction materials such as morrum, sand and gravel will be obtained.

Apart from these benefits other benefits are long term and will be realized later after the project is accomplished. This includes benefits that will result from overall improvement of grains business in the district. The multiplier effect of these benefits will result into improved community livelihood of the local people from these communities in the long term. This impact will be significantly noted in both construction and operation phases.

6.4.1.3 Improving growth of the economy

Through the use of locally available materials such as cement, concrete and ceramic tiles, timber, sand, ballast, electrical cables etc during the construction phase, the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be

payable to the Government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers and suppliers locally available.

6.4.1.4 Increased business opportunities

It is expected that several informal business opportunities will arise during the construction phase of the project. These include activities such as food vending for the construction staff members who buy food and other commodities from them. This will promote the informal sector in securing some temporary revenue and hence improved livelihood.

6.4.2 Significant negative impacts during construction phase

The potentially negative impacts likely to be caused by the construction activities include the following:

- Loss of vegetation cover
- Noise and Vibration
- Air quality deterioration including dust pollution
- Soil erosion
- Safety hazard and public health
- Aesthetic value
- Social conflict due to labour from outside
- Water availability and consumption
- Transmission of diseases

These potential impacts are discussed below.

6.4.2.1 Loss of vegetation

About 7 trees will need to be felled down to clear the land for constructing silos at the proposed project site of Makambako. The impact due to tree cutting is major. The duration of the impact is long term, irreversible and certain. The trees to be cut may not be all matured. Compensatory measures are possible but will take time to be effective.

6.4.2.2 Noise and vibration

The construction activities and increased vehicular traffic will generate noise and vibration, which are likely to affect the nearby communities. Maximum noise and vibration will be generated during pile driving particularly during day time and the construction workers will be affected the most.

6.4.2.3 Air quality

Construction machinery and project vehicles will release exhaust emissions, containing Carbon monoxide (CO), Sulphur dioxide (SO_2), oxides of Oxygen (NO_X), and particulate matter (PM). These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, leveling, filling and vehicular movement on unpaved tracks may also cause fugitive dust emissions. These emissions pose health hazards for the nearby communities. Thus unmitigated potential impact is characterized and assessed as follows:

Impact parameter	**Nature of project impact**	**Characterization of project impact**
Duration of impact	Medium term (during construction phase only)	Moderate
Spatial extent	May extend beyond project boundary (silo sites and access routes)	Moderate
Reversibility	Reversible in short term	Minor
Legal standards	Unmitigated emissions will breach the national standards	Major
Likelihood of impact	Certain	Major
Sensitivity	Moderate impacts on nearby community	Medium
Impact significance		Moderate
Residual impact if mitigated	Construction related air pollution	Low to negligible

Source: Beyond Nature Limited, 2017

6.4.2.4 Soil and Water contamination

Wastes particularly effluents from works site may contaminate the soil and water. The contractor's camp will generate domestic solid waste and waste water including sewage. The contractors' workshop will generate only water, waste oils, oil rags and other similar wastes. The stores and warehouse will generate solid waste such as empty cement bags, cardboards, and wooden crates. Improper disposal of these waste streams can potentially contaminate the soils and water resources of the area. Soil and water contamination can potentially have negative impacts on the local community, natural vegetation, agriculture and biological resources of the area including flora and fauna. If proper and adequate drainage and sewerage system and proper waste collection method is not provided that will create overflow, odor issue, public nuisance and pollution of underground and surface water.

Residual impacts: With the help of the measures in section 7.2.4, the potential impacts associated with soil and water contamination are likely to be adequately addressed, and hence the significance of the residue impact will be low.

6.4.2.5 Soil erosion

The proposed site is located in generally flat area and existing site is not prone to soil erosion. However, certain construction activities can cause potentially soil erosion at the proposed site particularly during rainy season. Soil erosion can potentially affect the integrity of the existing and proposed building at the site, can cause water ponding particularly during rainy season, and can also affect trees and natural vegetation of the area. The construction activities which could potentially cause soil erosion include the following:

- Construction camp establishment
- Site clearance
- Excavation
- Obtaining materials from borrow sites
- Construction of silo foundations.

6.4.2.6 Vehicular Traffic

The construction activities will cause an increase in the vehicular traffic on the local roads. Similarly, transportation of silo equipment and materials will also cause additional traffic on the access routes (Road). This increased traffic can potentially cause traffic congestion on roads and also pose safety hazards for the nearby population particularly children. It is quiet anticipated that, the number of trucks carrying construction materials including cement, reinforcement bar, sand and stone chips should not exceed the rate of truck flow limit during construction.

6.4.2.7 Safety hazards and Public Health

The steel silo will be connected on the base of the silo mentioned above. The factory fabricated galvanized steel sections of the silos and other steel structural embers will be bolted with the vertical members of the silo bins to form round outer skin of the silo as per the diameter of the bin. The upper cone of the silo will then be placed and constructed on top of this. Once the top cone has been placed on the first section the entire structure will be raised by a battery of special jacks placed at the base of the silo and another circular section added beneath it. The entire construction, till it reaches the required height, will thus be completed. The conveyor belts

and other equipment of the silos will be connected with the system as the construction works progress.

The construction activities will involve operation of heavy construction machinery, vehicular traffic, excavation, filling operation and demolition of structures. These activities may pose some safety hazards to local population. The fuel storage at the camp site may also pose safety hazards for the construction staff as well as for surrounding population. Stockpiling of construction materials in the site and debris from the demolished structure may cause serious accident to the construction workers and people in the vicinity.

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, fall of bolts during assembling of steel frames, loose construction materials/bolts, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction site.

Construction of steel silos may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools during assembling of the steel frames from height which can results in injury to the head, eyes and extremities.

Vehicle traffic and use of lifting equipment in the movement of machinery and equipment in the movement of machinery and materials on a silo construction site may pose temporary hazards, such as physical contact, dust emissions, and noise. Equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Centre-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.

Inappropriate waste disposal at camps and construction site and air quality deterioration caused by the project’s vehicular traffic and construction activities potentially pose health hazards for the construction staff and nearby population. Unhygienic condition and unavailability of safe drinking water for the construction staff will expose them to health risk. In addition, influx of construction staff can potentially expose the nearby population to communicable diseases. The unmitigated potential impact is characterized and assessed below.

Impact parameter	Nature of project impact	Characterization of project impact
Duration of impact	Short term (during construction phase only)	Minor
Spatial extent	May extend beyond project boundary (silo sites and access routes)	Moderate
Reversibility	Reversible	Minor
Legal standards		Minor
Likelihood of impact	Likely	Moderate
Sensitivity	Severe impacts on nearby communities and along roads traffic	Major
Impact significance		Major

Source: Beyond Nature Limited, 2017

Residual impacts: Despite the implementation of the measures addressed in section 7.2.7, some safety hazards and risks are still likely to exist. Therefore the significance of residual impacts has been assessed as medium.

6.4.2.8 Damage to infrastructure

Construction activities may require removal of some existing infrastructure in Dodoma. In addition, there could be some inadvertent damage to the roads, electricity line, water channels and other structures during construction activities, transportation of equipment and material and associated vehicular traffic.

6.4.2.9 Aesthetic value

Site clearance, tree felling, presence of construction materials/machinery and construction activities may potentially affect the aesthetic value of the area.

6.4.2.10 Water availability and consumption

Water consumption during construction phase (camp operation and construction activities) can potentially cause conflict with the existing water users particularly nearby communities.

6.4.2.11 Diseases transmission

The proposed project will go in hand with the recruitment of labour force from different areas but within villages and local communities. This will increase interaction within these societies that may contribute in creating a venue for infectious diseases such as HIV/AIDS and Sexually Transmitted

Diseases (STDs). Also due to improved incomes as a result of earnings from construction activities, workers are likely to change their behaviors and engage themselves in actions that may intensify the spread of STDs and HIV/AIDS.

6.4.2.12 Social conflict

The presence of large workforce, establishment of construction camps, project-related traffic and construction activities may potentially cause conflicts with the nearby communities, privacy issues for the women and other similar problems.

6.5 Significant Impacts during Operation Phase

6.5.1 Significant Positive Impacts during operation phase

6.5.1.1 Increased benefit to the Government

The proposed project will contribute positively to revenue generation at national level. Some of the revenues that proposed project will gain will come from charged taxes, weighbridge measurements fees among others. Parts of these revenues are distributed to the District where they are channeled to other development programs within the District. Therefore, these revenues have multiplier effect arising from its linkages to other sectors making agricultural industry contributing significantly to national economy. Improvement of agricultural sector is one of the government agenda that is also addressed in the national agriculture policy. Therefore this project is very beneficial to the government as it also fulfils some policy agendas of the government. This impact will occur both during construction and operation phases.

6.5.1.2 Creation of employment opportunities

It is anticipated that during operation phase several people based on gender equality will be employed. This number includes both skilled and non skilled workers such as Directors, Quality Insurance and Inspectors, Environmental Officers, IT experts, security officers, drivers, cooks, accountant to mention a few. Apart from direct employment unto the proposed project, employment opportunities will accrue from auxiliary activities.

6.5.1.3 The business opportunities will be increased

It is likely that several informal business opportunities will arise during the operation of the modern grain storage facilities particularly silos in Makambako. These will include activities such as transportation of the visitors and selling of local commodities. This will promote the informal

sector such as transportation and communication sectors, agricultural and natural resources sectors in securing revenues and hence improved livelihood of the people.

6.5.1.4 Standards of living will improve through income earnings

Employment opportunities and the trading activities in the proposed project area will stimulate generation of income to the people of Makambako, nearby districts and regions especially Iringa region and Tanzania in general. Income earned from the aforementioned activities will help in improving the standards of living of the employees and others who directly or indirectly depend on them.

6.5.2 Significant negative impacts during operation phase

The potentially negative impacts likely to be caused by the operation and maintenance (O & M) activities include the following:

- Safety hazards and public health
- Impacts from Ancillary activities
- Air quality
- Soil and water contamination
- Transmission of diseases
- Electricity consumption
- Noise and vibration
- Vehicular traffic
- Damage to infrastructure
- Aesthetic value

These potential impacts are discussed below:

6.5.2.1 Safety hazards and Public health

The O & M activities may pose some safety hazards particularly to the O & M staff. These may include electrocution, fall, burns, cut and other body injuries, asphyxiation and exposure to phosphine gas. The fuel storage at the silo facilities may also pose safety hazards for the O & M staff as well as for surrounding population.

Inappropriate waste disposal and air quality deterioration caused by the O & M activities potentially pose health hazards for the O & M staff and nearby population. Unhygienic condition

and unavailability of safe drinking water for the O & M staff will also expose them to health risks. O & M staffs are particularly exposed to fumigants which may cause severe respiratory irritation.

6.5.2.2 Impact from Ancillary Facilities

Silos will be equipped with several ancillary facilities like commercial scale grain chiller and dryer, commercial scale fumigation system; fuel storage; mechanical handling system; Generator as power back up system. Air pollution and electricity consumption are the main problems due to commercialized refrigeration. Figure 3 shows an example of typical grain chilling procedure. Carbon dioxide (CO_2), Nitrogen Oxide (NOx), Sulfur dioxide (SOx) and Suspended Particulate Matter (SPM) are the typical pollutants which are expected from the exhaust emission from silo and refrigerators.

The drying facility, mechanical handling system will cause dust pollution and electricity consumption. Fuel storage for machines, Generator for electricity back up will cause air pollution or accidental hazard. If fumigation is necessary special attention and guideline needs to be followed for fumigant application.

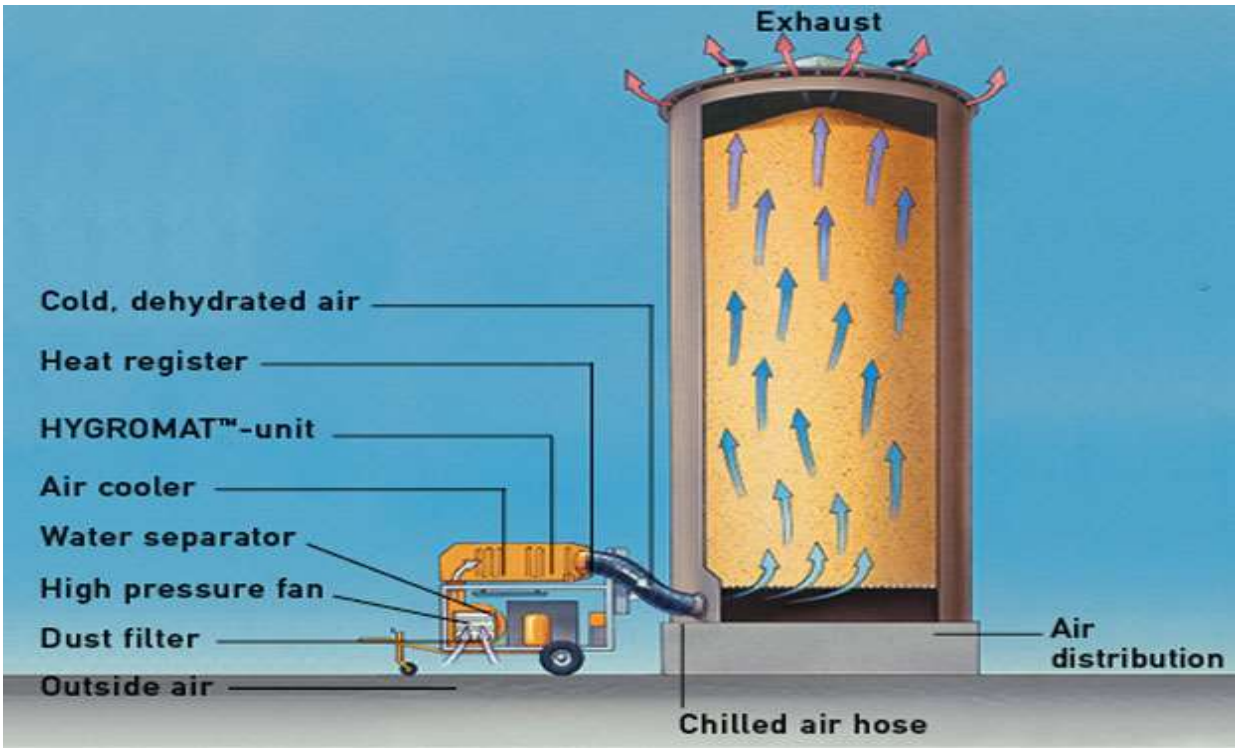

Figure 3: Process Grain Chilling

Source: Frigortech Technical Manual, 2017

6.5.2.3 Air quality

Emergency diesel generator and vehicles transporting grains will release exhaust emissions, containing Carbon monoxide (CO), Sulfur dioxide (SO_2), Oxides of nitrogen (NO_X), and particulate matter (PM). Emissions and leakage from the bag filters may also release PM. These emissions can deteriorate the ambient air quality in the immediate vicinity of the project sites. These emissions pose health hazards for the O&M staff and nearby communities.

In addition, phosphine gas may be released from the aluminum phosphide, which would be used as a fumigant in the facility. Phospine gas is toxic and is denser than air and hence may collect in low-lying areas. It can form explosive mixtures with air and also self-ignite. When phosphine burns it produces a dense white cloud of phosphorus pentoxide – a severe respiratory irritant. Primarily the O & M staff may be exposed to phosphine.

6.5.2.4 Soil and Water Contamination

Inappropriate waste disposal from the O & M activities as well as from offices and residential facilities may potentially contaminate soil and water thus negatively affecting nearby communities and biological resources of the area.

6.5.2.5 Noise and Vibration

The O & M activities (running of motors, conveyor belts, bag filters, chilling plant, dryers, and others) at the silos and vehicular traffic will generate noise and vibration which are likely to affect the O&M staff and nearby communities.

6.5.2.6 Diseases transmission

The proposed project will involve the employment of various people with different skills and behavior who are prone to disease attacks since they are living organisms. Due to this there is a high possibility of disease transmissions from one another if a disease attacks the work place. Also due to facility operation and improved incomes, visitors and workers are likely to change their behaviors and engage themselves in actions that may intensify the spread of STDs and HIV/AIDS.

6.5.2.7 Vehicular Traffic

Transportation of food grain to and from silos will cause additional traffic on the access routes (roads and water ways). This increased traffic can potentially cause traffic congestions on roads and in waterways and also pose safety hazards for the nearby population particularly children.

6.5.2.8 Electricity Consumption

For continuous power supply on priority basis through the 33 KV power line will have to be ensured at the Silo for uninterrupted operation of a silo. If chilling system is interrupted, the silo will not meet the required temperature and infestation of silo will be expedited.

6.5.2.9 Damage to Infrastructure

During the food grain transportation, there could be some inadvertent damage to the roads and other structures. This **unmitigated** potential impact is characterized and assessed below.

Impact parameter	**Nature of project impact**	**Characterization of project impact**
Duration of impact	Long term (during entire O & M phase)	Major
Spatial extent	May extend beyond project boundary (silo sites and access routes)	Moderate
Reversibility	Reversible (After mitigation)	Moderate
Legal standards		Minor
Likelihood of impact	Likely	Moderate
Sensitivity	Moderate impact on infrastructure	Moderate
Impact significance		**Medium**

Source: Beyond Nature Limited, 2017

6.5.2.10 Aesthetic Value

Presence of silos may potentially affect the aesthetic value of the area.

6.6 Significant impacts during decommissioning phase

6.6.1 Positive Significant Impacts during decommissioning phase

6.6.1.1 Rehabilitation

Upon decommissioning, rehabilitation of the project site will be done to restore the site to its original status. This will include replacement of topsoil and re-vegetation that will lead to

improved visual quality of the area. In long run the proposed area will develop into a nice place as succession will continue to take place from one stage to another until it reaches to its climax.

6.6.1.2 Employment Opportunities

For demolition to take place properly and in good time, one or two decommissioning firms and several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.

6.6.2 Negative Significant Impacts during decommissioning phase

6.6.2.1 Generation of Solid wastes

Demolition of the project buildings and related infrastructures will result in large quantities of solid wastes. The wastes will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition wastes are generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as Chloride (Cl), Sodium (Na), Sulphate (SO_3) and Ammonia (NH_3), which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

6.6.2.2 Generation of Dust

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighboring communities. This may pollute the air and in turn spread and cause diseases such as Flu.

6.6.2.3 Increased Noise and vibration generation

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 and vibration that will be experienced as a result of demolishing the proposed project.

6.6.2.4 Loss of employment

The laying-off labour force during decommissioning stage will bring about unemployment to those who either were directly employed to the storage facilities or through ancillary activities associated with the project. This may pose major challenges if alternatives are not found.

6.7 Alternative Analysis

From the environmental safeguard view point, alternative analysis is an important tool for the best selection of the project site, technology to be followed, and operational mechanism in terms of environmental acceptability of the chosen method. Alternative analysis provides information about the advantages and disadvantages, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible for each alternative considered. The alternative analysis for the proposed project was conducted into the following sections.

a) "No action" alternative of the project
b) Alternative Analysis for Selection of Sites
c) Alternative Analysis for Technology Options for Silos
d) Alternative analysis for energy options

The Alternative Analysis for Technology options also include the comparative analysis based on the option during construction and operation.

6.7.1 "No Action" Alternative of the Project

Tanzania can be termed as a disaster prone country. Almost every year this country is devastated by flood or drought. In all cases the devastation is on the crop, particularly grains and the main staples of the people. The situation is likely to aggravate due to global warming reflecting its effects on the erratic climatic behavior. Against the backdrop of such emerging issues like the natural calamities and disasters, the increasing food prices and the shortages of food during the times of urgent need develops food insecurity in the country. If Tanzania Government does not increase food storage capacity, at the time of food shortage, the country will need to import food at a higher price. The current storage capacity of the country is less than 300,000 metric tons (NFRA, 2015). It is estimated the requirement of storage capacity for the food grain is 700,000 metric tons by the end of financial year 2020. If the storage facility is not increased immediate with the increasing frequency of natural disaster, decreasing storage facility due to deteriorated existing godown, the country will face shortage of food during emergency need of food.

6.7.2 Alternative Analysis for Selection of Sites

The site selection criteria are as follows:

e) Strategic value of the storage location for distribution of food grain stocks in emergency relief situations or for the pre-positioning of such stocks

f) Rationality of increased storage capacity at the site based on existing and anticipated food grain movements by the client for all uses in order to ensure proper rotation of stocks
g) Avoidance of land acquisition issues that could delay the start of construction and therefore a focus on existing National Food Reserve Agency sites.

Initially eight sites were taken into account. Considering the above conditions, Makambako and Dodoma sites have been selected. Table 14 shows the comparative analysis of the site for environmental consequences.

6.7.3 Alternative Analysis for Technology Options for Silos

In Tanzania, conventional godowns/warehouses and concrete built silos were constructed in different locations of the country and are now being used to store various food grains. On the other hand, steel built silos are widely used in many countries of the world as modern food storage technologies as alternatives of concrete built silos and conventional godowns. The options are Steel Silo, Concrete Silo and Conventional Godowns.

Moisture and Temperature control are the critical aspects for bulk storage of grains particularly Maize. The optimum temperature for growth of most grain moulds is between 25°C to 30°C and some moulds develop best at around 37°C. The minimum Air Relative Humidity (RH) for mould germination is 65%. Thus to prevent mould growth on food grains at any temperature, the RH of the air in the grain mass must be less than 65%. Insect development is enhanced by high Moisture Content (MC) conditions (above 14%) and insect activity hardly occurs in food grains at moisture contents below 10%. Most insects are dormant below 10°C and are killed at temperature above 38°C. Moreover, presence of dust in food grains facilitates germination of insects inside the food grain. Dust also reduces the nutrition value of the food grains.

Table 15: Alternative Analysis for Site Selection Considering Major Environmental and Social Factors to be impacted

Sites	Land ownership	Risk Associated with Land Acquisition/Social Impact	Mode of transportation	Strategic location for the distribution of grain during emergency (Number of mode of transport 1=+, 2=++, 3=+++ and 4=++++)	Demolition of structure triggering dust pollution, health & Safety	Total trees to be cut possibly	Natural drainage facility	Apparent environmental impact
Makambako	NFRA	Low	Communications of site are rail and road. The site is linked to Mbeya, Iringa, Ruvuma and Dar es Salaam via Iringa, Morogoro and Coast regions where there is a Sea port.	+++	No	1	Yes	Very low
Dodoma	NFRA	Low	Communications of site are rail, road and air. The site is linked to Singida, Arusha, Iringa and Dar es salaam via Morogoro and Coast regions where there is a Sea port.	++++	No	7	Yes	Very low

Source: Beyond Nature Limited, 2017

The outside walls of both concrete and steel silo bins offer thermal insulation and the temperature of the outside air can be transferred to both the grains and the air inside the walls. In this way, the outside temperature variations make the initial grain storage conditions change. When the temperature outside the bin decreases, a temperature gradient is created across the walls[8]. The air in the silo develops a continuous convection movement. The air near the walls is cooled, raising its RH and resulting in an increase of the MC in the bottom of the silo. This increase in moisture can create a deterioration spot. Then the dry air rises through the central part of the bulk mass and picks up moisture from the grain. When this warm, moist air contacts the cool upper grain surface, the moisture is deposited and another deterioration zone can occur. The inverse air movement pattern may occur if the air outside the bin warms up, causing the MC to increase near the floor of the bin. In the tropics, where seasonal temperature changes are not very large, the main problem occurs with daily temperature changes or day to night temperature variations and high RH of the air. The high daytime temperature heats the inside of the bin causing moisture transport from the grain to the surrounding air. At night, the outside temperature drops very rapidly and the water vapors in the air spaces condense on the internal surface of the bin, mainly on the roof. The grain can act as a condensing surface if its temperature is reduced to below the dew point temperature of the air. This condensation problem may cause deterioration areas on the top of the grain and sometimes on the walls. This will create some hotspots or caking of grains inside the silos.

Therefore, the proponent has evaluated various alternative designs and technology and various professionals involved i.e. the Architect, Engineers and Surveyors and environmental consultants. After extensive discussions and relevant considerations, the various options were assessed and the most optimal design and technology were agreed as per professional plans, materials and technology particularly the use of steel silos.

It is currently proposed that all construction activities for the structures and infrastructures should be labour intensive and as much as possible to minimize the use of machinery; however this kind of construction technology will prolong construction phase and therefore delay operation phase which has both economic and environmental benefits to the developer. The proposed project will be constructed using locally and internationally accepted materials to

[8] Brooker, D. f., Bakker Arkema, and C. Hall, 1981. Drying cereal grains, AVI published company, Inc., 3rd printing.

achieve quality of infrastructure, public health, safety, security and environmental aesthetic requirements.

In some cases human labour may not work properly, therefore heavy machines will be used. The use of machines technology will not be complying with the main objective of the project which discourages use of heavy machines, which needs to ensure a significant number of local people are involved during construction and therefore obtain some kind of income. Likewise labour intensive other than use of machines will minimize impacts such as those with pollution from spill over of machines as well as noise.

6.7.4 Energy alternative

The use of other alternative energy sources apart from power from the National grid and diesel generators were considered. As it is the case in most of developing countries, supply of electricity from National grids is not reliable as it mostly originates from hydroelectric power and Generators, which depend on rainfall frequency, intensity and pattern. On the other hand, diesel Generators, which are mainly used during power interruptions, emit a lot of greenhouse gases especially when they are run for a long time. The use of gas as an energy source was considered and the design team shall explore the feasibility of using this alternative.

6.7.5 Waste management alternative

Makambako Township Council operates a Dumping sites at Kipagamo for proper management of solid waste and the environment. In addition to the operation of this Dumpsite, other operating equipment such as tipper trucks, tractors and trailers have been received to assist in the collection of solid waste. This Open dump site located at Kipagamo is the best option to be used for the management of solid wastes because the dumpsite is away from the residential area at about 7 Kilometers from Town Centres and it contains necessary facilities for proper management of solid wastes.

Table 16: Comparative Analysis of Food Grain Storage

ITEM (S)	STEEL SILO	CONCRETE SILO	CONVENTIONAL GODOWNS
View of Super Structure (Examples)			
Description of the structure	The steel Silos are the containers for storage of bulk volume of grains. The super structure of steel silo is made of galvanized steel.	The Concrete Silos are the containers for storage of bulk volume of grains. The super structure of concrete silo is made of concrete.	The conventional godown/ ware house is made of brick wall and galvanized tin top
Space requirement	Corrugated steel bins are mainly designed to resist tensile stress and the only efficient shape is circular bins to counteract bending/flexural stresses. Bulk storage in silos eliminates the need for pallets and other dunnage on which bags of grain are usually stacked. This reduces use of lumber and saves trees.	Concrete bins are built in different shapes, the most common being circular, rectangular and hexagonal. Diameters vary typically from 5m to 12m and heights from 15m to 55m. The wall thickness varies from 15cm to 20cm. Rectangular concrete bins have covered 90.5% area whereas Steel Silos cover 75% of the area for the same capacity. Concrete silo is also used for bulk storage.	The conventional ware-house/godown with dimensions 100ft X 80ft X 20ft space will make possible storing 1000 MT of grains, which is more than 8 times the area than the same of concrete silos considering the same capacity. This is not efficient in terms of bulk storage.
Temperature	Grain chilling, grain drying and grain	Grain chilling, grain drying and grain	Grain chilling, grain drying and grain

Moisture and dust control Technology	Cleaning equipment are used, are used for Steel Silo.	Cleaning equipment can be used, are used for Concrete Silo.	Cleaning are problematic or impossible when grain is held in bags in warehouses
ALTERNATIVES ASSESSMENT CONSIDERING IMPACTS DURING CONSTRUCTION			
Required amount of Concrete Volume (m^3/mt)	Foundation = 26 Superstructure = nil Foundation of the structure is important and rigorous and requires technical skill set for construction.	Foundation = 28 Superstructure = 15 Foundation work is equally rigorous like steel silo. The superstructure will be built in the Convention building method bottom up approach.	Foundation = 4 Superstructure = 8 Comparative Simple method to construct
Skillset	Required Skilled Manpower for Foundation = 100 Required Skilled Manpower for Superstructure = 2800	Required Skilled Manpower for foundation = 100 Required skilled manpower for Superstructure = 3000	Does not require highly skilled manpower. Unskilled manpower may create significant delay of work.
Locally Available manpower	No for superstructure	Yes	Yes
Dust Pollution during Superstructure Construction	Superstructure will be built with prefabricated steel. The factory fabricated galvanized steel sections of the silos and other steel structural members will be bolted with the vertical members of the silo bins to form the round outer skin of the silo as per the diameter of the bin. The upper cone of the silo will then be placed and constructed on top of this. Once the top cone has been	Constructing concrete silos superstructure require large volume of concrete works where cement, fine and coarse aggregates are to be mixed to prepare concrete throughout the construction period.	Constructing warehouse/godowns also require large volume of concrete works.

	placed on the first section the entire structure will be raised by a battery of special jacks placed at the base of the silo and another circular section added beneath it. The entire construction, till it reaches the required height, will thus be completed. The conveyor belts and other equipment of the silos will be connected with the system as the construction works progress. Dust is not a problem during superstructure construction.		
Temporary Work Camps	Steel Silos require mainly technically skilled labors. The waste management and sanitation facilities can be maintained adequately	Construction of both concrete silos and godowns requires many unskilled laborers for which temporary camps for the laborers are needed throughout the construction period. Consequently, the waste management and sanitary facilities are may not be maintained adequately.	
Hiring of Local Labors	Local labors may be hired during foundation construction. Super-structure requires only skilled labors. Local labors will be hired at smaller extent.	Local labors will be hired at a higher extent.	Local labors will be hired at a higher extent.
Safety issues	Top to bottom approach will be followed. Erection of steel silos is done completely at ground level using hydraulic jacks to lift the cylindrical structure as each ring of steel	Bottom up approach is followed. Concrete silo construction using slip forms is done partially with workers high off the ground.	Conventional method is followed for warehouse construction.

	panels is bolted together. Therefore there is little risk associated with falling from height.		
ALTERNATIVES ASSESSMENT CONSIDERING IMPACTS DURING OPERATION			
Dust Control	Dust collector can be integrated with the steel silo, which can reduce the dust from grains.	Dust collector can be integrated with concrete silo as to control dust from grains.	Grains are stored in bags in the warehouse. It is difficult to control in the ware house.
Insects and other pests control	Grain chillers used for chilling the grains can be integrated with steel silo which keeps the grains at lower temperature. Mould will not occur and insects will not reproduce at the lower temperature. This is important to facilitate long term storage of food grains as well.	By providing grain chiller, insects and pests can be controlled in concrete silo.	Temperature cannot be controlled in the conventional godowns. Insects and pests cannot be controlled adequately. Therefore, long term storage of food is difficult in conventional warehouse.
Rodent Control	Both steel and concrete silo structures prevent the rodents and birds which are often a major problem for grain storage.	Grains are protected from rodents and birds in the concrete silo.	Poisons and other measures need to be adopted for rodent and bird control.
Infestation due to fumigation (Fumigant Aluminum Phosphide 12gm/mt)	It is expected grain chiller will be used properly to control the temperature which will reduce the possibility of infestation.	Currently used once in a month. Since the grain chiller are not working in the existing Silo.	Fumigant is used once in every week with the mentioned dosage.
Power Consumption	Power consumption is high for steel silo. The steel silos are operated and monitored through electronically controlled	Concrete silos usually require 5 to 6 kwh/ month for each MT of grains.	Warehouse/godowns usually require 0.1 to 0.2 kwh/month for each MT of grains. Power consumption is least for conventional

	devices and they consist of chiller and dryer. For the NFRA, It is estimated that at an average 10 kwh is required power consumption/month for each MT of grains.		godowns.
Fewer plastic and jute bags in storage	The steel silo will be used for bulk storage of grains which will eventually reduce the use of plastic and jute bags.	Concrete silo also reduces the use of jute and plastic bags.	Grains are storage in bags in warehouse which generates environmental problem due to disposal of more worn out bags.
Elimination of dunnage and wooden pallets	No use of dunnage and wooden pallets.	No use of dunnage and wooden pallets.	In the godowns, bagged grains must be stored on dunnage and wooden pallets that wear out and need replacement every few years. This promotes tree cutting.
Reuse of rice husk	The steel silos will have dryers that will make good quality maize cob which may be also pressed into briquettes.	If dryer is used, good quality briquettes can be made.	Briquettes from maize cob cannot be prepared.
Dust Explosion	The possibility of dust explosion is less for steel silo.	The risk of catastrophic collapse of the grain storage due to grain dust explosion are much higher in concrete silos than in steel silos due to the confined area in the basement where dust concentrations can be high and easily ignited by a spark.	

Source: Beyond Nature Limited, 2017

CHAPTER SEVEN

IMPACT ENHANCEMENT AND MITIGATION MEASURES

7.0 Overview

This chapter entails measures or interventions that shall be implemented so as to minimize the potential impacts identified in the preceding chapter. Many of the mitigation measures put forward are simply good engineering or environmental best practice considerations that shall be adhered to in all the project phases which include construction, operation and decommissioning phase.

7.1 Enhancement and Mitigation Measures for Impacts during construction Phase

7.1.1 Enhancement measures during construction phase

7.1.1.1 Creation of Employment Opportunities

The following enhancement measures are proposed:

- The project shall ensure that the labour force comes from surrounding communities particularly those with relevant skills to be occupied in the construction activities.
- Due considerations shall be given between genders in providing employment opportunities.
- Training programmes shall be carried out to workers to improve their skills especially in the issues of occupational health and safety.
- The project management shall ensure formal employment contracts with the workers are instituted.

7.1.1.2 Increased benefits to community and local economy

The following enhancement measures are proposed;

- Ensure more involvement of the local people in employment, provision of construction materials and other services
- Ensure proper operation and maintenance of the proposed facilities after construction during operation phase to ensure sustainability of the project facilities and hence sustainable benefits from this project
- Developer to give priority to local goods and products from local communities.
- To ensure good governance and accountability with respect to benefits and gains that goes to the Local Government Authorities.

7.1.1.3 Improving growth of the economy

Enhancement measures:

- The project shall ensure effective payment of all relevant taxes to the government both local and central governments such as VAT during the procurement of construction materials such as cement.

7.1.1.4 Increased business opportunities

Enhancement Measures:

- The project shall give priority to local goods and services available from local producers and local service providers.

7.1.2 Mitigation Measures for Impacts during construction phase

7.1.2.1 Loss of vegetation

Mitigation measures

Compensatory tree plantation will be carried out within the facility and saplings five times the trees felled will be planted. Before starting the construction works, the contractor will prepare an inventory of the trees to be felled. The contractor will then prepare a tree plantation plan and the species to be planted and obtain approval from the Supervision Consultants. The plantation of trees will most likely take place towards the end of construction phase. Appropriate maintenance and monitoring will need to be carried out to ensure survival and growth of the planted species.

7.1.2.2 Noise and vibration

The following mitigation measures will address the potentially negative impacts of the project associated with noise and vibration:

- The contractor will ensure that the noise from the construction site and camps complies with the national standards
- Vehicular traffic through communities will be avoided as far as possible. Project routes will be authorized by the Supervision consultants
- Vehicle speed will be kept low, and horns will not be used while passing through or near the communities.
- Vehicle will have exhaust silencer to minimize noise generation
- Nighttime traffic will be avoided near communities

- Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution
- Working hours for construction activities within/near the communities will be limited to between 8 am to 6 pm.
- Liaison with community will be maintained. Grievances redress mechanism will be put in place to address the community complaints.
- Workers will use safety device for protection of ears (earmuffs and ear-plugs etc) following OSH Act of Tanzania.
- Silo facility foundation shall be designed to minimize vibration effect.

7.1.2.3 Air quality

The following measures will address the potentially negative impacts of the project associated with air quality deterioration:

- The vehicular and equipment exhaust will comply with the national standards
- Contractor to ensure compliance with standards for ambient air quality
- Water will be sprinkled where needed and appropriate, particularly at work site near the communities
- Liaison will be maintained particularly with the communities near camps and work sites.

7.1.2.4 Soil and Water contamination

The following measures will address the potentially negative impacts of the project associated with soil and water contamination:

- The contractor will prepare separate waste management plan for the site in accordance with international best practices
- No untreated waste effluent will be released to ground or water
- Vehicle and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination
- For the domestic sewage from construction camps and offices, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity. The contractor will submit to the Supervision Consultants the plans for the camp layout and waste disposal system, and obtain approval. As stated above, camps will preferably be established inside the existing NFRA facilities as far as possible.
- Waste oils will be collected in drums and sold to the recycling contractors

- The inert recyclable waste from site (such as cardboard, drums, broken/used parts etc.) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste.
- Domestic solid waste from construction camps will be disposed in a manner that does not cause soil contamination. The waste disposal plan submitted by the contractor (s) will also address the solid wastes.

Residual impacts: With the help of the above measures, the potential impacts associated with soil and water contamination are likely to be adequately addressed, and hence the significance of the residue impact will be low.

7.1.2.5 Soil erosion

The following mitigation measures will help avoid/mitigate any soil erosion at the proposed site:

- Material borrowing and disposal plan will be prepared and approval obtained from the Supervision consultants
- Cultivation fields will be avoided for borrowing material to the extent possible
- Written consent of the land owner will be obtained for material (Soil) borrowing. A standard form should be prepared and used for this purpose
- The borrow and disposal areas will be re-contoured to avoid deep ditches or high mounds
- Photographic record (before, during and after) will be kept for borrow and disposal areas.
- Leveling and re-contouring borrow sites will be carried out.
- Cut and fill at the proposed site will be carefully designed, and ideally should balance each other. The surplus soil, if any, will be disposed at places approved by supervision Consultants (“Engineer”). Such sites will be selected after surveying the area and ensuring that soil deposition will not have any significant impacts, such as loss of productive land, blocked access, natural vegetation and disturbance to drainage.
- If necessary, fill material for silo sites will be obtained from appropriate locations approved by Supervision consultants. Such locations will be selected after surveying the area and ensuring that soil extraction will not have any significant impacts, such as soil erosion, loss of natural vegetation and disturbance to drainage.

- Where the use of cultivated land is unavoidable for obtaining the fill material, the top 30cm soil layer will be removed and stockpiled for redressing the land after removal of the borrow material. The excavation in such areas will be limited to 50 cm depth.
- The fill material will not be obtained from any cultivation fields or orchards, unless the consent of the owner is obtained.
- Areas from where the fill material is obtained or surplus soil deposited, will be landscaped to minimize erosion and hazard for people and livestock.
- Construction camps will be located in a stable and flat area, requiring minimal devegetation and leveling. The contractor (s) will obtain approval from the Supervision Consultants for this purpose. Camps will preferably be located inside the existing NFRA facilities.
- Embankments and excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken per the design (e.g., stone pitching).
- Vehicular traffic on unpaved road will be avoided as far as possible. Operation of vehicles and machinery close to water sources will be avoided.
- After the completion of the construction works, construction site, campsites and other work areas will be completely restored. No debris, surplus construction material or any garbage will be left behind.
- Photographic record will be maintained for pre-project, during construction and post construction of the site.

7.1.2.6 Vehicular Traffic

The following mitigation measures will be implemented to address the above potential impacts:

- The contractors will prepare a traffic management plan for the site and obtain approval from Supervision Consultants. In particular, transportation and equipment ad material will be astutely planned to avoid traffic congestion and other associated problems.
- Project Drivers will be trained on defensive driving practices
- Speed limits will be enforced for the project vehicles
- Reduced speed near/through communities
- Liaison should be maintained particularly with the communities near camps and works sites.
- Safety signage shall be placed at the site work.

7.1.2.7 Safety hazards and Public Health

The following mitigation measures will b implemented to address the above potential impacts:

- The contractors will prepare site specific Health, Safety and Environment (EHS) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures particularly for communicable diseases such as hepatitis B, C and HIV/AIDS.
- The contractor will provide personal protective equipment (PPE) to the construction staff and will ensure its appropriate use.
- Availability of safe drinking water will be ensured for the construction staff.
- Construction staff will be screened for communicable disease.
- First Aid box will be made available on site. Emergency phone numbers (Including Hospitals, Fire Department and Police) will be displayed at key locations within the site. The site will have an Ambulance available.
- Approved EHS policy will be included in the contact document.
- Construction site will have protective fencing to avoid any unauthorized entry
- Project drivers will be trained for defensive driving skills
- Vehicular speed near/within communities will be kept low (20km/hr) to minimize safety hazards.
- Camp site will be selected with approval of the Supervision Consultants, as mentioned earlier. Camps will have periphery fencing to avoid any unauthorized entry.
- Firefighting equipment will be made available at the camps and worksite
- Camp staff will be provided with safety including firefighting training.
- All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.
- Waste management plan to be prepared and implemented in accordance with international best practices.
- Liaison with the community will be maintained.
- Engineer should be consulted before modifying a silo because a simple can drastically alter its structural ability. Equipment attached to a silo can impose dangerous loads.

Residual impacts: Despite the implementation of the above measures, some safety hazards and risks are still likely to exist. Therefore the significance of residual impacts has been assessed as medium.

7.1.2.8 Damage to infrastructure

The following are the mitigation measures that will be implemented to address the above potential impacts:

- Condition of the infrastructure in the vicinity will be regularly monitored.
- Appropriately sized vehicles will be used to transport construction materials so as to minimize wear and tear of the transportation route.
- All damaged infrastructure will be restored to its original or better conditions.

7.1.2.9 Aesthetic value

The following are the mitigation measures that will be implemented to address the above potential impacts:

- Screens will be used at the site periphery
- Landscaping and tree plantation will be carried out at site and camp where possible
- Proper housekeeping will be regularly carried out at the site and camp.

7.1.2.10 Water availability and consumption

The following are the mitigation measures that will be implemented to the negative impacts of the project associated with water consumption:

- Astute planning will be employed to conserve water at construction site and camps. Water will be procured in a manner that least affects the existing water users and local communities.
- Contractors will submit the plan to procure and consume water for their construction as well as camp needs, and obtain approval from the Supervision Consultants.
- Extreme care will be taken when working close to wells and other water sources. Any damage caused by the project activities will be repaired.

7.1.2.11 Diseases transmission

The following mitigation measures are proposed;

- The developer shall provide awareness education to workers on pathways for HIV/AIDS and other diseases and ways to avoid such diseases.
- Provide communication channels such as posters, films, books, brochures and flyers to educate people on the dangers of HIV/AIDS and how to avoid it.
- Developer in collaboration with Makambako Town Council shall provide Voluntary Counseling and Testing (VCT) Centres for HIV/AIDS.

- The developer shall provide protective gears to workers and encourage the use of condoms.

7.1.2.12 Social conflict

The following are the mitigation measures that will be implemented to address the above potential impacts:

- Liaison with communities will be maintained throughout the construction phase
- Grievances redress mechanism will be established at site.

7.2 Enhancement and Mitigation Measures during Operation phase

7.2.1 Enhancement Measures for Positive Significant Impacts

7.2.1.1 Increased benefit to the Government

The following enhancement measures are proposed;

- Local government authority must ensure revenue is collected and well distributed and utilized
- TRA to ensure VAT and other relevant levy are paid to the government.

7.2.1.2 Creation of employment opportunities

Enhancement Measures:

- Management of NFRA shall carry out regular training programme to workers to improve their skills especially in the issues of operation and maintenance as well as occupational health and safety.
- Proponent shall ensure that there are formal employment contracts with all the workers.

7.2.1.3 The business opportunities will be increased

Enhancement Measures:

- The project shall continue to give priority to local goods and services available from local producers and local service providers.

7.2.1.4 Standards of living will improve through income earnings

The following enhancement measures will be in place:

- The proponent shall offer good salary packages
- The proponent shall comply to all labour related legislations and guidelines

- Conducive environment for workers shall be promoted in the project site the motivate workers.

7.2.1 Mitigation Measures for Negative Significant Impacts

7.2.2.1 Safety hazards and Public health

The following are the mitigation measures will be implemented to address the above potential impacts:

- Each facility will prepare a site specific Health, Safety and Environment (HSE) Plan. The Plan should also include awareness raising and prevention measures particularly for communicable diseases such as Hepatitis B, C and HIV/AIDS. HSE Plan will be made an integral part of the operational manual of the facility. The plan will particularly address procedures to handle Aluminium phosphide and to prevent exposure to phosphine gas.
- Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals.
- PPE will be provided to the O & M staff.
- HSE training will be provided to the O & M staff on regular basis
- Availability of safe drinking water will be ensured in the facility
- First Aid boxes will be made available on site. Emergency phone numbers (such as Hospital, Fire Department and Police) will be displayed at key locations within the facility.
- Firefighting equipment will be made available at the facility
- All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.
- Waste management plan to be prepared and implemented in accordance with international best practices.
- Liaison with the community will be maintained.

7.2.2.2 Impact from Ancillary Facilities

The following measures will address the potentially negative impacts of the Project associated ancillary facilities:

- Adherence to fumigation Application Guideline
- Regular air quality for CO_2, SPM, SO_X and NO_X should be measured.
- Fire safety needs to be addressed during construction and operation. The Contractor should come up with a fire safety plan. NFRA will ensure fire safety measure is

appropriately addressed during operation phase. The fire safety should be according to the IFC Environmental Health and Safety Guideline for community.

7.2.2.3 Air quality

The following measures will address the potentially negative impacts of the Project associated with air quality deterioration:

- The vehicular and equipment exhaust should comply with the national standards.
- The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM. The emissions from these filters will comply with the national standards for air quality
- Compliance with the standard for ambient air quality will be ensured.
- The steel silos to be constructed under BMFS project has the duct at the dust collection point, which will be attached to a reverse jet bag filter and then to the fan which will vacuum the duct and extract the dust. These suction ducts will be suitably installed at the dump pit of the grain collection point, to the bucket elevator and chain conveyors also to collect dust during operation of silos.
- Standard operating procedures will be followed to handle and use aluminum phosphide, and to prevent exposure to phosphine gas. For this purpose, international sources such as Occupational Safety and Health Authority (OSHA) will be utilized.
- The O&M staff will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.

7.2.2.4 Soil and Water Contamination

The following measures will address the potentially negative impacts of the Project associated with soil and water contamination:

- Each facility will have waste management plan as part of its Operations Manual. No untreated waste effluents will be released to the environment.
- For the domestic sewage from the offices and residential areas, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity.
- Waste oils will be collected in drums and sold to the recycling contractors.
- The inert recyclable waste from the site (such as card board, drums, and broken/used parts) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste.

- Domestic solid waste from the offices and residential areas will be disposed in a manner that does not cause soil contamination.

7.2.2.5 Noise and Vibration

The following measures will address the potentially negative impacts of the Project associated with noise and vibration:

- It will ensure that the noise from the facility complies with the national and WB standards.
- PPE (ear muffs or air plugs) will be provided to the O&M staff
- Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the Supervision Consultants.
- Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.
- Vehicles will have exhaust silencers to minimize noise generation.
- Nighttime traffic will be avoided near the communities.
- Movement of all project vehicles and personnel will be restricted to within work areas
- Liaison with the community will be maintained. Grievance redress mechanism will be put in place to address the community complaints.

7.2.2.6 Diseases transmission

The following mitigation measures are proposed;

- The developer shall provide awareness education to workers on pathways for HIV/AIDS and other diseases and ways to avoid such diseases.
- Provide communication channels such as posters, films, books, brochures and flyers to educate people on the dangers of HIV/AIDS and how to avoid it.
- Developer in collaboration with Makambako Town Council shall provide Voluntary Counseling and Testing (VCT) Centres for HIV/AIDS.
- The developer shall provide protective gears to workers and encourage the use of condoms.

7.2.2.7 Vehicular Traffic

The following mitigation measures will be implemented to address the above potential impacts:

- The Department will prepare a traffic management plan for each silo facility. This plan will be a part of the Operational Manual of each facility.

- Liaison will be maintained with the relevant authorities (such as traffic police) regarding the wheat transportation particularly during emergencies.

7.2.2.8 Electricity Consumption

The following mitigation measures will address the negative impacts of the Project associated with the electricity consumption:

- Ensure electricity connection from multiple sources i.e., National grid and local source
- Keep the provision for backup generator

7.2.2.9 Damage to Infrastructure

The following mitigation measures will be implemented to address the above potential impacts:

- Appropriately sized vehicles will be used to transport the food grain, minimizing the wear and tear of the transportation routes.
- Proponent will maintain close liaison with the relevant authorities such as TANROADS for any damages caused by the food grain transportation.

7.2.2.10 Aesthetic Value

The following mitigation measures will be implemented to address the above potential impacts:

- Landscaping and tree plantation will be carried out at the facility.
- Proper housekeeping will be regularly maintained at the facilities.

CHAPTER EIGHT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.0 Overview

The Environmental and Social Management Plan (ESMP) prepared provide a guide for implementation of enhancement and mitigation measures of the impacts identified for the proposed project. The management plan indicates impacts, their proposed mitigation or enhancement measures, responsible institutions, and appropriate time for taking action and estimated costs. The proposed cost is only indicative, but during implementation the NFRA will work out actual costs and include them in the overall costs of the project. According to Environmental Management Act Cap 191 of 2004, NEMC will be responsible for ensuring compliance of all agreed conditions. Therefore the project management is ought to be pro-active in ensuring voluntary compliance by adopting the proposed mitigation and enhancement measures prescribed in this EIS.

The Environmental and Social Management Plan (ESMP) also presents the implementation schedule of the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. In order to be effective, Environmental Management Plan must be fully integrated within the overall project management efforts at all levels, which itself should be aimed at providing a high level of quality control, leading to a project which has been properly designed and functions effectively throughout its determined life span. The sited responsible institution should be ready to monitor indicators and fully supervise to fully minimize the impacts level.

To facilitate smooth implementation of the project, all parties involved in the design and those to be involved in construction of the transmission line will have to take into consideration the mitigation measures recommended in this study.

Table 17: Environmental and Social Management Plan (ESMP) for the proposed expansion of grain storage facilities

Identified impact	Enhancement and/ or Mitigation measures	Responsible Institution	Mitigation time	Estimated cost (US$)
Construction phase				
Positive impacts				
Creation of Employment Opportunities	• The project shall ensure that the labour force comes from surrounding communities particularly those with relevant skills to be occupied in the construction activities. • Due considerations shall be given between genders in providing employment opportunities. • Training programmes shall be carried out to workers to improve their skills especially in the issues of occupational health and safety. • The project management shall ensure formal employment contracts with the workers are instituted.	▪ Contractor ▪ Developer	Construction phase	10,000
Increased benefits to community and local economy	• Ensure more involvement of the local people in employment, provision of construction materials and other services • Ensure proper operation and maintenance of the proposed facilities after construction during operation phase to ensure sustainability of the project facilities and hence sustainable benefits from this project • Developer to give priority to local goods and products from local communities. • To ensure good governance and accountability with respect to benefits and gains that goes to the Local Government Authorities.	▪ Contractor ▪ Developer	Construction phase	2,500
Improving growth of the economy	▪ The project shall ensure effective payment of all relevant taxes to the government both local and central governments such as VAT during the procurement of construction materials such as cement	▪ Contractor ▪ Developer	Construction phase	4,500
Increased business opportunities	• The project shall give priority to local goods and services available from local producers and local service providers.	▪ Contractor ▪ Supervision firm ▪ Developer	Construction phase	5,000

Negative impacts				
Loss of vegetation	Compensatory tree plantation will be carried out within the facility and saplings five times the trees felled will be planted. Before starting the construction works, the contractor will prepare an inventory of the trees to be felled. The contractor will then prepare a tree plantation plan and the species to be planted and obtain approval from the Supervision Consultants. The plantation of trees will most likely take place towards the end of construction phase. Appropriate maintenance and monitoring will need to be carried out to ensure survival and growth of the planted species.	▪ Contractor ▪ Supervision firm ▪ Developer	Construction phase	1,000
Noise and vibration	• The contractor will ensure that the noise from the construction site and camps complies with the national standards • Vehicular traffic through communities will be avoided as far as possible. Project routes will be authorized by the Supervision consultants • Vehicle speed will be kept low, and horns will not be used while passing through or near the communities. • Vehicle will have exhaust silencer to minimize noise generation • Nighttime traffic will be avoided near communities • Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution • Working hours for construction activities within/near the communities will be limited to between 8 am to 6 pm. • Liaison with community will be maintained. Grievances redress mechanism will be put in place to address the community complaints. • Workers will use safety device for protection of ears (earmuffs and ear-plugs etc) following OSH Act of Tanzania. • Silo facility foundation shall be designed to minimize vibration effect.	▪ Contractor ▪ Supervision firm ▪ Developer	Construction phase	2,000

Air quality	• The vehicular and equipment exhaust will comply with the national standards • Contractor to ensure compliance with standards for ambient air quality • Water will be sprinkled where needed and appropriate, particularly at work site near the communities • Liaison will be maintained particularly with the communities near camps and work sites.	▪ Contractor ▪ Supervision firm ▪ Developer	Construction phase	1,000
Soil and Water contamination	• The contractor will prepare separate waste management plan for the site in accordance with international best practices • No untreated waste effluent will be released to ground or water • Vehicle and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination • For the domestic sewage from construction camps and offices, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity. The contractor will submit to the Supervision Consultants the plans for the camp layout and waste disposal system, and obtain approval. As stated above, camps will preferably be established inside the existing NFRA facilities as far as possible. • Waste oils will be collected in drums and sold to the recycling contractors • The inert recyclable waste from site (such as cardboard, drums, broken/used parts etc.) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste. • Domestic solid waste from construction camps will be disposed in a manner that does not cause soil contamination. The waste disposal plan submitted by the contractor (s) will also address the solid wastes.	▪ Contractor ▪ Supervision firm ▪ Developer	Construction phase	2,000

Soil erosion	• Material borrowing and disposal plan will be prepared and approval obtained from the Supervision consultants • The borrow and disposal areas will be re-contoured to avoid deep ditches or high mounds • Leveling and re-contouring borrow sites will be carried out. • Cut and fill at the proposed site will be carefully designed, and ideally should balance each other. The surplus soil, if any, will be disposed at places approved by supervision Consultants ("Engineer"). Such sites will be selected after surveying the area and ensuring that soil deposition will not have any significant impacts, such as loss of productive land, blocked access, natural vegetation and disturbance to drainage. • Areas from where the fill material is obtained or surplus soil deposited, will be landscaped to minimize erosion and hazard for people and livestock. • Construction camps will be located in a stable and flat area, requiring minimal devegetation and leveling. The contractor (s) will obtain approval from the Supervision Consultants for this purpose. Camps will preferably be located inside the existing NFRA facilities. • Embankments and excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken per the design (e.g., stone pitching). • Vehicular traffic on unpaved road will be avoided as far as possible. Operation of vehicles and machinery close to water sources will be avoided. • After the completion of the construction works, construction site, campsites and other work areas will be completely restored. Photographic record will be maintained for pre-project, during construction and post construction of the site.	• Proponent ▪ Contractor	Construction phase	1,000
Vehicular Traffic	• The contractors will prepare a traffic management	• Proponent	Construction phase	1,000

	plan for the site and obtain approval from Supervision Consultants. In particular, transportation and equipment ad material will be astutely planned to avoid traffic congestion and other associated problems. • Project Drivers will be trained on defensive driving practices • Speed limits will be enforced for the project vehicles • Reduced speed near/through communities • Liaison should be maintained particularly with the communities near camps and works sites. • Safety signage shall be placed at the site work.	▪ Contractor		
Safety hazards and Public Health	• The contractors will prepare site specific Health, Safety and Environment (EHS) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures particularly for communicable diseases such as hepatitis B, C and HIV/AIDS. • The contractor will provide personal protective equipment (PPE) to the construction staff and will ensure its appropriate use. • Availability of safe drinking water will be ensured for the construction staff. • Construction staff will be screened for communicable disease. • First Aid box will be made available on site. Emergency phone numbers (Including Hospitals, Fire Department and Police) will be displayed at key locations within the site. The site will have an Ambulance available. • Approved EHS policy will be included in the contact document. • Construction site will have protective fencing to avoid any unauthorized entry • Project drivers will be trained for defensive driving skills • Vehicular speed near/within communities will be	• Proponent ▪ Contractor	Construction phase	2,000

	kept low (20km/hr) to minimize safety hazards. • Camp site will be selected with approval of the Supervision Consultants, as mentioned earlier. Camps will have periphery fencing to avoid any unauthorized entry. • Firefighting equipment will be made available at the camps and worksite • Camp staff will be provided with safety including firefighting training. • All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel. • Waste management plan to be prepared and implemented in accordance with international best practices. • Liaison with the community will be maintained. • Engineer should be consulted before modifying a silo because a simple can drastically alter its structural ability. Equipment attached to a silo can impose dangerous loads.			
Damage to infrastructure	• Condition of the infrastructure in the vicinity will be regularly monitored. • Appropriately sized vehicles will be used to transport construction materials so as to minimize wear and tear of the transportation route. • All damaged infrastructure will be restored to its original or better conditions.	• Proponent ▪ Contractor	Construction phase	2,000
Aesthetic value	• Screens will be used at the site periphery • Landscaping and tree plantation will be carried out at site and camp where possible • Proper housekeeping will be regularly carried out at the site and camp.	• Proponent ▪ Contractor	Construction phase	1,000
Water availability and consumption	• Astute planning will be employed to conserve water at construction site and camps. Water will be procured in a manner that least affects the existing water users and local communities. • Contractors will submit the plan to procure and consume water for their construction as well as camp needs, and obtain approval from the	• Proponent ▪ Contractor	Construction phase	1,000

	Supervision Consultants. • Extreme care will be taken when working close to wells and other water sources. Any damage caused by the project activities will be repaired.			
Social conflict	• Liaison with communities will be maintained throughout the construction phase • Grievances redress mechanism will be established at site.	• Proponent ▪ Contractor		1,000
Operation phase				
Positive impacts				
Increased benefit to the Government	• Local government authority must ensure revenue is collected and well distributed and utilized • TRA to ensure VAT and other relevant levy are paid to the government.	• Proponent ▪ Contractor	Operation phase	10,000
Creation of employment opportunities	• Management of NFRA shall carry out regular training programme to workers to improve their skills especially in the issues of operation and maintenance as well as occupational health and safety. • Proponent shall ensure that there are formal employment contracts with all the workers.	• Proponent ▪ Contractor	Operation phase	10,000
The business opportunities will be increased	• The project shall continue to give priority to local goods and services available from local producers and local service providers.	• Proponent ▪ Contractor	Operation phase	5,000
Standards of living will improve through income earnings	• The proponent shall offer good salary packages • The proponent shall comply to all labour related legislations and guidelines • Conducive environment for workers shall be promoted in the project site the motivate workers.	• Proponent ▪ Contractor	Operation phase	2,000
Negative impacts				
Safety hazards and Public health	• Each facility will prepare a site specific Health, Safety and Environment (HSE) Plan. The Plan should also include awareness raising and prevention measures particularly for communicable diseases such as Hepatitis B, C and HIV/AIDS. HSE Plan will be made an integral part of the operational manual of the facility. The plan will	• Proponent ▪ Contractor	Operation phase	1,000

	particularly address procedures to handle Aluminium phosphide and to prevent exposure to phosphine gas. • Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals. • PPE will be provided to the O & M staff. • HSE training will be provided to the O & M staff on regular basis • Availability of safe drinking water will be ensured in the facility • First Aid boxes will be made available on site. Emergency phone numbers (such as Hospital, Fire Department and Police) will be displayed at key locations within the facility. • Firefighting equipment will be made available at the facility • All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel. • Waste management plan to be prepared and implemented in accordance with international best practices. • Liaison with the community will be maintained.			
Impact from Ancillary Facilities	• Adherence to fumigation Application Guideline • Regular air quality for CO_2, SPM, SO_X and NO_X should be measured. • Fire safety needs to be addressed during construction and operation. The Contractor should come up with a fire safety plan. NFRA will ensure fire safety measure is appropriately addressed during operation phase. The fire safety should be according to the IFC Environmental Health and Safety Guideline for community.	• Proponent ▪ Contractor	Operation phase	1,000
Air quality	• The vehicular and equipment exhaust should comply with the national standards. • The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM. The emissions from these filters will	• Proponent ▪ Contractor	Operation phase	1,000

	comply with the national standards for air quality • Compliance with the standard for ambient air quality will be ensured. • The steel silos to be constructed under BMFS project has the duct at the dust collection point, which will be attached to a reverse jet bag filter and then to the fan which will vacuum the duct and extract the dust. These suction ducts will be suitably installed at the dump pit of the grain collection point, to the bucket elevator and chain conveyors also to collect dust during operation of silos. • Standard operating procedures will be followed to handle and use aluminum phosphide, and to prevent exposure to phosphine gas. For this purpose, international sources such as Occupational Safety and Health Authority (OSHA) will be utilized. ▪ The O&M staff will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.			
Soil and Water Contamination	• Each facility will have waste management plan as part of its Operations Manual. No untreated waste effluents will be released to the environment. • For the domestic sewage from the offices and residential areas, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity. • Waste oils will be collected in drums and sold to the recycling contractors. • The inert recyclable waste from the site (such as card board, drums, and broken/used parts) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste. • Domestic solid waste from the offices and residential areas will be disposed in a manner that does not cause soil contamination.	• Proponent ▪ Contractor	Operation phase	1,000
Noise and Vibration	• It will ensure that the noise from the facility	• Proponent	Operation phase	1,000

	complies with the national and WB standards. • PPE (ear muffs or air plugs) will be provided to the O&M staff • Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the Supervision Consultants. • Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities. • Vehicles will have exhaust silencers to minimize noise generation. • Nighttime traffic will be avoided near the communities. • Movement of all project vehicles and personnel will be restricted to within work areas • Liaison with the community will be maintained. Grievance redress mechanism will be put in place to address the community complaints.	▪ Contractor		
Vehicular Traffic	• The Department will prepare a traffic management plan for each silo facility. This plan will be a part of the Operational Manual of each facility. • Liaison will be maintained with the relevant authorities (such as traffic police) regarding the wheat transportation particularly during emergencies.	• Proponent ▪ Contractor	Operation phase	1,000
Damage to Infrastructure	• Appropriately sized vehicles will be used to transport the food grain, minimizing the wear and tear of the transportation routes. • Proponent will maintain close liaison with the relevant authorities such as TANROADS for any damages caused by the food grain transportation.	• Proponent ▪ Contractor	Operation phase	1,000
Aesthetic Value	• Landscaping and tree plantation will be carried out at the facility. • Proper housekeeping will be regularly maintained at the facilities.	• Proponent ▪ Contractor	Operation phase	1,000
				Decommissioning phase
				Positive impacts
Rehabilitation/Vegetation	• Implement an appropriate re-vegetation programme to restore the site to its original status	• Proponent • Contractor	Throughout during decommissioning	2,000

	• Consider use of indigenous plant species in revegetation • Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent area and the development.		phase	
Employment opportunities	• NFRA in collaboration with contractor shall ensure that the labour force comes from surrounding communities particularly those with relevant skills to be incorporated in the decommissioning.	• Proponent • Contractor	Throughout during decommissioning phase	1,000
				Negative impacts
Solid wastes	• The proponent shall reuse and recycle all recyclable waste materials. • All solid wastes resulting from decommissioning activities shall be collected, sorted and then taken to the dump site for its destruction. • Instead of demolishing everything existed; agreements might be made in collaboration with CDA to have alternative uses of the structures instead of demolishing the structures.	• Proponent • Contractor	Throughout during decommissioning phase	5,000
Dusts	• Use water howitzers to dampen dust. • Cover rubble and other waste materials on transit. • To adhere to national standards on air quality.	• Proponent • Contractor	Throughout during decommissioning phase	3,000
Noise and vibration	• The proponent shall use well maintained and serviced machines and equipments which will have less noise emission confine activities to core area i.e. project area. • Use of Personal Protective Equipment (PPE). • Nearby residents shall be informed on the activities going on at the site and the possible impacts for them to take precautions. • There shall be warning signs to show major risks and necessary precautions to be taken. • Proponent shall shorten the decommissioning period as much as possible to reduce the extent of the impacts. • Activities shall be confined to core project area only to minimize spread of impacts to nearby areas.	• Proponent • Contractor	Throughout during decommissioning phase	5,000
Loss of employment	• NFRA shall give early notice to the workers (at least four months before decommissioning process) so	• Proponent • Contractor	Once during decommissioning	3,000

	that they can start looking for other jobs. • Workers shall be encouraged to explore other alternatives of employments so as to sustain their livelihoods after the closure of the project. • The project management shall ensure that the workers are paid terminal benefits on time.		phase	
			TOTAL	**89,000**

Source: Beyond Nature Limited, 2017

CHAPTER NINE

ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1 Introduction

Mitigation options and enhancement measures are meaningless without effective and consistent follow up – i.e. monitoring. Tanzania is facing this problem and the EMA (URT, 2004) and the EIA Regulations (URT, 2005) defines measures that have to be taken to address this issue. Monitoring must include checking for effectiveness or otherwise of mitigation and enhancement measures. EMA of 2004 defines roles for monitoring where the National Environment Management Council (NEMC) is empowered to enforce compliance to the environmental permits issued prior to development and follow in monitoring to ensure implementation of the Environmental Management Plan (EMP). NEMC therefore is required to conduct monitoring activities in collaboration with relevant sectors and other stakeholders.

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. There are four types of monitoring (Sadler, 1996) 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. Baseline monitoring for this project would entail observation of the types and rate of changes on the baseline conditions that was identified prior to the start of the project.
- **Impact/effect monitoring***:* involves the measurement of parameters (performance indicators) during construction, operation and decommissioning phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project. This monitoring provides experience for future projects and lessons that can be used to improve methods and techniques. For this project, this monitoring would entail analysis of the impact of the project on a range of parameters – for example, changes in livelihoods, increased in number of sales and purchase of grains in the Njombe and Iringa regions and increase of incomes and revenues for the people and the government of Tanzania.
- **Compliance monitoring:** takes the form of periodic sampling and continuous measurement of levels of compliance with standards and thresholds – e.g. for waste discharge, ambient air quality and noise levels. The monitoring for this project would mean collecting data on key parameters and compare them with national and international standards as provided in this report or other government notices.

- **Mitigation monitoring** aims to determine the suitability and effectiveness of mitigation measures and programmes, designed to diminish or compensate for adverse effects of the project. In this project, monitoring for this component would entail auditing the effectiveness of the mitigation measures to ascertain whether changes are needed to enhance best practices.

In this chapter a monitoring plan is proposed, the mitigation plan and the monitoring plan together constitute the **Environmental Management Plan** (EMP) for the proposed development. There will be several components for monitoring that will be an integral part of the proposed development project. Some of the issues for monitoring will relate to the potential for improved income and changes in life styles, increased employment opportunities, revenues and wilderness quality of the area. Other issues will relate to monitoring for waste management issues, water and power use and gains. The monitoring plan is provided in Table 17 below.

9.2 Monitoring Frequency and Reporting

Monitoring frequency is proposed for each critical parameter depending on the likelihood and level of change over time. Some parameters take longer time to show changes while others would change in very short time. For example, liquid effluents outflows should be monitored daily for pH and suspended solids. Monitoring should at least be on quarterly basis where water treatment is needed as in this project. Other parameters such as income, revenue, employment, changes in livelihoods, and use of resources (water and energy) will be monitored on annual basis – so as to allow for change to take place.

Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions are taken. Records of monitoring results should be kept in an acceptable format, an easily accessible, and information reviewed and evaluated to improve the effectiveness of the environmental protection plan. The results should be reported to the responsible authorities and relevant parties including NEMC in this case.

The monitoring plan addresses both impacts, positive and negative ones. Table 17 provides details of attributes to be monitored, responsible institutions, frequency, target level and estimated costs. These costs are only approximations and might vary during actual implementation. Therefore, NFRA will collaborate with government institutions such as NEMC, relevant sectors and other stakeholders accountable for follow up of the monitoring program.

Table 18: Environmental Monitoring Plan

Impact (s)	Enhancement/Mitigation measure	Responsible institution	Monitoring frequency	Target level	Measurement Unit	Cost (US$) per year
Monitoring of impacts during construction phase						
Creation of Employment Opportunities	• The project shall ensure that the labour force comes from surrounding communities particularly those with relevant skills to be occupied in the construction activities. • Due considerations shall be given between genders in providing employment opportunities. • Training programmes shall be carried out to workers to improve their skills especially in the issues of occupational health and safety. • The project management shall ensure formal employment contracts with the workers are instituted.	• Proponent • Contractor	Throughout construction phase	Use of local labour force Skilled local people employed Women employees increase of skilled labour from the local communities and Workers with contracts	Number of local labour force employed/total number of labour force Number of skilled local labour per total skilled labour Women employees per total staffs Number of trainings per year	20,000.00
Increased benefits to community and local economy	• Ensure more involvement of the local people in employment, provision of construction materials and other services • Ensure proper operation and maintenance of the proposed facilities after construction during operation phase to ensure sustainability of the project facilities and hence sustainable benefits from this project • Developer to give priority to local goods and products from local communities. • To ensure good governance and accountability with respect to benefits and gains that goes to the Makambako Town Council. • Revenues from proposed project shall be well distributed among members and the Council.	• Contractor • Proponent	During construction phase	Increase in sales unit	Revenues generated	10,000.00
Improving growth of the economy	• The project shall ensure effective payment of all relevant taxes to the government both local and central governments such as VAT during the procurement of construction materials such as cement.	• Proponent • Makambako Town Council • TRA	Throughout construction phase	Type and number of social services supported by the project	Direct observation	5,000.00

Increased business opportunities	• The project shall give priority to local goods and services available from local producers and local service providers.	• Proponent	Throughout construction phase	Increase in production	Unit output purchased	3,000.00
Noise pollution	• Confine activities to core project site • Use noise dampening equipment • Keep construction time as short as possible (i.e. adhere to time and schedule of construction) • Conduct regular servicing of building equipment to minimize noise	• Proponent • Contractor	In tandem with project developme nt phases	Low noise levels within allowed standard (85 dB)	Day time DB per area per day Night dB (A) per area per night	1,000.00
Wastes generation	• Preparation and implementation of the plan shall be made the responsibility of the building contractor with the system being monitored independently. • Special attention shall be given to minimizing and reducing the quantities of solid waste produced during site preparation and construction. • Any vegetation and combustible waste shall not be burned on the site. • Reusable inorganic waste (e.g. excavated sand/soils) shall be stockpiled away from drainage features and used for in filling where necessary and/ or possible. • Unusable construction waste, such as damaged pipes, formwork and other construction materials, will be disposed of at an approved dumpsite. • A solid waste management firm shall be consulted to collect the waste at the project site.	• Contractor • Proponent	Throughout construction phase	No wastes within areas	Tones of waste recycled per month Tones of waste disposed per month	1,000.00
Dust level	• Cover construction materials (sand, gravel, cement, etc) on transit and on site. • Restrict activities to core construction area. • Use water howitzers to dampen dust • Developer to adhere to national standards on air quality.	• Contractor • Proponent	Every day during construction phase	Low emission level within allowed standards	mg/L	1,000.00
Monitoring of impacts during Operation phase						
Diseases transmission	• The developer shall provide awareness education to workers on pathways for HIV/AIDS and other diseases and ways to	• Contractor • Proponent	Throughout construction	Number of staff aware on HIV/AIDS Records of	Direct discussion	1,000.00

	avoid such diseases. • Provide communication channels such as posters, films, books, brochures and flyers to educate people on the dangers of HIV/AIDS and how to avoid it • Developer in collaboration with Makambako Town Council shall provide Voluntary Counseling and Testing (VCT) Centres for HIV/AIDS. • The developer shall provide protective gears to workers and encourage the use of condoms.			compliance with measures		
Occurrence of Accidents and Hazards	• Provide and enforce use of protective gears • Ensure safety measures are followed during construction	• Contractor • Proponent	Throughout construction	Number of occurrence of accidents	No accidents at work place	1,000.00
Oil Spills	• Confine any vehicle maintenance to specially prepared areas with impermeable pads. • Refueling and maintenance of large vehicles will not take place on the construction site and that; correspondingly, there will be appropriate storage of fuel and lubricants on the site.	• Contractor • Proponent	Throughout construction	Quality of surface and underground water unchanged	–	1,000.00
Increased run-off	• Water runoff shall be handled by constructing and designing of curbs, channels, side inlets and road side ditches to channel water into the main drainage lines. These must be designed to prevent formations of pond and flooding. • All drainage lines shall be kept open and no obstruction shall be built within these lines.	• Contractor • Proponent	Throughout construction	No soil pollution and water pollution	-	1,000.00
Increased water demand	• Providing adequate water storage reservoirs on the construction site to meet project needs during periods of high demand externally and refill the tanks during periods of low demand (e.g. late at night). • Engaging water supply tankers in case of total supply failure.	• Contractor • Proponent	During construction phase	No underground seepage of wastewater Waste water effluents within standards	M^3	1,000.00
Increased resource use from Building materials and energy	• Construction materials such as wood, timber, stone aggregates and sand shall be obtained from established or	• Contractor • Proponent	Continuous during construction	Type of resources uses in the project area	-	5,000.00

used	designated sources. • Fuel wood for staff shall be obtained from established sources.		phase			
Incidents, accidents and dangerous occurrences	• Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Authority (OSHA) are in place. • Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training be emphasized.	• Contractor • Proponent	Every day during construction phase	Number of occurrence of accidents	No accidents at work place	1,000.00
Monitoring of impacts during Operation phase						
Increased wastes	• Rubble and solid waste shall be collected, sorted out, packed and transported outside the project site. • The developer to consider re-using or recycling some of the solid wastes. • Remaining solid waste shall be disposed off to outside the project area. • Some organic matters such as excrement shall be used as manure in gardens/ lawn to be established.	• Proponent • Local Council	Continuous	No wastes within areas	Tones of waste recycled per month Tones of waste disposed per month	1,000.00
Increased benefit to the Government	• Makambako Town Council must ensure revenue is collected and well distributed and utilized • TRA to ensure VAT and other relevant levy are paid to the government.	• Local Council • Proponent • TRA	Once in a year	Tax paid to the government	Direct observation	2,000.00
Creation of employment opportunities	• Management of NFRA shall carry out regular training programme to workers to improve their skills especially in the issues of animal's management and keeping as well as occupational health and safety. • Proponent shall ensure that there are formal employment contracts with all the workers.	• Proponent	As needed	Number of local community employed by the project	-	1,000.00
The business opportunities will be increased	• The project shall continue to give priority to local goods and services available from local producers and local service providers.	• Local Council	Continuous	Increase in production	Unit output purchased	2,000.00
The use of local products/services	• Proponent shall use the local available materials to increase benefits to suppliers.	• Proponent	Continuous	Income change per	Direct observation	10,000.00

	• Proponent shall promote its availability by paying reasonable prices to suppliers. • The project shall encourage sustainable use of locally available resources such as water.	• Local Council		household per unit time Type and number of social services supported by the project		
Standards of living will improve through income earnings	• The proponent shall offer good salary packages • The proponent shall comply to all labour related legislations and guidelines • Conducive environment for workers shall be promoted in the project site the motivate workers.	• Proponent • Workers	Once in a year	Increased revenues to the workers and government	–	5,000.00
Risk of accidents and injuries	• Provide and enforce use of protective gears • Ensure safety measures are followed during operation phase. • Anima eyes shall be covered during examination and treatment. • Provide trainings in relevant safety measures to workers. • Post sign and posters in relevant areas to forewarn workers on safety and dangerous issues.	• Proponent	Continuous	No accidents associated with operation and animal management and treatment	-	1,000.00
Monitoring of impacts during decommissioning						
Demolition waste management	• Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary landfills. • All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible • All foundations must be removed and recycled, reused or disposed of at a licensed disposal site • Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site	• Project Manager • Contractor	One-off	No wastes within premises	Tones of waste recycled per month Tones of waste disposed per month	3,000.00

	• Donate reusable demolition waste to charitable organizations, individuals and institutions.					
Vegetation disturbance	• Implement an appropriate re-vegetation programme to restore the site to its original status • Consider use of indigenous plant species in revegetation • Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent area and the development.	• Proponent • Contractor	During decommissioning	No deforestation	-	1,000.00
Employment opportunities	• Developer in collaboration with contractor shall ensure that the labour force comes from surrounding communities particularly those with relevant skills to be incorporated in the decommissioning.	• Proponent • Contractor	Throughout during decommissioning phase	Use of local labour force Number of Women employees	No of skilled local labour/ total skilled labour. Women employees/total staffs	5,000.00
Solid wastes	• The proponent shall reuse and recycle all recyclable waste materials. • All solid wastes resulting from decommissioning activities shall be collected, sorted and then taken to the dump site for its destruction. • Instead of demolishing everything existed; agreements might be made in collaboration with the Council to have alternative uses of the structures instead of demolishing the structures.	• Proponent • Contractor	Throughout during decommissioning phase	No wastes within premises	Tones of waste recycled per month Tones of waste disposed per month	1,000.00
Dusts	• Use water howitzers to dampen dust. • Cover rubble and other waste materials on transit. • To adhere to national standards on air quality.	• Proponent • Contractor	Throughout during decommissioning phase	Low dust levels (below 150 $\mu g/m^3$)	$\mu g/m^3$	1,000.00
Noise and vibration	• Use of well maintained and serviced machines and equipments which will have less noise emission confine activities to core area i.e. project area. • Minimize period of decommissioning as short as possible. • Use of Personal Protective Equipment (PPE). • Nearby residents should be informed on the activities going on at the site and the	• Proponent • Contractor	Throughout during decommissioning phase	Low noise levels within allowed standard (85 dB) No land degradation	Decibel (dB)	1,000.00

	possible impacts for them to take precautions. • There shall be warning signs to show major risks and necessary precautions to be taken. • To shorten the decommissioning period as much as possible to reduce the extent of the impacts. • Activities shall be confined to project area only to minimize spread of impacts to nearby areas.					
Loss of employment	• The developer shall give early notice to the workers (at least four months before decommissioning process) so that they can start looking for other jobs. • Workers to be encouraged to explore other alternatives of employments so as to sustain their livelihoods after the closure of the Petrol Service Station. • The proponent shall ensure that the workers are paid terminal benefits on time.	• Proponent • Contractor	Once during decommissioning phase	Termination of employment without complains	–	10,000.00

Source: Beyond Nature Limited, 2017

CHAPTER TEN

COST BENEFIT ANALYSIS

10.0 Financial cost benefit analysis to the project

Cost-benefit analysis is normally done in the framework of feasibility study of an activity. The aim of cost-benefit analysis is to inform the project developer to make a decision on:

- Whether it makes economic sense to continue with the project;
- Whether the chosen option is cost effective alternative; and
- Whether the size of a project is appropriate.

In this project the costs will include:

- Capital expenditures;
- Construction costs
- Operating and maintenance costs;
- Staff costs;
- Operation materials; and
- Environment, health and other social costs.

Benefits may include:

- Availability of modern and improved grain storage facilities
- Improved working conditions
- Accurate operation schedule to avoid unnecessary costs;
- Protection of environment and health; and
- Provision of other social benefits.

National Food Reserve Agency (NFRA) has undertaken a feasibility study of the proposed project, expansion of grain storage facilities both modern steel silos and warehouses and has confirmed that the project is economically viable.

10.1 Quantifiable and non-quantifiable benefits of the proposed project

There will be direct and indirect benefits to the communities as follows:

a) The project will employ over 100 people and almost all staff will be recruited locally.
b) The building will also attract other social economic activities
c) This facilities will be used as one of the Investment Resources thus to generate funds to NFRA and the government as a whole.

d) Modernizing the current food storage system in the country will result in improved storage capacity at national level to make available food stock in case of emergency and disasters.
e) The project will help ensure food and nutritional security to the communities, particularly in the disaster prone areas. By enhancing the post-disaster food distribution system.
f) The project will serve to safeguard livelihood, human capital and welfare of the poor and vulnerable populations.

10.2 Possible costs to communities

The construction is located at the plot owned by National Food Reserve Agency (NFRA), thus no any activities that will be disrupted. Other impacts are as elaborated in section 10.1. However, NFRA is committed to mitigate both environmental and social negative impacts.

10.3 Environmental costs and benefits analysis

Environmental cost benefit analysis is assessed in terms of the negative and positive impacts. Furthermore, the analysis is considering whether the impacts can be mitigated and the costs of mitigating the impacts are reasonable. One of the major significant negative environmental impacts is that the building is tall and silo will be made from steel thus in case of fire or earthquakes rescue might be a problem. Some mitigation measures to be considered during construction to minimize the danger.

10.4 Resources Evaluation

This section addresses financial analysis, economic analysis of the project and an extended cost-benefit analysis for the proposed project. However, lack of information on aspects such as cost and units for various materials that will be used in the construction process, overall running costs, cost of labour, etc. However, Table 18 shows some details relating to project' engineering costs estimates of this proposed project.

10.4.1 Benefit related to the project

Several benefits are associated with the proposed development both at local and national level in terms of revenue of generation and the multiplier effects associated with linkages with local and national economy. The proposed project will generate employment opportunities during construction and operational phases, which may be filled by local people with relevant skills. This opportunity will be supporting government initiatives to create employment opportunities for Tanzania and to meet the target of creating a million jobs per year as targeted by the current

Government. Notwithstanding that at the moment salaries are yet to be specified, it is envisaged that from employment, workers will get incomes, which will improve their quality of life and perhaps extend beyond the workers and benefits as many people as possible, including several dependants.

Table 19: Project's engineering costs estimate for Makambako site

S/.No.	PARTICULARS	Amount (USD)
1.	Electrical	615,706.97
2.	Installation of ICT equipment	47,416.36
3.	Environmental costs	155,016.02
4.	Procurement of Equipment	285,939.86
5	Civil works	1,392,057.99
6	Silos installations	2,319,726.38
7.	Warehouses	2,050,148.41
8.	Office Building, Canteen, Control rooms and Toilets	103,234.33
	Total Investment Costs for Makambako Site	**6,969,246.31**

Source: NFRA, 2016

Nevertheless, 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 developer in the agricultural sector generate revenue to both local and central government in the form of rents, taxes and levies including VAT.

10.4.2 Cost Related to the project

The estimated costs for implementing impact management as well as monitoring process as outlined in Chapter 8 and 9 is about US$ 89,000 and 96,000 respectively. The estimated costs for mitigation do not include the environmental costs, which could not be accurately calculated. Since some of the impacts will only be realized during construction phase, the costs for these will also be short term, especially if mitigation measures are fully implemented the project benefits outweighs the project costs by far.

CHAPTER ELEVEN

DECOMMISSIONING

11.0 Overview

The decommissioning of the project will be when the lifespan of the project area has reached to an end. The current life span for Makambako site is 61 years as per Right of Occupancy issued on 13st June 1979. The decommissioning process will involve closing of project operations and demolish all buildings and all machines and equipments and other facilities (like electrical systems, water tanks, air compressor, power generators, etc.). Other decommissioning activities will involve site clearance and transportation of waste materials to the disposal site. Decommissioning will address issues such as accidents, loss of employment, waste management and loss of revenues to the government. The decommissioning process will involve a series of activities, which need to be planned to ensure effective and efficient decommissioning.

11.1 Decommissioning plan

The proposed decommissioning plan for the closure of the project area is provided in (Table, 20). The plan indicates a series of activities to be undertaken, responsible institutions, duration of activity and estimated costs. The proposed cost for decommissioning is only indicative bear in mind that costs changes time after time, but during the actual decommissioning phase the developer will have to work out the actual costs and include that on the overall cost of the project. However, the developer prior to the decommissioning works might prepare a decommissioning plan that takes environmental issues into consideration. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use. (Table 20) proposed decommissioning plan, which can be amended in future during actual works.

Table 20: Decommissioning plan for NFRA – Makambako site

Planed Activities	**Responsible institution**	**Duration**	**Relative cost (US$)**
Provide information to workers on workshop termination, create awareness to workers who are losing employment on alternative means of generating their income and giving notes of termination of contracts	Developer (NFRA)	Three months	Low 3,500

Closure of the project site	Developer (NFRA)	One day	No cost
Payment of compensation and terminal benefits to workers	Developer in collaboration with Ministry of labour	One month	High 60,000
Removal of all movable facilities and assets such as computers, furniture and office documents	Developer (NFRA)	One week	Low 5,000
Dismantling of machines and equipment	Developer in collaboration with the contractor	One month	Medium 20,000
Demolition of buildings and other structures.	Developer in collaboration with the contractor	Two weeks	Low 10,000
Collection and sorting of wastes for reuse, recycle and disposal	Developer in collaboration with the contractor	One month	Low 5,000
Removal of wastes such as rubbles, and other wastes to the disposal site	Developer in collaboration with the contractor	Two weeks	Low 10,000
Refilling of depression and land leveling	Developer in collaboration with the contractor	One month	Medium 15,000
Compaction of the refilled land	Developer in collaboration with the contractor	One week	Low 8,000
Planting natural trees and grasses of origin to the cleared land	Developer in collaboration with the contractor	Two weeks	Low 4,000
Maintaining and monitoring of planted trees and grasses	Developer (NFRA)	Two years	Medium 15,000

Source: Beyond Nature Limited 2017

11.2 Significant impacts during decommissioning phase

11.2.1 Negative impacts

11.2.1.1 Noise level

The decommissioning phase will involve demolition of the buildings and removal of all machines and equipments and associated facilities (such as air compressor, water pipelines, power

generators, electrical appliances, water tanks, cooling system, etc.) and wastes generated. Other decommissioning activities will involve site clearance and removal of all solid wastes like pieces of timber, used iron sheets, used sanitary appliances, used electrical stuff, rubbles, etc. Demolition activities will be associated with noise generation and will increase noise levels in the surrounding area. Noise will also result from machines or equipments that will be used for demolition, for example, welding machines for cutting, drilling machines, etc. This impact will persist for a short period and will end immediately after decommissioning.

Proposed mitigation measures;

- Minimize period of decommissioning as short as possible to minimize exposure duration.
- Use noise dampening equipment.
- Regular servicing of decommissioning equipments.
- Use of PPE during decommissioning

11.2.1.2 Dust level

Demolition activities during decommissioning phase will generate dust. These activities (such as demolition all buildings, site clearance and transportation of waste materials to the disposal site and remove of all other facilities) will also generate dust hence increase dust level in the area and its coverage can spread in a wide area depending on wind speed and direction. The spread of dust might reach nearby residents and eventually affect people's health. Similarly, this impact will persist for a short period and will end immediately after decommissioning.

Proposed mitigation measures;

- Use of PPE like masks when people are at work in order to prevent dust.
- Fence the decommissioning site to minimize blowing air in order to reduce the spread of dust.
- Watering the bear land to reduce the dust as well as erosion
- Cover the rubbles on transit and on site

11.2.1.3 Increase of solid waste generation

The decommissioning process will involve generation of solid waste such as rubble materials from the floor, wall and other permanent structures, sanitary facilities (such as toilets, cisterns, wash basins, water pipes, tanks, etc.) and other used materials and furniture. These rubbles

and used materials will have to be removed and disposed off in appropriate disposal facilities. Sorting of wastes may be done to separate materials that are suitable for recycling and reuse to minimize waste for disposal. Considerable transport facility will be required to ensure that rubbles and other used materials are carted away from the company site to the disposal site.

Proposed mitigation measures;

- Solid waste should be collected, sorted out, packed and transported to the appropriate dumpsite
- Materials that cannot be reused shall be sent to the authorized dumpsite at Kipagamo.
- The developer to consider re-use or recycle of some solid wastes to minimize wastes for disposal
- Cover the rubbles on transit to avoid dropping of some the rubbles or used materials

11.2.1.5 Accidents and injuries

Accidents and injuries during decommissioning process may occur due to demolition activities. Accidents and injuries related to these activities may occur due to inappropriate handling or use of machines, mishandling of equipments, poor instructions and misconduct of procedures. All these issues endanger the safety of the workers. Therefore strong measures need to be taken to ensure no accidents and injuries are experienced during decommissioning process.

Proposed mitigation measures;

- Use of qualified staff in using machines and equipments
- Provide First Aid Kit
- Provide and ensure use of protective gears by the contractor
- Demolition workers should be well trained on safety measures
- Ensure safety measures are followed during decommissioning

11.2.1.6 Loss of employment and income

NFRA –Makambako is currently providing direct and indirect employment to local community from Makambako Township and nearby areas of Njombe region and other parts of the country. Decommissioning of the company would mean loss of employment and individual income to people. Over 100 people who are currently working with NFRA will lose employment and this may pose major challenges if alternative employments will not be found. It will result people to be jobless and lead to closure of small businesses around the area hence poor living standards to affected families. The decommissioning would also mean loss of revenue (i.e. Tax) to the

Tanzania Revenue Authority (TRA) and other taxes and levies to both central and local governments. This in turn may affect the governments in one way or another in provision of social services and enhancement of development programmes.

Proposed mitigation measures;

- The developer in collaboration with Njombe Region Labour office should ensure that workers are paid compensation and terminal benefits timely
- Workers should be encouraged to explore other alternative employment opportunities to sustain their livelihood after the closure of the project.
- Workers should be advised to introduce savings schemes and owning assets that would sustain their livelihoods in case employment comes to an end.

11.2.2 Positive impacts

11.2.2.1 Land restoration

Decommissioning of the Makambako project site will involve demolition of structures and removal of associated wastes generated as well as used materials for re-use. Such activity will allow the site to rejuvenate to its original condition prior to the construction of the workshop and parking area.

The proposed enhancement measures include:

- Rehabilitation of the area by removing all the artificial materials and reclaim all the land by allowing natural vegetation to grow.

CHAPTER TWELEVE

SUMMARY AND CONCLUSION

The proposed project is to be constructed in Njombe region, Njombe District. The project has enormous socio-economic benefits to both NFRA and the national as a whole. The project as such entails minimal adverse environmental impacts of which adequate mitigation measures have been proposed and incorporated in the project design.

It is therefore concluded that the proposed project expansion of grain storage facilities Silos and Warehouse will entail no significant impacts provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implemented regime laid down in this EIS. National Food Reserve Agency (NFRA) is committed in implementing all the recommendations given in this EIS and further carrying out the environmental auditing and monitoring schedules.

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Appendix 1: Terms of Reference (ToR) for the proposed project

TERMS OF REFERENCE FOR ENVIRONMENTAL IMPACT ASSESSMENT ON GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

Introduction

During scoping several key environmental issues of concern were identified after holding consultations with stakeholders of the project and also after reviewing various literature related to the project. Similarly, expert opinion was sought on various key issues identified as requiring specialized knowledge.

The purpose of Terms of Reference (TOR) therefore, is to provide formal guidance to the Proponent/EIA Consultants of the proposed development on the range of issues that must be addressed in the EIA process. They form the basis for subsequent review process. In these Terms of Reference, strategies for addressing the issues identified during scoping have been in cooperated to make the EIA focused.

Project Description

Government of The United Republic of Tanzania has received a Polish credit (tie-up soft loan) toward the cost of the Storage Capacity Expansion Project (SCEP). This project is being implemented by the National Food Reserve Agency (NFRA) which was established by the Executive Agencies Act No. 30 of 1997 and came into effect on the 1st day of July, 2008. The overall purpose of NFRA is to meet food emergency in the country for post disaster needs and improve the efficiency of grain storage management. Currently NFRA is planning to develop an improved silo storage system to store grain through the construction of modern grain storage silos at eight selected strategic sites.

Due to complexity and sensitivity of the project, NFRA is planning to carry out Environmental and Social Impact Assessment (ESIA) study for its proposed project at Makambako in Njombe district, Njombe region. Thus, following enactment of the Environmental Management Act Cap 191 of 2004 (EMA, 2004) and the Environmental Impact Assessment and Audit Regulations G.N. No. 349 of 2005, the proposed project has to be registered to the National Environment Management Council for screening. Moreover, based on the Third Schedule of the EIA and Audit Regulations of 2005, National Food Reserve Agency "*Client*" has commissioned the assignment to Beyond Nature Limited ("*Consultants*"); certified and registered firm of experts by

NEMC to register the proposed project to the Council and prepare a project brief and submit to the Council as required by the Environmental Management Act Cap 191 of 2004 (EMA, 2004).

The proposed project will be constructed in a way that its structures and operations will be designed to have a minimal impact on the environment. Proposed designed concept focuses on scheme that will not allow environmental pollutions and/ or degradation, underground seepage, using materials and styles which are compatible with the proposed project and the surrounding environment. The following structures will be constructed for the proposed project:-

- Silos and warehouse
- Internal roads (hardstand) pavements,
- Drainage system
- Office
- Control room
- Washrooms
- Canteen and
- Stores

Other components required in the silo complex from grain intake to grain storage will include intake unit, Bins, Cleaning and drying unit, bulk Conveyance unit (Conveyors and elevators), Bulk storage unit (prefabricated grain storage and Bagging Bin), aeration system, and Instrumentation.

Objectives of EIA

The objectives of the EIA are:

- To establish baseline information on both natural and built environment including socio-economic conditions of the proposed project area.
- To identify, predict and evaluate foreseeable impacts, both beneficial and adverse, of the proposed installation of pilot aggregate crushing plant project; and
- To develop mitigation measures that aim at eliminating or minimizing the potential negative impacts and promote positive ones.
- To develop management clauses and monitoring aspects to be observed during project implementation.

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

Environmental Assessment Requirements

The Environmental Management Act Cap 191 of 2004 requires that EIA be undertaken for all new projects that may cause adverse environmental and social impacts. Under the EIA and Audit Regulations of 2005 the proposed project is categorized as an EIA obligatory project for which a full EIA is required.

1.5 Study Area

Environmental Impact Assessment Scope of Work

Task 1: Description of the Proposed Project

The Consultants shall give details of:

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

Task 2: Description of the Environment

The Consultants shall:

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

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

Task 3: Legislative and Regulatory Considerations

The Consultants shall:

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

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

Under this activity the consultants shall:

i. Identify issues and concerns in order to find suitable remedies;
ii. Identify linkages among project components and the issues;
iii. Identify where project activities or elements interact with social and biophysical environment (direct impacts):
iv. Identify indirect impacts of the project on the environment;
v. Identify cumulative impacts that may be anticipated;
vi. Identify residual impacts if any;
vii. Predict probability, magnitude, distribution and timing of expected impacts:
viii. For certain project components it might be necessary to carry out assessment at two or more sites (alternatives) in order to come out with the best option; and
ix. Forecast what will happen to the affected environmental components if the project is implemented as is or if the alternatives (e.g. Sites and routes) are chosen.

Task 5: Estimation of the significance of the impacts

The consultant shall:

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

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

The consultants shall:

i. Determine appropriate measures to avoid or mitigate undesirable impacts;
ii. Assess and describe the anticipated effectiveness of proposed measures;
iii. Ascertain regulatory requirements and expected performance standards;
iv. Determine and assess methods to monitor impacts for prediction accuracy remedial measures for effectiveness;
v. Determine and assess methods to monitor for early warning of unexpected effects;
vi. Re-assess project plans, design and project management structure;

vii. Describe follow-up scheme and post-project action plan for achieving EIA objectives; and
viii. Assess the level of financial commitment by the project proponent for the management and monitoring plan, and follow up activities.

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

Task 7: Institutional set-up for

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

Task 8: Drawing Recommendations

The consultants shall:

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

Task 9: Environmental Impact Statement (EIS)

The assessment shall result into an EIS focusing on findings of the assessment, conclusions and recommended actions, supported by summaries of data collected etc. This shall be a concise document limited to significant environmental issues. The report format will be as per Environmental Management Act Cap 191 of 2004 and EIA and Audit Regulations of 2005.

Task 10: Review

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

Task 11: Public involvement

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

The assessment will provide a framework:

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

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

Structure of the EIA Report

Consultant shall prepare EIA report which must contain the following information:

(i) Executive summary;
(ii) Acknowledgement;
(iii) Acronyms;
(iv) Introduction;
(v) Project background and description;
(vi) Policy, administrative and legal framework;
(vii) Baseline or existing conditions;
(viii) Stakeholder Participation and Public Participation
(ix) Assessment of impacts and identification of alternatives;
(x) Impacts management or environmental mitigation measures;
(xi) Environmental and social management plan
(xii) Resource evaluation or cost benefit analysis;
(xiii) Decommissioning;
(xiv) Summary and conclusion
(xv) References;
(xvi) Appendices;

The Cover page of the Environmental Impact Assessment must have the following information:

i. Title of the proposed project;

ii. Location of proposed development;
iii. Developer;
iv. Lead consultants;
v. Contact address and phone;
vi. Date of submission.

The EIA must also contain an executive summary that contains the following information.

a) Title and location of the project or undertaking;
b) Name of the proponent and contact;
c) Names and addresses of experts or firms of experts conducting EIA;
d) A brief outline and justification of the proposed project or undertaking showing
    (i) A brief description of the project environment;
    (ii) Project stakeholders and their involvement in the EIA process;
    (iii) Explanation on why some impacts are not addressed;
    (iv) List of developer, consultant, local planning authorities and other people and organizations consulted
    (v) Results of public consultation
    (vi) Description of the major significant impacts;
    (vii) Alternative considered;
    (viii) Recommendations and plan for mitigation of the impacts;
    (ix) Environmental and social management;
    (x) Proposed monitoring and auditing; and
    (xi) Resource evaluation or cost benefits analysis.

Time Scale

It is expected that the study would be completed within a period of four months. However the effective consultancy period is 90 days (Including registration of the project, follow up of the review with NEMC on behalf of the Client).

Personnel Requirement

The consultants shall deploy consultants/experts with the demonstrable practical experience in conducting EIA studies with specific experience in civil and structural engineering, environmental engineering and management and sociology.

Reporting and Report Presentation

The final draft of the EIS document should be concise, following the report writing guidelines in the EIA and Audit Regulation of 2005, for simplifying the review process.

Record of Meetings

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

Expected Output and Deliverables

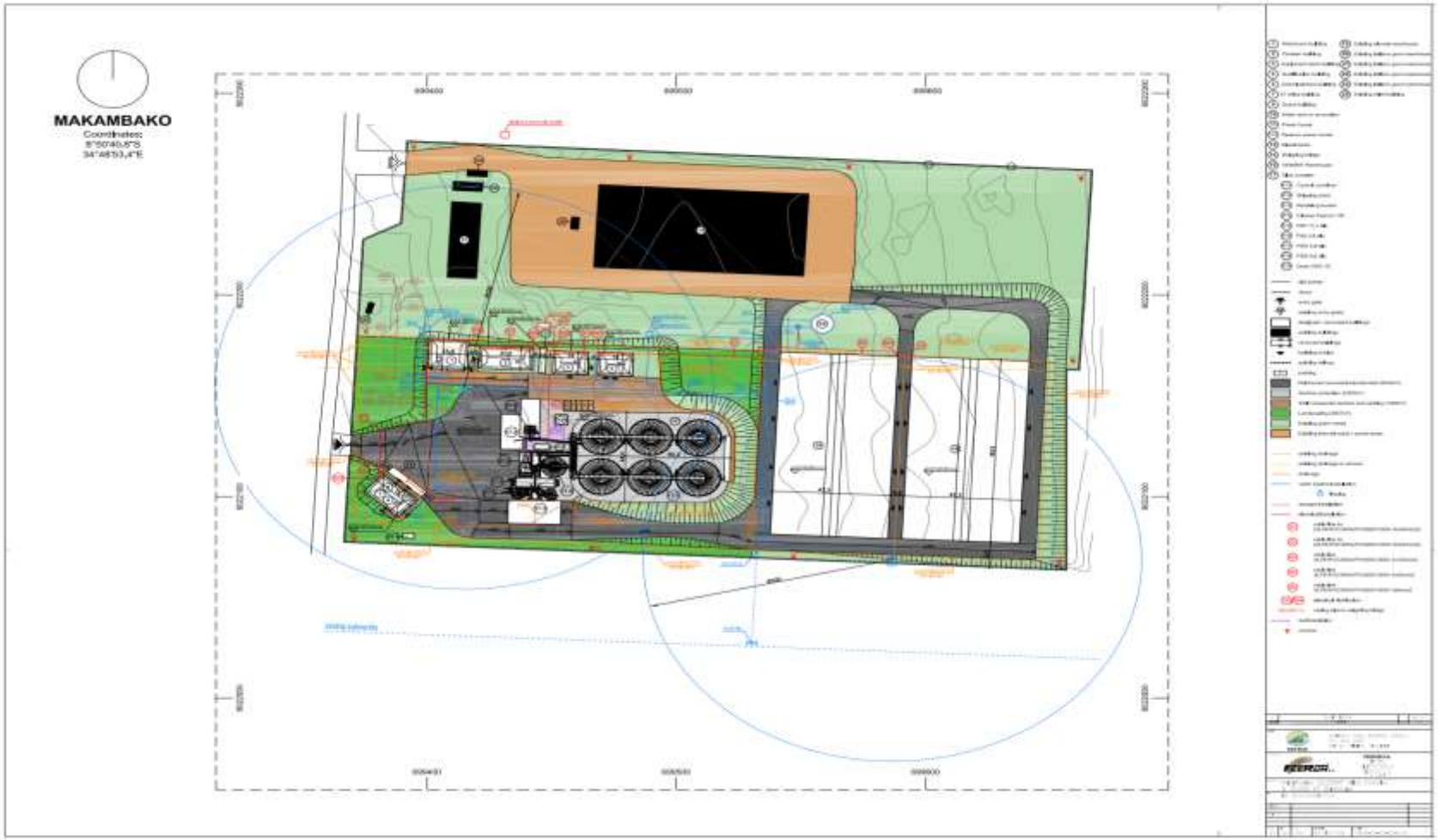
The EIA team should produce and submit a draft Environmental Impact Statement (EIS) to the developer for review and comments. The team shall incorporate all relevant comments to the report and produce final EIS, which will be handed to the developer for submission to the National Environment Management Council (NEMC) for review. The Team shall produce draft 15 hard copies of the EIS and 5 copies after comments shall be submitted to NEMC. Alongside these hard copies, one electronic copy of the same shall also be submitted to NEMC

The EIS report shall follow guidelines and outline stipulated under subsection VII on the section detailing activities in this ToR.

Reference

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

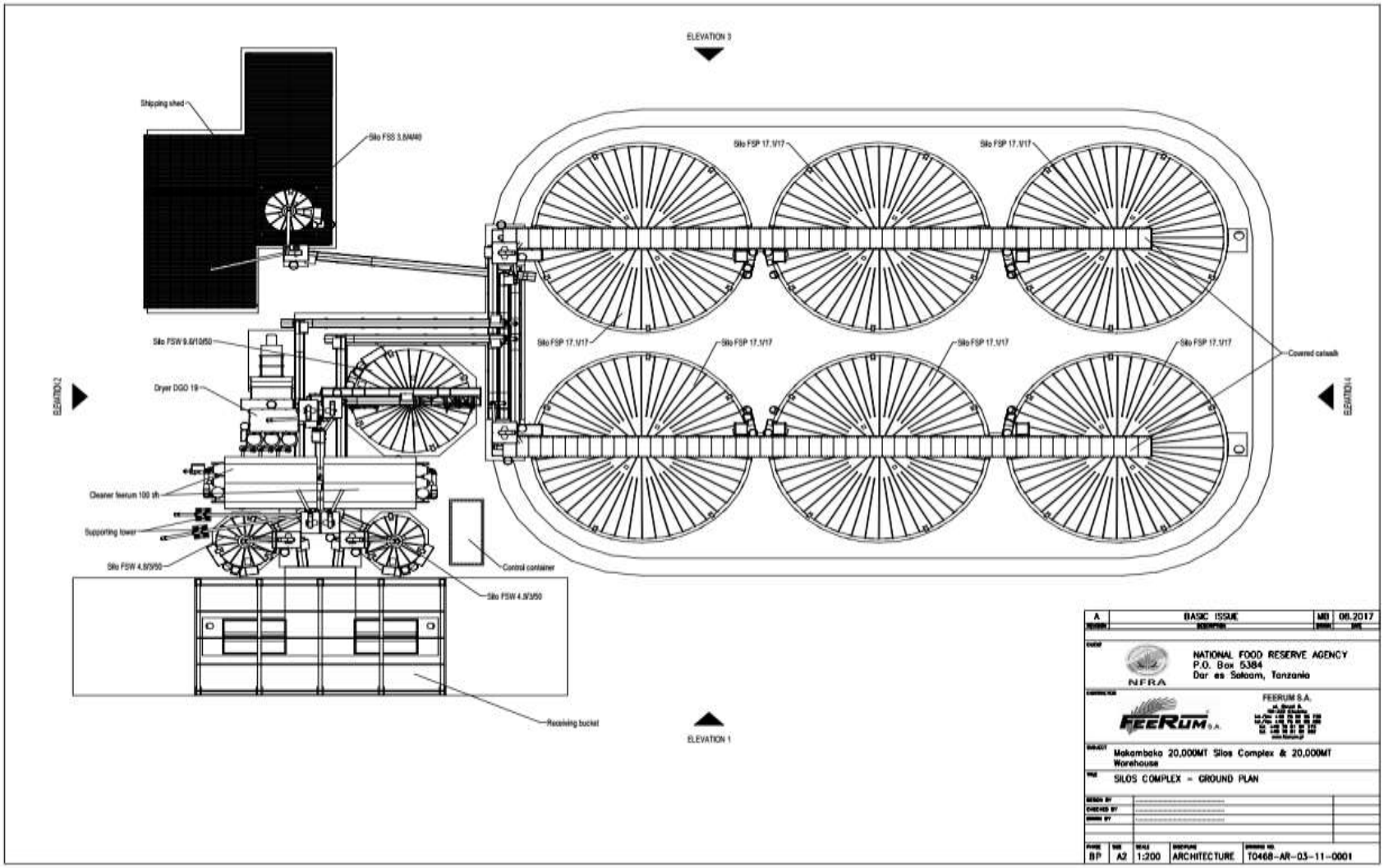
Appendix 2: Site layout plan for Makambako



Site layout Plan

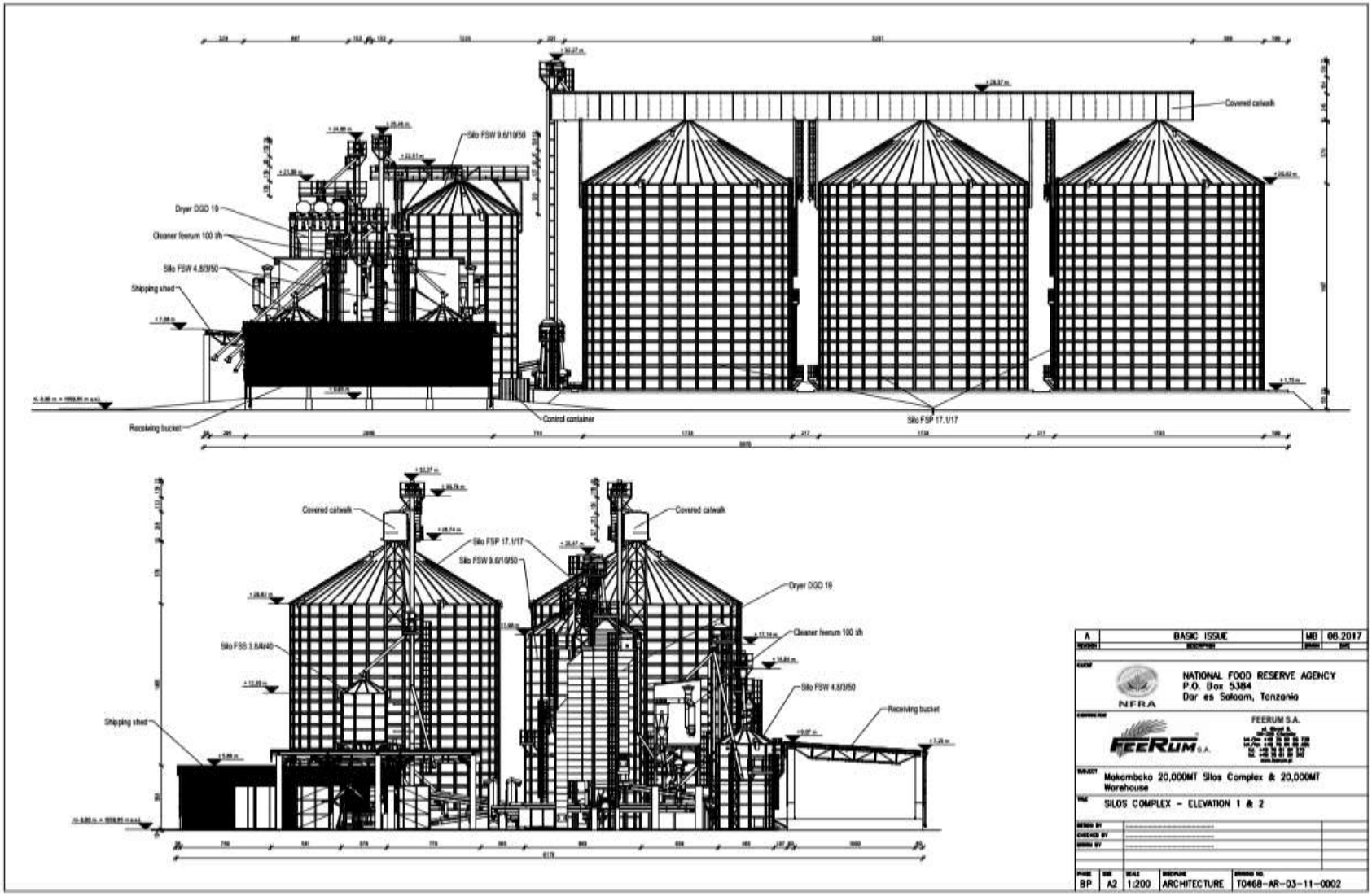
Source: NFRA, 2016

Appendix 3: Design and Architectural drawings of Silos



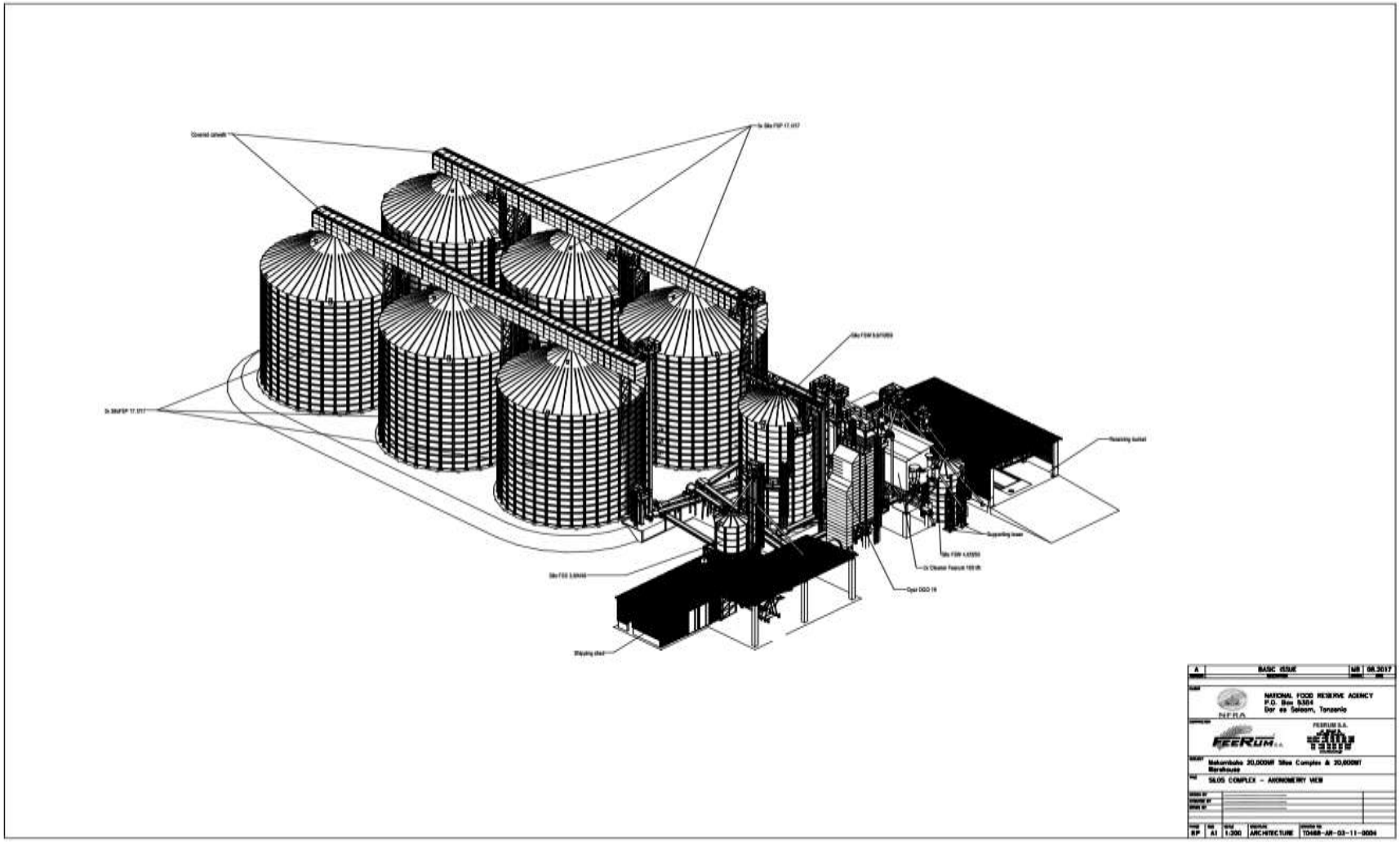
Silo Plan

Source: NFRA, 2017



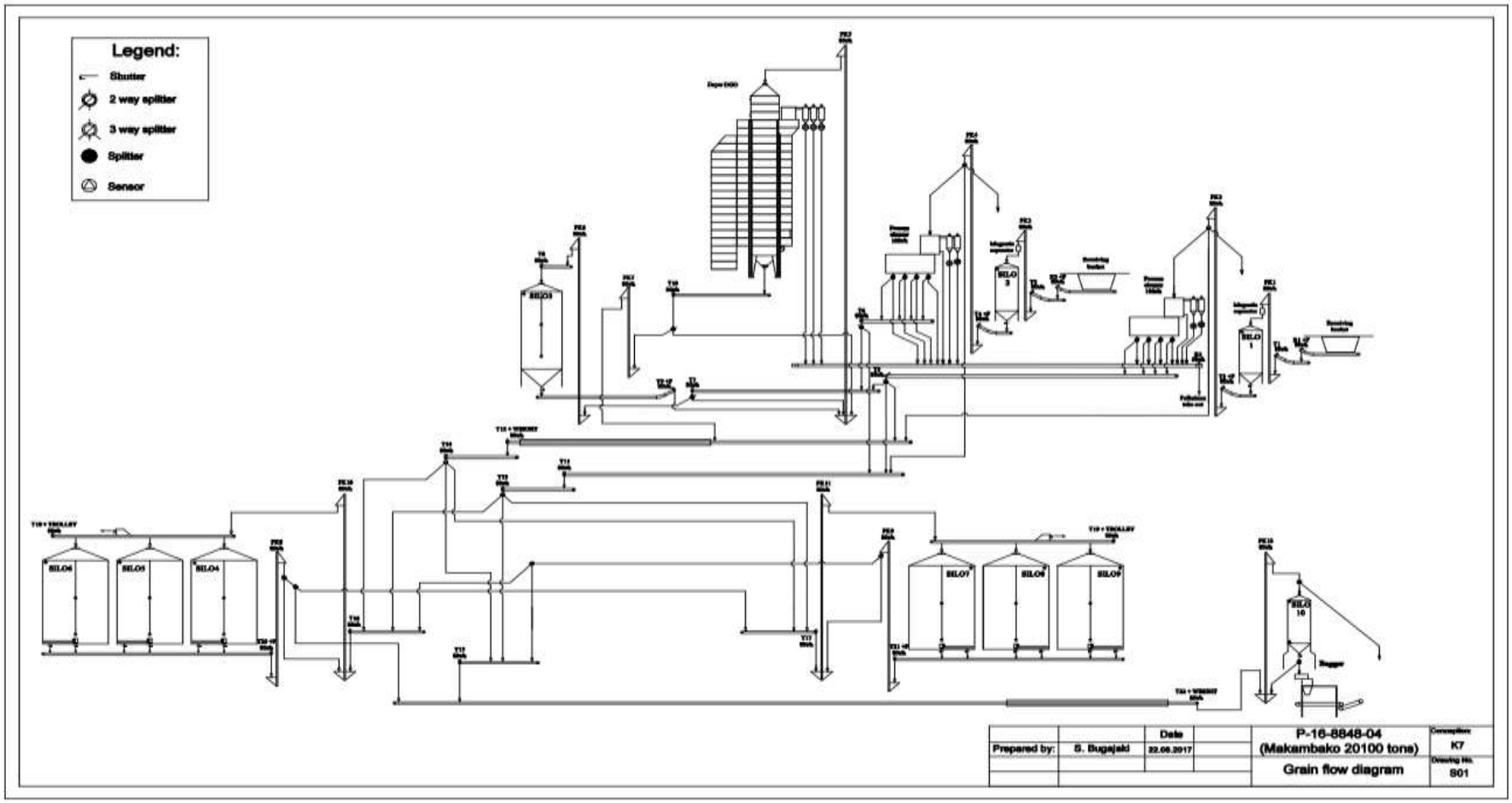
Silo Elevation Plan

Source: NFRA, 2017



Silo 3 Dimension Plan

Source: NFRA, 2017



Grain Flow Diagram

Source: NFRA, 2017

Appendix 4: Constructional features of Silos complex

Constructional Features of a Silo Complex

821.1 Intake hopper

Intake hopper to be constructed with drive on grates made in steel and designed for 10 ton wheel pressure. The hopper should be complete with motorized regulating shutters. Size shall be 3000mm by 5000mm.

821.2 Chain conveyor

Belt conveyor be supplied complete with drive section belt tension, intermediate section, and 3 inlets, all completely to cover.

821.3 Bucket elevator

The bucket elevator should be fabricated to AISI 304 standards and supplied complete with speed guard, top head and intermediate trunks, belt, buckets, and backstop.

821.4 . Pre-holding Bin

Buffer bin for pre-cleaner complete within section door and window and level sensors to operate intake

821.5 . Pre-Cleaner

- Product : Maize
- Density : 710kg/m3
- Moisture Content : 18%

Pre-cleaning of all cereal and has a Screen area of 13m² in conjunction with an efficient pre and after suction system. The base and frame of the 145 machine is in heavy gauge pressed steel profiles. The screen boat is manufactured from insect and moisture resistant marine plywood.

The machine inlet is equipped with a ribbed feeding roller Complete with a separate motor and variable gearbox for step less speed adjustment of the feeding roller. The screen boat is oscillated via a balanced central eccentric system producing a vibration free motion. The fixed speed drive consists of one motor with belt drive, belt protection and motor brackets. The highly efficient pre and after suction system incorporates false air intake principle in order to control the airflow simple and quick.

The extracted lightweight material is deposited in two separate expansion chamber and discharged by two discharge augers, each equipped with multi-flap seals to prevent increase of any unwanted false air.

821.6 . Motor for cleaner

- 0.75; 2.2 kW or as per manufacturer specifications.

821.7 . Set of screens for pre-cleaning

821.8 . Centrifugal Fan

Centrifugal fan, complete with intake Grid Ø 620mm, exhaust air adaptor diameter 600 x 460- Ø 600, pull rings exhaust assembly method Air flow 16000m³/h, Static pressure 120mm WG, Motor size 11.0 KW or as per manufacturer specifications.

821.9 . Cyclone and Rotary valve

Cyclone complete with inlet and outlet and rotary valves, Motor Size 0.37 Kw or as per manufacturer specifications.

821.10 . Aspiration pipes

Aspiration pipes including bend, straight pieces and clamps

821.11 Cleaner Stand

Strong steel stand for cleaner mounting and free from vibration

821.12 Motorized Two Way Valve

Motorized two way valve complete with indications and Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.13 Bucket Elevator

Bucket elevator supplied complete comprising boot with speed guard, top head with drive and intermediate trunks, belt, buckets and backstop. Drive: Hollow shaft gear arrangement with 11 Kw motor or as per manufacturer specifications.

821.14 Belt Conveyor

Belt conveyor supplied complete with drive section belt tension and fully covered. Drive: Hollow shaft gear arrangement with 1.1Kw motor or as per manufacturer specifications.

821.15 Motorized Two Way Valve

Motorized two way valve complete with indications Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.16 Conveyor with Discharge Car

Belt conveyor supplied complete with drive section belt tension and fully covered. Drive: Hollow shaft gear arrangement with 2.2 Kw motor and 0.37 kW or as per manufacturer specifications.

821.17 Catwalk Package

Catwalk on top of wet bin for inspection and maintenance of conveyors, complete with side extension supports, silo peak supports, goal post supports and roof.

821.18 Wet Maize Holding Bin

Hopper bin for holding wet Maize, Hopper angle 45º, Diameter 7.0 meter Height to eave 13 m, Overall height 15 m, Cubic volume 392 m³ capacity Storage capacity 294 metric tons, Compacted capacity 307 Metric tons, Product: Wet Maize 0.710Ton /m³, Gate clearance 955mm, Galvanizing G-600, Design pressure DINN 1055, Structural

calculation BS5950 Pt 5, Allowable wind load 50/sec (180km/hour), Allowable snow load 1 kn/m², Anchor bolt packages. Roof vents to be fitted to each silo, Rack and pinion gate with hand wheel, Temperature cable supports, Eaves Access Hatches, Hopper Access Hatches, Bottom ring sidewall access Hatches, Complete silo access package with silo eaves, platforms, 2 catwalk access ladders, portable hook ladder, 2 sidewall hatch platforms and sidewall hatch platform ladders.

821.19 Hopper Aeration systems

Hopper Aeration systems with half round perforated duct, and 0.75 kW fan total air flow cfm per 1050 cfm & cfm per ton 3.73cfm/ton static pressure 3.8 WG, Perforated lateral packages, lateral runs complete with inlet spigot, end cap and fittings, hopper assembly requires site drilling.

821.20 Regulating Shutters

Regulating shutters with indications Motor Size 0.37

821.21 Belt Conveyor

Belt conveyor supplied complete with drive section belt tension four inlets and fully covered. - Drive: Hollow shaft gear arrangement with 2.2 Kw motor or as per manufacturer specifications.

821.22 Belt Conveyor

Belt conveyor supplied complete with drive section belt tension and fully covered. - Drive: Hollow shaft gear arrangement with 1.1Kw motor or as per manufacturer specifications.

821.23 Bucket Elevator

Bucket elevator supplied complete comprising boot with speed guard, top head with drive and intermediate trunks, belt, buckets and backstop. - Drive: Hollow shaft gear arrangement with 11 kw motor or as per manufacturer specifications.

821.24 Conveyor

Belt conveyor supplied complete with drive section belt tension and fully covered. - Drive: Hollow shaft gear arrangement with 1.1Kw motor or as per manufacturer specifications.

821.25 Catwalk Package

Catwalk on top of wet dryer for inspection and maintenance of conveyors, complete with side extension supports, silo peak supports and goal post supports.

821.26 Dryer

Continuous flow grain dryer type AEG - 19 made in Galvanized steel plate out of which 4 sections are for cooling. Dryer equipped with Six standard Vertical mounted cyclo-fans, With dust collection system and rotary valve supplied with direct fired heating arrangement, horizontal furnace and 2- step burner for use with either light diesel or industrial diesel oil. Dryer provided with Fuel meter and Hour meter -

- Drive: standard cyclofans 6 x 22 Kw,

- Burner 1.5 Kw
- Rotary Valve 0.37 Kw
- Discharge 0.75 Kw
- Discharge Auger 3.0 Kw
- Product Maize
- Reduction of moisture content (18-13) %
- Ambient temperature 22°C
- Relative humidity 60%
- Drying air temperature 85°C
- Drying zone 15 sections
- Cooling zone 4 section
- Air flow per section 6700m³/h
- Capacity: Drying 25tph
- Holding 47.mt
- Maximum grain temperature 56.0°C
- Grain discharge temperature 27°C
- Evaporation of water 1476Kg/h
- Net heat requirement 1830Mcal/h
- Oil consumption 187kg/h

821.27 Belt Conveyor

Belt conveyor supplied complete with drive section belt tension, intermediate section all completely Covered - Drive: Hollow shaft gear arrangement with 1.1Kw motor or as per manufacturer specifications.

821.28 Motorized Two Way Valve

Motorized two way valve complete with indications - Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.29 Bucket Elevator

Bucket elevator supplied complete Comprising boot with speed guard, top head with drive and intermediate trunks, belt, buckets and backstop. - Drive: Hollow shaft gear arrangement with 15 Kw motor or as per manufacturer specifications.

821.30 Hopper Bin

Hopper bin for pre holding grains before weighing, complete with shutter and level sensors. - Size 1200 x 1200 x 2900 (L x W x H) mm - Capacity 2.2 Mtor as per manufacturer specifications.

821.31 Process Weigher

Process weigher Complete with Radial linefeed gate, Dual Bomb door discharge, Dual load cell weigher system, Built in at 30 controller Electronic Totalizing -

- Product Maize
- Capacity 100 T/H

821.32 Motorized Two Way Valve

Motorized two way valve complete with indications - Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.33 Belt Conveyor

Belt conveyor supplied complete with drive section belt tension, intermediate section all completely Covered - Drive: Hollow shaft gear arrangement with 1.1Kw motor or as per manufacturer specifications.

821.34 Belt Conveyor

Belt conveyor supplied complete with drive section. - Drive: Hollow shaft gear arrangement with 1.5 Kw motor or as per manufacturer specifications.

821.35 Motorized Two Way Valve

Motorized two way valve complete with indications - Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.36 Chain Conveyor with discharge car

Chain conveyor supplied complete with drive section belt tension, intermediate section with discharge car. - Drive: Hollow shaft gear arrangement with 3.0 Kw motor AND 0.37 or as per manufacturer specifications.

821.37 Steel Catwalk

Catwalk on top of wet silos for inspection and maintenance of conveyors, complete with roof cover, side extension supports, silo peak supports and goal post supports.

821.38 Flat Bottom Storage Silos

- Flat Bottom Grain Storage Silos type	
- Diameter	17.00 Meter
- Height to eave	18.80 Meters
- Overall height	23.90 Meters.
- Cubic volume	4,268 m^3
- Storage capacity	3,031 Metric tons
- Compacted capacity	3,350 Metric tons
- Product:	Maize
- Product Density	0.71Ton /m^3
- Galvanizing	G 600
- Design pressure	DINN 1055
- Structural calculations to	BS5950 Pt 5
- Allowable wind load	50/sec (180km/hour)
- Allowable snow load	1 kn/m^2
- Anchor bolt packages.	
- Temperature Cable Supports	
- Roof vents – 7 vents to be fitted to each silo	
- Eaves Access Hatches	
- Bottom Ring Sidewall Access Hatches.	

- Angle of repose Sidewall Access Hatches
- Complete silo access package
- Silo eaves platforms
- Catwalk access ladders
- Escape Ladders
- AR Door Access Platform Ladders
- Portable hook ladder,

821.39 Silo Aeration fans

- Centrifugal Fan 7.5 Kw 50 hz 415 Volt
- Fans per silo 2
- Cfm per ton 4.81 cfm/ton
- Total CFM 10,000
- Static pressure 10.0 WG
- Product Maize
- Sufficient perforated lateral packages a total of 225 linear meters giving a total of 75 per silo
-

821.40 Silo Sweep Augers Assemblies

- Permanent Sweep Auger Assemblies
- Each sweep is complete as follows
- Silo Diameter: 17.00 Metres
- Cubic Capacity 67m³/hrs
- Handling Capacity 50TPH
- Product Maize
- Motor drive 5.5 KW 50 Hz 3 Phase 400 Volt

821.41 Sets of silo wells and shutters

- Set of silo wells
- Set of motorized shutters with indication for open and close
- Hand operated regulating shutters with indication
- Drive Motors 0.37

821.42 Chain Conveyor

Chain conveyor supplied complete with drive section, belt tension and intermediate sections and 18 inlets - Drive: Hollow shaft gear arrangement withappropriate power requirements i.e(2.2 Kw motor, .1.5 Kw motor.1.1 Kw motor etc or as per manufacturer specifications.)

821.43 Chain Conveyor

Chain conveyor supplied complete with drive section, belt tension and intermediate sections and 1 inlet - Drive: Hollow shaft gear arrangement with 1.1Kw motor or as per manufacturer specifications.

821.44 Chain Conveyor

Chain conveyor supplied complete with drive section, belt tension and intermediate sections and inlet - Drive: Hollow shaft gear arrangement with 1.1 Kw motor or as per manufacturer specifications.

821.45 Bucket Elevator

Bucket elevator supplied complete comprising boot with speed guard, top head with drive and intermediate trunk, belt, buckets and backstop. - Drive: Hollow shaft gear arrangement with 15 Kw motor or as per manufacturer specifications.

821.46 Hopper Bin

Hopper bin for pre holding grains before weighing, complete with shutter and level sensors. Size 1200 x 1200 x 2900 (L x W x H) mm - Capacity 2.2 Mt or as per manufacturer specifications.

821.47 Process Weigher

- Process weigher Complete with Radial linefeed gate
- Dual Bomb door discharge
- Dual load cell weigher system
- Built in at 30 controller
- Electronic Totalizing
- Product Maize
- Capacity 100 T/H

821.48 Motorized Two Way Valve

Motorized two way valve complete with indications Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.49 Belt Conveyor

Belt conveyor supplied complete with drive section, belt tension and intermediate sections and 1 inlet - Drive: Hollow shaft gear arrangement with 1.5 Kw motor or as per manufacturer specifications.

821.50 Open Steel Catwalk

Catwalk on top of bagging bin for inspection and maintenance of conveyors, Complete with side extension supports, silo peak supports, goal post supports.

821.51 Motorized Two Way Valve

Motorized two way valve complete with indications - Motor for rotary valve 0.37 kW or as per manufacturer specifications.

821.52 Bagging Bin

- Apache Hopper Bottom Storage Silo
- Diameter 4.00 Metres
- Height to Eave 3.78 Metres
- Overall Height 4.36 Metres
- Cubic Volume 25 m^3
- Storage Capacity 18 Metric Tons
- Product Maize
- Product Density 710kg/m^3
- Hopper Angle 45

- Gate Clearance 850mm
- 1 Roof Vent
- 1 Rack and pinion
- 1 Eaves Access Hatch
- 1 Roof Ladder

821.53 Bagging Bin Stand

Steel made bagging bin stand.

821.54 Electronic net weighing scale - 50 Kg

Suitable for free flowing granulated cereals to fill 50kg bags, Feeder made of two gates, pneumatically operated, to control coarse and dribble flow. Two load cells arrangement. Filling spout suitable for 50kg elliptical shape, equipped with clamps, pneumatically activated to hold the bag during the weighing and filling operations.

The release of the bag is automatic once the weighing and filling is complete. Discharge hopper to connect the scale with the packer, designed with round corners to avoid product stagnation.

- Electrical cabinet for the control
- Steel frame to support the scale.
- Capacity : 250 bags/hr on 50kg.
- Accuracy : +/- 0,15 per cent on
- (Approval and Stamping by Weights and Measure excluded)

821.55 Bag conveyor

- Length; 3.2mt long.
- Suitable to transport fillet bags with open mouth.
- Linear speed of the conveyor; Standard 10m/min
- Motor reducer; 0.37kW, 230/400V AC, 1450rpm
- Material; PVC
- Belt thickness; 3.2mm
- Belt width; 300mm

821.56 Column mounted sewing system

Equipped with the following components or as per manufacturer specifications.;

- Manual height adjustable column: range 500mm (distance from the ground to the needle minimum: 610mm, maximum: 1110mm)
- Adjustable over arm, ref. 4100. "Low Vibration"
- Sewing Head with shear type knife.
- Stitch length: Standard 9mm, adjustable between 7 and 11,5mm.
- Linear speed of the system: Standard 11m/min, adjustable (depending on the stitch length and motor pulley).
- Noise Level : 77 dB.
- Color : Billowy Grey
- Wire box 1 starter for the motor of the sewing head (when a conveyor is linked, it needs another wire box).
- Start/stop of the sewing process controlled by foot switch
- Power supply : 415VAC- 3 Ph– 50Hz.

- Control Circuit: 24VAC – 50 Hz.
- Total Power: 0,5 kW – 1,5 A.
- Degree of protection: IP55.
- Motor for the sewing head: 240/415VAC-3 Ph- 50Hz-1450 rpm, 0,37kW/IP55
- Insulation class: F.

821.57 Central aspiration System

Super Cyclofan type CF930 complete with rotary valve, adaptor, sucking off spout and pipes Motor for fan and valve 22 Kw & 0.37 Kw or as per manufacturer specifications.

821.58 Pellet Dispenser

Phostoxin Pellet Dispenser Completely motorized and automatically controlled on fumigation

821.59 Compressor

- High capacity compressor to support the entire plant
- Less Noise level
- Motor 7.5 Kw 10 Bar or as per manufacturer specifications.

821.60 Lot of Aspiration pipes,

- Complete lot of aspiration pipes complete with bends, branch pieces clamps and straight sections

821.61 Grain Ducts

Lot of square grain ducts, complete with all necessary bends, elbows, two way valves, shutters and assembly flanges.

821.62. Lot of ladders

Ladders to silo top, elevator platforms and down into elevator pits

821.62 Lot of elevator platforms

Elevator platforms for service and inspection of elevator heads.

821.63 Lot of brackets and supports

Brackets and support for the quoted supply

821.64 Unitest Temperature Monitoring System

Completely equipped with window based software that gives situation report inside the silo. It also record the data and stores in a data base for a period not less than one month and can be accessed and printed.

821.65 Stock Monitoring Unit

Computerized program for continuous checking what is in and out of the silo (Silo Stock)

821.66 Lot of electrical cables, cable trays safety and service Switches.

For an intrinsically safe installation, superb layout with service and emergency isolation switches and necessary start warning incorporated.

821.67 Electrical Control Panel including:

Free standing Main Control Panel, Telemecanique switch gear (contactors, overloads, Auxiliaries & General control)

821.68 PLC:

A Programmable Logic Controller (PLC-Omron) is installed in the Main Control Panel (MCP), in which the complex part of the control a circuit is programmed. Inputs and outputs are connected to the PLC, the control circuits are programmed into the PLC memory, and substitute a lot of auxiliary relays and wiring as well as it makes modification and future expansion easy.

The PLC is placed behind the doors on a mounting plate. Input and output plug modules are placed in racks and status is indicated by built in Light emitting diodes.

- Digital input modules: 24 VDC
- Digital output modules: No voltage contacts.

821.69 PC Station:

The plant is controlled from the PC in the control room. The mimic will be divided into several pictures, in a way that makes the plant well arranged in a systematic and logical sequence.

The used software on the PC is Omron CX-Supervisor, that is a software package used to create PC based man- machine interfaces. Future changes and expansion are easily accommodated in this setup. Online help/backup service is also possible.

821.70 Computer:

The computer is delivered with all necessary equipment for a safe usage i.e. Monitor, keyboard, mouse, excluding UPS, SCADA software: Omron CX-Supervisor

Appendix 5: Views and concerns from the consulted stakeholders

Consulted stakeholders	Views and concerns
Bright E. Mollel **Zonal manager – NFRA Makambako**	• My office is happy with the proposed project and we are ready to start the project soon after getting all the permits. • The project is urgently needed and it will cover an area of 0.5Ha (5,000m^2) • Issued regarding waste management and use of utilities will be well managed during all phase of project development
Frank M. Felix **Supplier Officer – NFRA Makambako** Vincent A. Ndelwa **Quality Inspector – NFRA Makambako**	• Our main source of water is central system from Makambako Urban Water Supply and Sanitation Authority. During project implementation will continue to take water from them. • For our current operations, solid waste management is by composting and burning. For a proposed project, Makambako Town Council will work with us and the contractor hand in hand in ensuring proper management of all wastes. • Current pest control methods are Spraying and fumigation. But for the proposed project, this will be done from the Silos and the system will be a closed one. • We normally use very little chemicals and we do not keep expired chemicals because most the time we order them as per demand and not in excess. All chemicals are sourced from our local suppliers. In case we find any expired chemicals, we communication with Tropical Pesticides Research Institute (TPRI) of Arusha for proper management and disposal. • Solid wastes produced from Tablets and Sachets especially inert materials are disposed after mixing them with water and soap and then disposed of in to the environment (a dug hole).
Engineer Nyemba H. S **Managing Director – Makambako Urban Water Supply and Sanitation Authority (MAKUWASA)**	• Our water supply is low comparing to water demand in the area we are serving. Water demand coverage is 50% during Rainy season and only 23% during dry season. And thus the annual coverage is only 37.5%. This is because the water source is old and was constructed in 1990. • However, water demand of NFRA is low which about 100m^3 Litres per day during construction and operation phases of the proposed project thus the Authority can supply water to NFRA. • We are informed by NFRA that much water will be used for fire hydrants, so the Authority is capable to offer the service.

	• Our water quality (Physical, Chemical and Biological) is good and our water is collected for Laboratory analysis every week of a month. Therefore our water is clean and safe for human consumption and others. • We have long term and short term plans to improve our services which need about Tshs. 57 billion for the construction of Dams. • NFRA must ensure that their sewerage system is constructed about 50 metres from our project facilities like Pipes and must ensure that sewerage systems are well constructed and managed and there should be proper ways of solid waste management during project implementation.
Makambako Town Council Fredrick Kazikuboma **Acting Town Director**	• We accept the proposed project • We have enough space for the expansion of the storage facilities • Our area is becoming a centre of the big four, we still can store food for others. We are producers and with the nature of our area transport of the food is easy as we are connected by roads and railway. • NFRA must offer employment opportunities to our local people and has to pay all necessary dues i.e., service levies to the Council • Our people need others for their daily activities; expansion of the facilities will create more opportunities thus increased livelihood development.
Appia C. Mayemba **Town Environment, Solid Waste Management Officer (TESWMO)**	• The Council is working hard to have a disposal site (Open dumping site) and we are working in collaboration with TFDA at Kipagamo about 7.5 kilometers from the Council HQ. • Authority issues permit to allow disposal of wastes as per our by-laws. Thus NFRA must ensure that they cooperate with the Council on collection, storage, transportation and disposal of all wastes. • During construction phase, NFRA must ensure that sanitary facilities are in place.
Rashidi Njozi **Town Community Development Officer (TCDO)**	• Accept the proposed project • Any environmental hazard must be avoided and/ or mitigated.

Ephraim Mkumbo **Town Lands & Natural Resources Officer (TLNRO)**	• Since the level of HIV/AIDS is high in our area, due consideration must be in place and education has to be provided. To reduce the risk, NFRA may opt to employ laborers from our communities. • NFRA must ensure safe discharge of the wastewater including storm water. • Solid waste management must be well managed and the Authority must be contacted when carrying out waste management particularly management and disposal of debris.
Majengo Ward Office - Ward Development Committee (WDC) Edina A. Nyagawa **Ward Councilor** Dorothea S. Mpembela **Ward Executive Officer** Daman S. Ngungulu **Ward Education Officer** Hamid Mtwange **Mtaa Chairperson - Majengo** Jolly M. Sanga **Ward Environmental Management Officer** Christina Nyanda **Ward Agricultural Officer** Eden Mbogela **Mtaa Executive Officer (MEO)** Witness Ngoloka Nasra Luhanjo Anipha Matatala **Office Assistants/Attendants**	• WDC accepts the proposed project • The proposed project area is close to Community Borehole, NFRA must ensure there is no water pollution is occurring due to proposed project. • Project should maintain required distances from all public facilities such as a Railway and TAZAMA pipeline and all water supply facilities. • NFRA must establish baseline information on the quality of the water source from our community borehole. • NFRA must cooperate with us and must play a role in offering job opportunities to our people so as to help them earn their living. • During construction, NFRA must offer education to our community members and the people to be employed regarding the prevalence of HIV/AIDS. • Both solid and liquid wastes must be well managed and NFRA and their consultants must cooperate with our office the Council. • Our office is willing to offer assistance required.

Mtaa Community development, Environment and Sanitation Committee – Mtaa wa Majengo Hamid Mtwange **Mtaa Chaiperson – Majengo** Given Mlowe **Mtaa Executive Officer (MEO)** Amani K. Mdalingwa **Member** Asha T. Mtemga **Member** Neema S. Mgeni **Member**	• We accept the proposed project • We need NFRA to educate our people on how the problem of diseases transmission is going to be mitigated • Issues such as increased noise level, soil erosion, destruction of infrastructure and increased level of dust, must be well mitigated and NFRA has to be responsible in case, the effects are going to be adverse. • During construction, Developer must consider other users of roads. We will not be happy if the area will be fenced. • We are expecting that the proposed project will not come up with resettlement of our houses. • There is a community borehole; NFRA must avoid water pollution during all phases of development of the project. • The Committee and the Office is willing to cooperate with NFRA whenever we are needed. • The project has to start as soon as possible but all important legal procedures must be followed.
Regional Commissioner's Office – Njombe Region Hon. Christopher Ole Sendeka **Regional Commissioner – Njombe** Jackson L. Saitabau **Regional Administrative Secretary (RAS) – Njombe**	• We accept the proposed project because there is high production of grains in our region. So this is a good opportunity to us. • NFRA if works well and expand the storage facilities, farmers will easily sale their produce especially the surplus and increase food security for our nation. • We think NFRA have enough space for the intended project, we want them to speed up the development and we are ready to offer assistance needed from our office. • We expect a lot of opportunities from this project and therefore all legal procedures must be adhered to. • We accept and welcome the proposed development. We are big producers and we have enough surpluses, so expansion of storage facilities is very vital now. • If NFRA increases capacity to store grains, our farmers will be able to sale and increase food security so that the stored food can help other places and people in need of food.

Lameck G. Noah **Assistant Administrative Secretary – Economy, Njombe**	• Therefore, we are ready to offer any assistance required. NFRA must speed it up and comply with all legal requirements for this proposed project. • This proposed project is accepted • Expansion of facilities is of advantage to our region and our farmers. • We expect the proposed project will reduce/avoid loss of stored produce. • Due to water scarcity in terms of coverage from available source, NFRA must ensure to use harvest Rainwater for future uses. • NFRA should employ both skilled and non skilled labors from local market.
District Commissioner's Office – Njombe district Ruth B. Msafiri **District Commissioner, Njombe**	• We accept the project • Food storage is good and important because farmers do not store enough food as they always sale due to availability of poor storage facilities and for the case of Njombe district farmers always leave the produce in their farms due to lack of storage facilities. • NFRA is advised to offer education to farmers on how to store their produce particularly surplus for their own benefits. • Employment opportunities is what we expect highly, NFRA must put due consideration on this.
Yolanda Mbatiya **Building and Construction Inspector (BCI) – Occupation Safety and Health Authority (OSHA)**	• The project is good and we think it will stimulate and promote agriculture industry and development in the proposed area. Developer must ensure the following: a. Registration of the proposed project b. Training: During construction and operation phases of the project, all workers must be trained on Occupational safety and health. c. Provision of Personal Protective Equipment (PPE) such as safety boots, Helmets, Hard hat, gloves, nose mask, earmuffs, safety overall and safety harness. Emergency Preparedness Plan (EPP) and Risk Assessment (RA): There should be an emergency preparedness plan and pre-start operation risk assessment.

Source: Beyond Nature Limited, 2017

Appendix 6: Signatures of the consulted stakeholders

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA KILIMO MIFUGO NA UVUVI

WAKALA WA TAIFA WA HIFADHI YA CHAKULA
Chang'ombe Plot No. 35 Mbozi Rd | S.L.P 5384, D'Salaam, Tanzania
Simu :+255(0)22- 2862134 | Fax: +255(0)22-2864069 | Barua pepe: info@nfra.go.tz |Tovuti: www.nfra.go.tz NFRA

STAKEHOLDERS' CONSULTATION FORMS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON

GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

PLACE: NFRA-MAKAMBAKO, MAKUWASA AND MAKAMBAKO TOWN COUNCIL DATE: 30th January 2017

S/No.	Names	Title	Institute & Contacts	Signature
1.	BRIGHT MALUWE	Z/Mamawa	NFRA - MMB	
2	FRANK. M. FELIX	SUPPLIES OFFICER	NFRA - MKB	
3	VINCENT. D. NDELWA	Q/IMAP	NFRA - MKB	
4.	Eng. Nyamba; HS	M·D	MAKUWASA-Makambako	
5	KADIKUBOMA F.	AgTD	MTC-026968892.	
6	AGGIA C' MATENGA	TESWMO	MTC- 0767421244	
7	RASHIDI NJOZI	TCDO	MTC- 0686750129	
8	EPHRAIM MLAWA	TLNRO	MTC- 0754368433	

JAMHURI YA MUUNGANO WA TANZANIA
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WAKALA WA TAIFA WA HIFADHI YA CHAKULA

Chang'ombe Plot No. 35 Mbozi Rd | S.L.P 5384, D'Salaam, Tanzania
Simu :+255(0)22- 2862134 | Fax: +255(0)22-2864069 | Barua pepe: info@nfra.go.tz |Tovuti: www.nfra.go.tz

NFRA

STAKEHOLDERS' CONSULTATION FORMS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON

GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

PLACE: MTAA WA MAJENGO DATE: 31-01-2017

S/No.	Names	Title	Institute & Contacts	Signature
1.	HAMIS MTWANGE	MKT-MAJ	0763881777	
2.	GLODEN MLOWE	MEO/MW	0756610164	
3.	[illegible]	[illegible]	0757008289	
4	ASHA J. MTIGHGA	MJUMBE	0755705135	
5.	NEEMA S. MGENI	MJUMBE	0762255260	

AFISA MTENDAJI
MTAA WA MAJENGO
MAKAMBAKO

21/01/2017

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA KILIMO MIFUGO NA UVUVI
WAKALA WA TAIFA WA HIFADHI YA CHAKULA
Chang'ombe Plot No. 35 Mbozi Rd | S.L.P 5384, D'Salaam, Tanzania
Simu :+255(0)22- 2862134 | Fax: +255(0)22-2864069 | Barua pepe: info@nfra.go.tz | Tovuti: www.nfra.go.tz NFRA

STAKEHOLDERS' CONSULTATION FORMS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

PLACE: MAJENGO WARD OFFICE (WARD DEVELOPMENT COMMITTEE) DATE: 31st JANUARY, 2017

S/No.	Names	Title	Institute & Contacts	Signature
1.	EDINA A. NYAGAWA	M/KITI	0756394949	Nyagawa
2	DOROTHEA S. MSEMBELA	KATIBU / MEO	0768 885515	
3.	DAMIAN S. NGUNGULU	AE-KATA	0754768139	
4.	HAMID A. MTWANGE	MJUMBE	0763 881777	
5.	Jolly M. Sanga	Environmental	0769876568	Sanga
6.	CHRISTINA NYANDA	AFISA KILIMO	0754032559	
7.	EDEN MBOGELA	MEO	0768821206	
8	WITNESS NGOLOKA	FIELD	0744221172	
9.	NASRA LUHANJO	FIELD	0742491059	
10	ANIPHA MAJATALA	FIELD	0756217720	

AFISA MTENDAJI
KATA MAJENGO
MAKAMBAKO
31/01/2017
0768 885515.

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA KILIMO MIFUGO NA UVUVI
WAKALA WA TAIFA WA HIFADHI YA CHAKULA
Chang'ombe Plot No. 35 Mbozi Rd | S.L.P 5384, D'Salaam, Tanzania
Simu: +255(0)22- 2862134 | Fax: +255(0)22-2864069 | Barua pepe: info@nfra.go.tz | Tovuti: www.nfra.go.tz NFRA

STAKEHOLDERS' CONSULTATION FORMS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON

GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

PLACE: OFFICE OF THE REGIONAL COMMISSIONER - NJOMBE DATE: 1st FEBRUARY 2017

S/No.	Names	Title	Institute & Contacts	Signature
01	Christopher Ole Sendeka	RC - Njombe	+255 768 300000	
02	Jackson L. Saitabau	RAS-NJOMBE	+255 754 47 605C	
03	Lameck G Noah	AAS-ECONOMY-NJOMBE RS, Tel 0759010066		
04	Ruth B. Msafiri	DC Njombe	0788067663	

JAMHURI YA MUUNGANO WA TANZANIA
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STAKEHOLDERS' CONSULTATION FORMS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

PLACE: OSHA-HQ **DATE:** 20.03

S/No.	Names	Title	Institute & Contacts	Signature
1.	Yolanda Mbatiya	BCI	OSHA, Box 519 DSM	
			0655-278731	

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA KILIMO MIFUGO NA UVUVI

WAKALA WA TAIFA WA HIFADHI YA CHAKULA
Chang'ombe Plot No. 35 Mbozi Rd | S.L.P 5384, D'Salaam, Tanzania
Simu :+255(0)22- 2862134 | Fax: +255(0)22-2864069 | Barua pepe: info@nfra.go.tz |Tovuti: www.nfra.go.tz **NFRA**

STAKEHOLDERS' CONSULTATION FORMS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ON GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

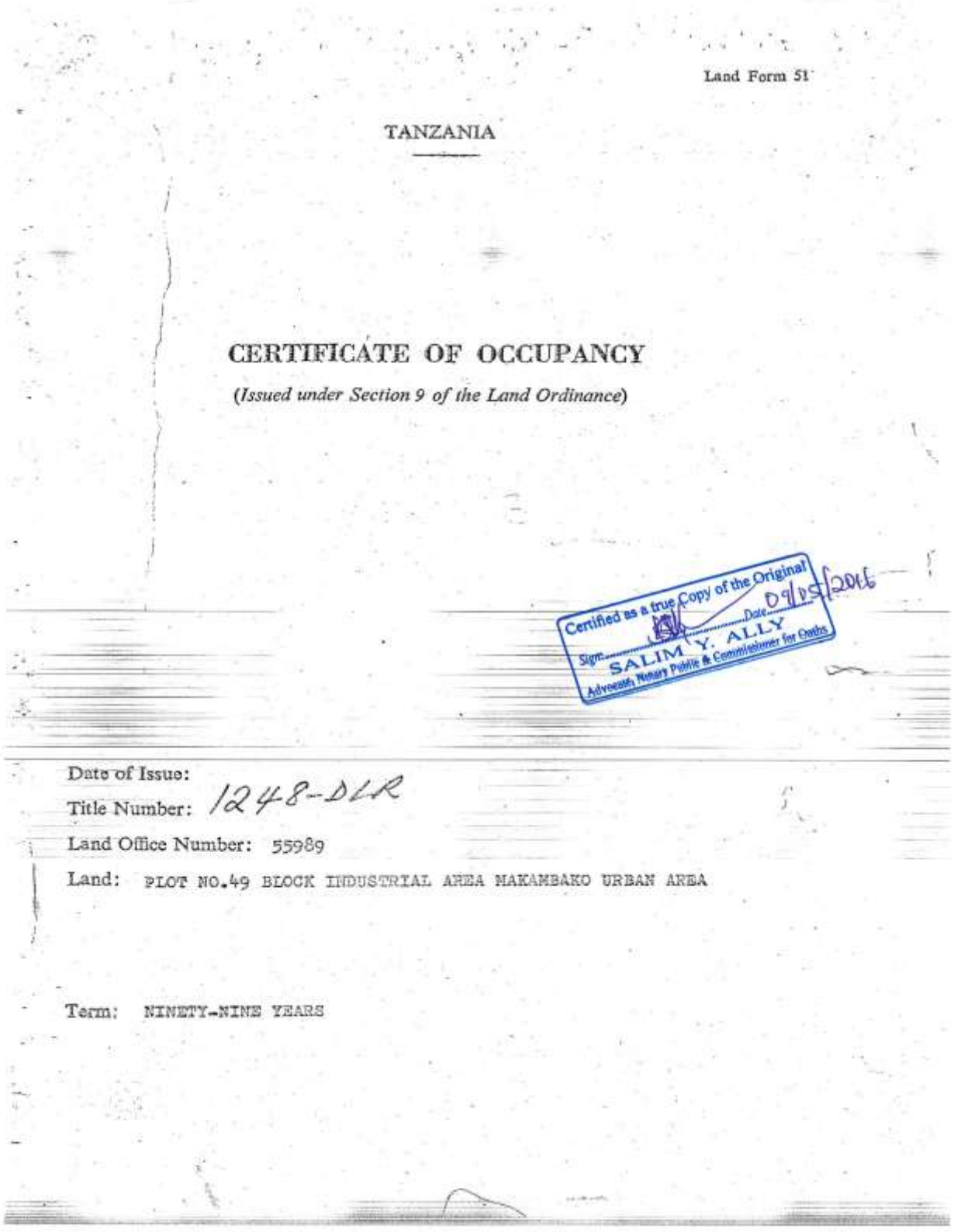
PLACE: MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES - HQ - DODOMA **DATE:** 25.05.2017

S/No.	Names	Title	Institute & Contacts	Signature
1.	ELIMPAA KIRANGA	Ag. PS	MALF - DODOMA	
2.	Vumilia Zlankula	Ag. CEO	NFRA	
3.	JOSEPH. P. DUDONGA	Ag DED	NFRA HEAD OFFICE	
4.	Oswald Ruboha	AD-M&E	MALF - DODOMA	
5.	Sospeter W. Mtemi	AD - IM	MALF	
6.	Richard Kasuga	HGCU	MALF	
7.	B. A. Shaban	DPMU	MALF	
8	Beatus Malema	AD CPS	MALF	
9.	Seushi J. Mburi	DAHRM	—"—	
10	George Mandepo	HLU	—"—	

PROPOSED DEVELOPMENT OF GRAIN STORAGE FACILITIES EXPANSION ON PLOT NO.49 AT INDUSTRIAL AREA,MAKAMBAKO URBAN,MAJENGO MTAA IN MAJENGO WARD,MAKAMBAKO TOWN COUNCIL,NJOMBE REGION.

1.	Peter H. Luena	Environmental Consultant	Beyond Nature Limited	[signature]
2.	Flourine Molanda	Consultant	Beyond Nature Ltd	[signature]
3.	Titus A. Hlaga	HRM	NFRA	[signature]
4	Joyce Omolo	NEMC Env. Officer	NEMC	[signature]
5-	NAOMI JOSHUA	LEGAL UNIT	NEMC	[signature]
6	Adelaida Tillya	Environment Office	VPO-DoE	[signature]
7-	Prosper Malumd	PAO	MALF-EMU	[signature]
8	Rachel Lugoe	NEMC Senior Comm. officer	NEMC	[signature]
9-	Rukia Ally	Env. Inspector	NEMC	[signature]
10.	Albina John	"	NEMC	[signature]

Appendix 7: Certificate of occupancy



Land Form 51

TANZANIA

CERTIFICATE OF OCCUPANCY

(Issued under Section 9 of the Land Ordinance)

Certified as a true Copy of the Original
Sign..... Date 09/05/2016
SALIM Y. ALLY
Advocate, Notary Public & Commissioner for Oaths

Date of Issue:

Title Number: 1248-DLR

Land Office Number: 55989

Land: PLOT NO.49 BLOCK INDUSTRIAL AREA MAKAMBAKO URBAN AREA

Term: NINETY-NINE YEARS

TITLE No. 1248-DLR
REGISTERED 24-6-1981
Land Form 32
at 9.30 a.m.
Asst. Registrar of Titles

IRINGA LAND REGISTRY
UNITED REPUBLIC OF TANZANIA

TANGANYIKA
STAMP DUTY PAID ON
ORIGINAL Shs. 145/=
Receipt No. 050616 of 13-6-79
L.O. No. 55989
Asst. Registrar of Titles

L.D. No. IRF/6447

Stamp Duty Shs. 20/= Paid
and Revenue Receipt No. 050616
13-6-79 issued.
Asst. Registrar of Titles

THE UNITED REPUBLIC OF TANZANIA

CERTIFICATE OF OCCUPANCY

(Section 9 of the Land Ordinance)

The 13th day of June One thousand nine hundred and eighty one Title No. 1248-DLR

THIS IS TO CERTIFY that IRINGA REGIONAL TRADING COMPANY LIMITED A LIMITED LIABILITY COMPANY INCORPORATED IN TANZANIA AND HAVING ITS REGISTERED OFFICE AT IRINGA OF P.O. BOX 3 IRINGA.

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

1. The Occupier having paid rent up to the thirtieth day of June, 1980, shall thereafter pay rent of shillings five thousand three hundred (Shs. 5,300/=) a year in advance on the first day of July in every year of the term without any deduction PROVIDED that the rent may be revised by the Minister for the time being responsible for Lands (hereinafter called "the Minister") on the first day of July in each of the years 1989, 1999, 2009, 2019, 2029, 2039 and 2049 or within three years thereafter in each case.

2. The Occupier shall:—

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

(ii) By the thirty-first day of December 1979, submit to the Authority such plans for the buildings (including block plans showing the position of the buildings) and such drawings, elevations and specifications of them as will satisfy the Authority and as are in accordance with the building condition in sub-paragraph (i) above which said plans and specifications shall be submitted in triplicate;

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

(iv) Complete the buildings according to the plans and specifications so that they are ready for use and occupation by the thirtieth day of June 1982;

(v) At all times during the term after the thirtieth day of June 1982, have on the land buildings as approved by the Authority and maintain them in good order and repair to the satisfaction of the Commissioner for Lands (hereinafter called "the Commissioner");

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

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

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

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

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

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

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

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

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

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

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

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

6. Only one main building together with the usual and necessary out-buildings shall be built on the land and the same shall be used for whole sale and storage warehouses only. Use Group "L" class (a) as defined in the Town and Country Planning (use classes) Regulations, 1960.

Certified as a true Copy of the Original
Sign..... Date 09/05/2016
SALIM Y. ALLY
Advocate, Notary Public & Commissioner for Oaths

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

SCHEDULE

All that land known as Plot No.49 Block industrial Area Makambako Urban Area, containing two point nine thousand nine hundred sixty five (2.9965) hectares

~~square feet~~ shown for identification only edged on the plan attached to this Certificate and defined on the registered survey plan numbered 17766 deposited at the Office of the Commissioner for Surveys and Mapping at Dar es Salaam.

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

DIRECTOR
LAND DEVELOPMENT SERVICES
COMMISSIONER FOR LANDS

We, the within-named Iringa Regional Trading Company Limited hereby accept the terms and conditions contained in the foregoing Certificate of Occupancy

SEALED with the COMMON SEAL of the said Iringa Regional Trading Company Limited and Delivered in the presence of us this

5th day of June 1981.

Signature: .....
Postal Address: BOX 3, IRINGA
Qualification: DIRECTOR

Signature: .....
Postal Address: Box 381, IRINGA
Qualification: DIRECTOR

GPDsm 11212/4-70/80m

In this document every reference to "Commissioner for Lands" and "Commissioner for Surveys and Mapping" should be read and construed as a reference to the "Director of Land Development Services" and "Director of Surveys and Mapping"

LAND REGISTRY, MBEYA
TRANSFER
Filed Document No. 1108-MBYLR.
Date of Registration 27-2-92. time 8:00 A.m
To M/S SOUTHERN HIGHLANDS HOLDINGS LIMITED OF P.O BOX 489-DAR-ES-SALAAM.
(C/V SHS 7,371,000/=)
Asst. Registrar of Titles

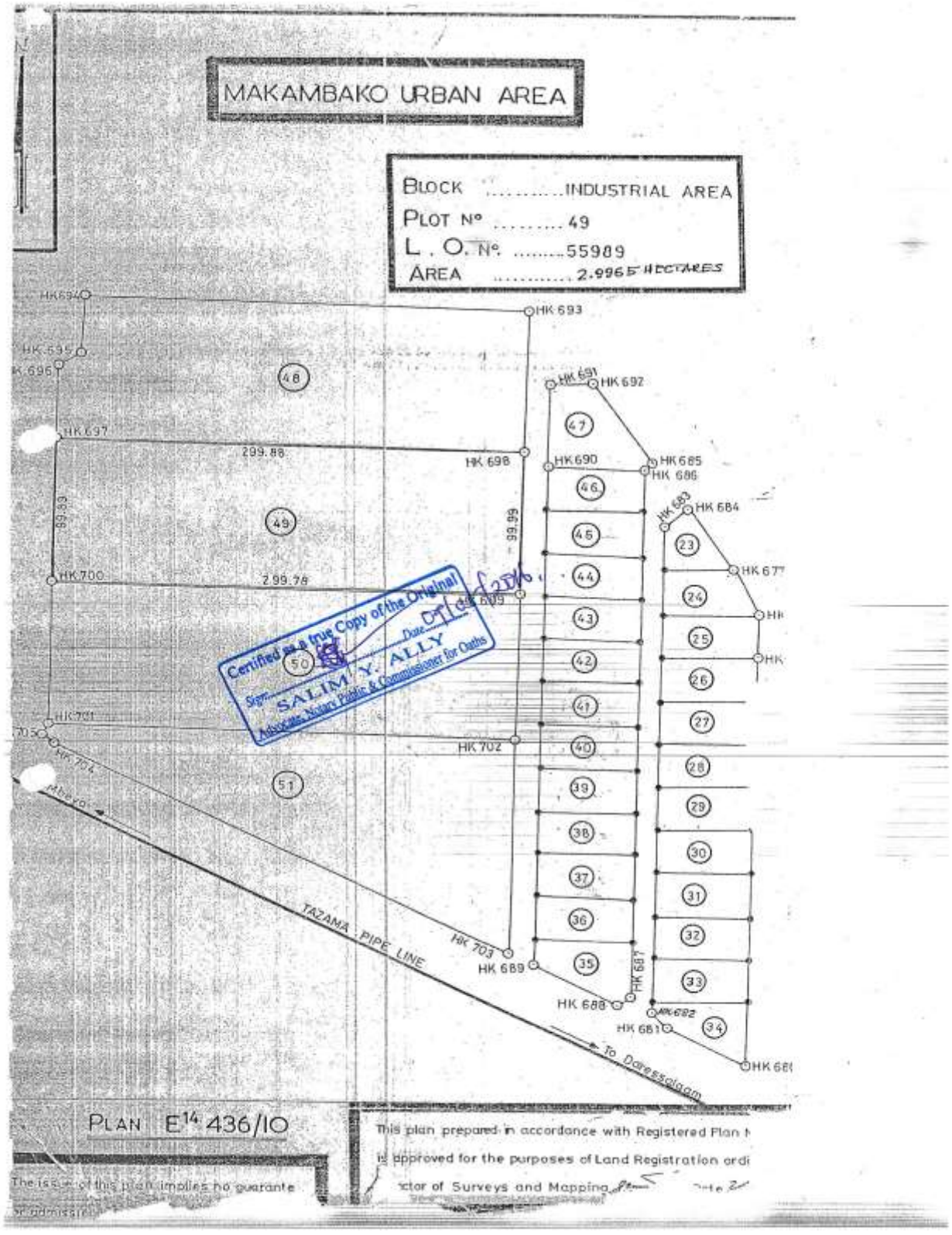
LAND REGISTRY, MBEYA
TRANSFER
Filed Document No. 16155-MBYLR
Date of Registration 29/05/2012 time 9:00AM m
To SILAS ADAM MBILINYI
P.O. BOX 72158 DSM
(CONS. THS. 24,000,000/=)
Asst. Registrar of Titles

LAND REGISTRY, MBEYA
TRANSFER
Filed Document No. 2667-MBYLR
Date of Registration [illegible] time [illegible]
To GAPOIL TANZANIA LIMITED of P.O.Box 9104 Dar es Salaam
(Cons. Shs. 12,000,000/=)
Senior Asst. Registrar of Titles

LAND REGISTRY, MBEYA Including CT. No 6312-MBYLR and 4316-MBYLR
MORTGAGE
Filed Document No. 8890-MBYLR
DISCHARGED FD NO 10084-MBYLR
Date of Registration 17-11-2006 time 1:00 Pm m
ON 17-1-2008 AT 1:00 pm
To BARCLAYS BANK PLC
(To secure US$ 75,000,000/=)
PRINCIPAL REGISTRAR OF TITLES
Senior Asst. Registrar of Titles

Certified as a true Copy of the Original
Date 09/05/2014
Sign:
SALIM Y. ALLY
Advocate, Notary Public & Commissioner for Oaths

FILED DOCUMENTS No:
REGISTERED
AT
Asst. Registrar of Titles


MAKAMBAKO URBAN AREA
BLOCK .....INDUSTRIAL AREA
PLOT Nº 49
L. O. Nº 55989
AREA ..... 2.9965 HECTARES
HK 693
HK 694
HK 695
HK 696
HK 697
HK 698
HK 699
HK 700
HK 701
HK 702
HK 703
HK 704
HK 705
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34
TAZAMA PIPE LINE
To Daressalaam
Certified a true Copy of the Original
Sign SALIM Y. ALLY
Advocate, Notary Public & Commissioner for Oaths
PLAN E14 436/10
This plan prepared in accordance with Registered Plan
is approved for the purposes of Land Registration ordi
ctor of Surveys and Mapping

Land form No.35

THE UNITED REPUBLIC OF TANZANIA
THE LAND ACT, NO. 4 OF 1999
TRANSFER OF AN OFFER OF A RIGHT OF OCCUPANCY
[Under Section 62]

TITLE No 1248-DLR
PLOT NO 49
BLOCK: INDUSTRIAL AREA
MAKAMBAKO,
NJOMBE REGION

In consideration of the sum of 245,000,000/= (Only Two Hundred Forty Five Million Tanzania Shillings.) I, **SILAS ADAM MBILINYI** of P.O. BOX 72158 DAR ES SALAAM DO HEREBY TRANSFER to **CEO, NATIONAL FOOD RESERVE AGENCY** of P.O. BOX 5384 DAR ES SALAAM, the Right of Occupancy under the above reference.

SIGNED and **DELIVERED** by the said **SILAS ADAM MBILINYI** who is known to me personally/identified to me by .....the latter being known to me personally in my presence this ..5.... day of ..August..2013

TRANSFEROR

Signature: .....
Address: 72158
Qualification: Advocate

SEALED with the Common Seal of the said **NATIONAL FOOD RESERVE AGENCY** and **DELIVERED** in the presence of us this ..... day of 2013

Name: Charles Walwa

Signature:

Postal Address: P.O. Box 5384
DAR ES SALAAM

Qualification: Chief Executive Officer

Name: MIKALU MAPUNDA

Signature:

Postal Address: P.O. Box 5384
DAR ES SALAAM

Qualification: DIRECTOR BUSINESS SUPPORT

DRAWN BY:
National Food Reserve Agency,
P. O. Box 5384,
DAR ES SALAAM

Appendix 8: Water Quality Analysis report

ARDHI UNIVERSITY
School of Environmental Science and Technology

Telephone: (255-022) - 2771272, 2775004, 2772291/2
Fax: (255-022) - 2775391,2775479
Telegrams: ARDHICHUO

P. O. Box 35176
Dar es Salaam
e-mail: aru@aru.ac.tz
website: http://www.aru.ac.tz

ENVIRONMENTAL ENGINEERING LABORATORY

Water Analysis Results

Client: NATURAL FOOD RESERVE AGENCY (NFRA)
Date Received: 22 March 2017
Source: Spring Water (Makambako)

S/N	PARAMETER	Unit	RESULTS	(WHO) Standards
1	pH		6.87	6.5-8.5
2	Turbidity	NTU	2	25
3	Colour	Hazen°	21	50
4	Salinity	‰ (ppt)	0.1	na
5	Electric conductivity	µS/cm	305	1000
6	Total Dissolved solids	mg/l	148	1000
7	Phosphate	mg/l	0.53	na
8	Nitrate –Nitrogen	mg/l	5.80	6.7
9	Nitrite –Nitrogen	mg/l	0.0081	1.0
10	Ammonia-Nitrogen	mg/l	0.197	0.5
11	Chloride	mg/l	18.0	600
12	Sulphate	mg/l	3.60	400
13	Bicarbonate Alkalinity	mg/l	42	na
14	Total Hardness	mg/l	22.0	500
15	Iron	mg/l	0.068	1.0
16	Carbonate Alkalinity	mg/l	0	na
17	Total Alkalinity	mg/l	42	na
18	Magnesium	mg/l	0.749	150
19	Calcium	mg/l	8.0	75
20	Sodium	mg/l	21.34	150
21	Potassium	mg/l	5.85	150
22	Aluminium	mg/l	<0.01	na
23	Lead	mg/l	<0.01	0.01
24	Manganese	mg/l	<0.01	0.5
25	Copper	mg/l	<0.01	0.05
26	Zinc	mg/l	<0.01	5
27	Cadmium	mg/l	<0.01	0.05
28	Chromium	mg/l	<0.01	0.05
29	Nickel	mg/l	<0.01	na
30	Faecal coliform	Count/100ml	4	0
31	Total coliform	Count/100ml	9	0

na= Not available/applicable
Sampling done by *Client*

Reporting Officer
Ndimbo A.M

Appendix 9: Environmental Standards

as provided in
Fifth Schedule,
Made Under Regulation 12
ENVIRONMENTAL STANDARDS

1. Standard for Water- effluent and receiving water

Parameter	units	effluent		Receiving water			
		TL	MPC	TL	MPC1	MPC2	MPC3
pH		-	6.5-8.5	-	6.5-8.5	6.5-8.5	6.5-9.0
TDS	Mg/1	2500	3000	1700	2000	2000	2000
TSS	Mg/1	60	100	-	-	-	-
Conductivity	Us/cm3	400	-	-	-	-	-
BOD5	Mg/1	25	30	3.5	5	5	10
COD	Mg/1	45	60	-	-	-	-
Chloride-Cl	Mg/1	650	800	170	200	200	400
Sulphate- SO4	Mg/1	500	600	500	600	600	600
Ammonia – N	Mg/1	7.5	10	0.35	0.5	0.5	0.5
Nitrate – N	Mg/1	35	50	35	50	50	100
Nitrite – N	Mg/1	0.75	1	-	-	-	-
Phosphate – PO4	Mg/1	4.5	6	-	-	-	-
Oil & grease	Mg/1	3.5	5	0.35	0.5	0.5	5

Source: Water Utilization (Control and Regulation) Act, 1981 for effluent discharge as given in the Tanzania Standards General Tolerance Limits for Municipal and Industrial Wastewaters.

Notes: TL=Trigger level which, if exceeded, requires investigation of potential problem and action if necessary; this level acts as a warning.

MPC=Maximum Permissible Concentration, for receiving water as given in the Water Utilization (Control and Regulation) (Amendment) Act, 1981: for effluent discharge as given in the Tanzanian Standard General Tolerance Limits for Municipal and Industrial Wastewaters.

MPC 1: Water suitable for drinking, water supplies, swimming pools, food and beverage manufacturing industries, pharmaceuticals manufacturing industries or industries requiring water of similar quality.

MPC 2: Water suitable for use in feeding domestic animals; in fisheries, shell cultures, recreation and water contact sports.

MPC 3: Water suitable for irrigation and other industrial activities requiring water of standards lower than those in MPC 1 or 2.

The MPC in the receiving water should be measured below the mixing zone of the effluent discharged. For specific discharges, the MPC for effluents given may need to be amended to take account of the mass discharge of the pollutant (i.e. concentration x discharge rate) and the dilution in the receiving waters, such that the appropriate receiving water standard is not breached).

FIRST SCHEDULE

(***Made under Regulation 8 of the Environmental Management (Water Quality Standards) Regulations, 2007***

PERMISSIBLE LIMITS FOR MUNICIPAL AND INDUSTRIAL EFFLUENTS

Table A: Physical Components		
Parameter	**Limit**	**Test Method**
BOD_5 at 20 ^oC	30 mg/l	TZS 861(Part 3):2006 – Five-day BOD Method
COD	60 mg/l	TZS 861(Part 4):2006 – Dichromate Digestion Method
Colour	300 TCU	ISO 7887: 1994, Water quality – Examination and determination of colour – Section 3: Determination of true colour using optical instruments
pH range	6.5-8.5	TZS 861(Part 2):2006 – Electrometric Method
Temperature range	20-35^oC	See Annex A
Total Suspended Solids (TSS)	100 mg/l	TZS 861(Part 1):2006 – Gravimetric Method
Turbidity	300 NTU	APHA Standard Methods:2130 B. Nephelometric Method

Table B: Inorganic Components		
Parameter	**Limit (mg/l)**	**Test Method**
Nitrates (NO_3^-)	20	APHA Standard Methods: 4110 B. Ion Chromatography with Chemical Suppression of Eluant Conductivity
Phosphorus Total (as P)	6	TZS 861(Part 6):2006 – Colorimetric-Ascorbic Acid Method
Sulphate (SO_4^{2-})	500	APHA Standard Methods: 4110 B. Ion Chromatography with Chemical Suppression of Eluant Conductivity
Total Kjeldahl Nitrogen (as N)	15	TZS 861(Part 5):2006 – Kjeldahl Method

Table D: Microbiological Components		
Parameter	**Limit**	**Test Method**
Total Coliform Organisms	10,000counts/ 100mL	ISO 6222:1999, Microbiological methods

NINTH SCHEDULE

Made under Regulation 17 of the Environmental Management (Water Quality Standards) Regulations, 2007

FREQUENCY OF SAMPLING

Type of Source/Population served	**Up to 1,000**	**Up to 2,000**	**Up to 5,000**
Borehole deeper than 8m	6 months	4 months	3 months
Well less than 8m.	2 months	1 month	1 month
Surface water, lakes, rivers, springs, dams	1 month	2 weeks	2 weeks

NB:

(i) The minimum number of samples to be taken from a distribution system is calculated at the rate of one sample per 500 population in addition to the intake or source;

(ii) The above-prescribed frequency of sampling refers to those water supplies, which on previous examination showed total absence of faecal coli, if the result of bacteriological examination indicates faecal pollution, the water supply in question should be re-examined within a fortnight, at the latest, irrespective of the type of source or population served.

(iii) Supplier/Authority should determine key points on the distribution system from which samples should be collected. On each occasion samples should be taken from different points.

(iv) The minimum number of samples to be taken from a distribution system is calculated at the rate of one sample per 500 population in addition to the intake or source.

(v) The above-prescribed frequency of sampling refers to those water supplies, which on previous examination showed total absence of faecal coli, if the result of bacteriological examination indicates faecal pollution, the water supply in question should be re-examined within a fortnight, at the latest, irrespective of the type of source or population served.

(vi) Supplier/Authority should determine key points on the distribution system from which samples should be collected. On each occasion samples should be taken from different points.

AMBIENT AIR QUALITY TOLERANCE LIMITS

	Pollutant	**Time weighted Average**				**Test methods**
			Industrial area	**Residential, Rural & Other area**	**Controlled areas*** **	
1.	Sulphur oxides (SO_X);	Annual Average*	80 μg/m³	60 μg/m³	15 μg/m³	IS0 4221-1980
		24 hours**	125 μg/m³	*80 μg/m³*	30 μg/m³	
		Annual Average		*0.019 ppm/50μg/m³*		
		Month Average				
		24 Hours		*0.048ppm /125μg/m³*		
		One Hour				
		Instant Peak		*500 μg/m³*		
		Instant Peak (10 min)		*0.191 ppm*		
2.	Oxides of Nitrogen (NO_X);	Annual Average*	80 μg/m³	60 μg/m³	15 μg/m³	ISO7996: 1985
		24 hours**	150 μg/m³	80 μg/m³	30 μg/m³	
		8 hours				
		Annual Average		*0.2 ppm*		
		Month Average		*0.3 ppm*		
		24 Hours		*0.4 ppm*		
		One Hour		*0.8 ppm*		
		Instant Peak		*1.4 ppm*		
3.	*Nitrogen Dioxide*	*Annual Average*	150 μg/m³	*0.05 ppm*		IS0 6768:1998
		Month Average		*0.08 ppm*		
		24 Hours	100 μg/m³	*0.1 ppm*		
		One Hour		*0.2 ppm*		
		Instant Peak		*0.5 ppm*		
4.	Suspended particulate matter (SPM)	Annual Average*	360 μg/m³	140 μg/m³	70 μg/m³	*ISO 9835:1993*
		24 hours**	500 μg/m³	200 μg/m³	100 μg/m³	
			Industrial area	**Residential, Rural & Other area**	**Controlled areas*** **	
		mg/Kg				
		Annual Average****		100 μg/m³		
		24 hours***		180 μg/m³		
5.	Respirable particulate	Annual Average*	70 μg/m³	50 μg/m³	50 μg/m³	*ISO 9835:1993*

	Pollutant	**Time weighted Average**				**Test methods**
	matter (<10μm) (RPM)					
		24 hours**	150 μg/Nm^3	100 μg/Nm^3	75 μg/Nm^3	
6.	$PM_{2.5}$	Annual Average	35 μg/m^3			*ISO 9835:1993*
		24 hours	75 μg/m^3			
7.	Lead (Pb)	Annual Average*	1.0 μg/Nm^3	0.75 μg/Nm^3	0.50 μg/m^3	ISO 9855:1993
		24 hours**	1.5 μg/m^3	1.00 μg/m^3	0.75 μg/m^3	
		Month Average		2.5		
8.	Carbon monoxide (CO)/ carbon dioxide (CO_2)	*8 hours***	*5.0 mg/m^3*	*2.0 mg/m^3*	*1.0 mg/m^3*	ISO 4224:2000
		1 hour	*10.0 mg/m^3*	*4.0 mg/m^3*	*2.0 mg/m^3*	
		mg/Kg				
		*24 hours***				
9.	Non-methane hydrocarbons					
		instant Peak	*700ppb*			
10.	Total VOC	6 *mg/m^3*				ISO16000-6:2004,
11.	Ozone	1-Hour	200 μg/m^3	0.12 ppm		ISO 13964:1998
		8 hour (instant Peak)	120 μg/m^3	1.25 ppm		

Appendix 10: Communication with National Environmental Management Council (NEMC)

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL(NEMC)
BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA

Telephone: +255 22 2774889,
Direct line: +255 22 2774852
Mobile: 0713 608930
Fax: +255 22 2774901
Email: dg@nemc.or.tz
Website: www.nemc.or.tz

35 Regent Street,
P. O. Box 63154
11404 Dar es Salaam
TANZANIA

In reply please quote:

Ref: **NEMC/HQ/EIA/01/0681/Vol.1/2** Date: **23/01/2017**

Chief Executive Officer,
National Food Reserve Agency (NFRA),
P.O. Box 5384,
Dar es Salaam

Attn: Joseph P. Ogonga

RE: SCREENING DECISION FOR THE PROPOSED GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

Kindly refer the heading above.

We acknowledge receipt your letter with **Ref. No. BA.52/112/01/34** dated 4th **January, 2017**, attached with three copies of dully filled Environmental Impact Assessment certificate application forms and copies of the Project briefs in respect of the above mentioned project for review.

Kindly be informed that the project has been registered by the Council and allotted Application Reference number **6539** which must be referred in all future correspondence for this project.

Following the review of the submitted documents, the Council has reached a decision that your project requires a full Environmental Impact Assessment (EIA) study.

Following this decision, you are therefore required to carry out a scoping exercise and submit a Scoping report and Terms of References (ToR) to the Council for review and approval before the beginning of the EIA study. Also, be reminded that, the scoping report should conform to the EIA and Audit Regulations 2005 particularly Regulation 13 (3) and the

Fourth Schedule made under Regulation 15 for the contents of the scoping report and the essence of the scoping exercise respectively. However, the scoping report should also contain the following information:-

i. Evidence of land ownership for the proposed project site and all other documents relevant to the proposed development;

ii. Detailed description of the nature and size, components/activities and historical commencement of the existing grain storage facilities;

iii. Detailed description of all project components/activities of the expected expansion of the storage facilities and

iv. Detailed stakeholders consultations.

In case you need further clarification on this matter, please do not hesitate to contact us through **Tel No. +255 787 539 468.**

We look forward to your cooperation on this matter.

Yours Sincerely;

R. Said

For: Director General

Cc: Beyond Nature Limited, P.O. Box 31178, **Dar es Salaam.**

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL(NEMC)
BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA

Telephone: +255 22 2774889,
Direct line: +255 22 2774852
Mobile: 0713 608930
Fax: +255 22 2774901
Email: dg@nemc.or.tz
Website: www.nemc.or.tz

35 Regent Street,
P. O. Box 63154
11404 Dar es Salaam
TANZANIA

In reply please quote:

Ref: **NEMC/HQ/EIA/01/0681/Vol.1/4**

Date: **21/03/2017**

Chief Executive Officer,
National Food Reserve Agency (NFRA),
P.O. Box 5384,
Dar es Salaam

Attn: Joseph P. Ogonga

RE: SCOPING REPORT AND TERMS OF REFERENCE FOR THE PROPOSED DEVELOPMENT OF GRAIN STORAGE FACILITIES EXPANSION AT MAKAMBAKO IN NJOMBE DISTRICT, NJOMBE REGION

Kindly refer the heading above.

We acknowledge receipt your letter with **Ref. No. BA.52/112/01/51** of **3rd March, 2017**, attached with 5 copies of scoping reports and terms of reference of the above mentioned project for review.

Kindly be informed that the Council has reviewed the scoping report and terms of reference and found to be adequate to guide the EIA study. However, the following should also be taken into consideration to improve the ToRs.

i. Evidence of land ownership for the proposed project site and all other documents relevant to the proposed development;

ii. Detailed description of the nature and size, components/activities and historical commencement of the existing grain storage facilities;

iii. Detailed description of all project components/activities of the expected expansion of the storage facilities;

iv. Stakeholders' consultation should be exhaustive and records of meeting, communication and comments raised should be appended and addressed in the EIS. Names and signatures

of all consulted stakeholders should be appended as well. Also, include stakeholder's issue response table showing how and where significant issues raised by stakeholders have been addressed in the EIS and

v. The contents and the structure of the EIA report should adhere to Regulations 18 and 19 respectively of the EIA and Audit Regulations, 2005.

Please, work on these comments and the improved ToRs should be appended in the EIA report to be submitted to NEMC for review.

Following receipt of the EA report, the Council will arrange for the site verification visit to the project site and review meeting that will follow thereafter.

You will be required to provide transport facility for site verification team and review costs amounting to **Tshs. 15,583,234.75** which excludes transport costs as elaborated on the attached sheet (**NEMC Invoice NO. 4196** of 21/03/2017).

The funds can be paid by cheque or electronic money transfer to NEMC's Bank Account No. **0150005055800**, Bank Name: **CRDB Bank Limited**, Branch: **PPF Tower Branch**, Swift Code: **CORUTZXXX**. Please, submit copy of bank transfer note to the Council. We look forward to your cooperation on this matter.

Yours Sincerely,

R. Said
For: Director General

Cc: Beyond Nature Limited, P.O. Box 31178, **Dar es Salaam**.

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)
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Email: dg@nemc.or.tz
Website: www.nemc.or.tz

35 Regent Street,
P. O. Box 63154
11404 Dar es Salaam
TANZANIA

In reply please quote:

Ref: **NEMC/HQ/EIA/01/0682/Vol.1/7** Date: **01/08/2017**

Chief Executive Officer,
National Food Reserve Agency (NFRA),
P.O. Box 5384,
Dar es Salaam

RE: COMMENTS OF THE TECHNICAL ADVISORY COMMITTEE (TAC) MEETING ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) THE PROPOSED DEVELOPMENT OF GRAIN STORAGE FACILITIES EXPANSION ON PLOT NO. 63 AT WESTERN INDUSTRIAL AREA, RELINI MTAA IN KIZOTA WARD, DODOMA MUNICIPALITY, DODOMA REGION

Please refer to the subject above.

We are attaching herewith, comments on the Environmental Impact Assessment Report for the aforementioned project as raised by the Multi-Sectoral Technical Advisory Committee (TAC) in the review meeting held on **28th July, 2017** at NEMC offices, Dar es Salaam, to discuss the adequacy of the project before consideration of issuance of EIA Certificate.

In view of the significance these comments bear to your EIA report, we advise you to carefully study and accordingly address them in the final EIA report. The final report should be submitted in five (5) original copies and an electronic version (copied on a CD), accompanied by five (5) copies of stand-alone Non- Technical Executive Summary in both English and Kiswahili languages for further action. The Non-Technical Executive Summary should be presented in accordance with the format stipulated in the Environmental Impact Assessment and Audit Regulations, 2005.

You are also required to provide comments response table indicating comments addresses section and page numbers where the comments have been addressed. Also indicate where comments have not been addressed and the reasons thereof. Attached please find the TAC comments for your action.

Looking forward to your cooperation on this matter.

Yours sincerely,

R. Said
For: Director General

Cc: Beyond Nature Limited, P.O. Box 31178, **Dar es Salaam.**

COMMENTS OF THE TECHNICAL ADVISORY COMMITTEE (TAC) MEETING ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE PROPOSED DEVELOPMENT OF GRAIN STORAGE FACILITIES EXPANSION ON PLOT NO. 63 AT WESTERN INDUSTRIAL AREA, RELINI MTAA IN KIZOTA WARD, DODOMA MUNICIPALITY, DODOMA REGION

1.0 GENERAL COMMENTS.

1. Imported construction materials has to be stated with their specifications
2. The sustainability of the project requires clear identifications of the boundaries in all aspect- especially spatial boundaries are where maize will be brought not reflected.
3. Append the report with non technical executive summary in both Swahili and English version-it is legal requirement.
4. On declaration page – one expert has not signed. Ensure all experts involved in this study are signed and the signing date.
5. Append the proof of land ownership. Clear and legal copy of certificates of occupancy.
6. Provide clear and detailed profile of the proponents, core business and experience on such business.
7. Discuss on the project impacts on the natural of the environment and those on human environments.
8. Discuss also on the project layout design of waste management system, drainage system.

2.0 SPECIFIC COMMENTS

REVIEW AREA 1: Description of the Development, Local Environment and Baseline Conditions

1. On page ii; the acknowledgement should include the names and profession of other experts who participated in the EIA study but not registered as EIA experts
2. Project components should be well described e.g. how many silos and their capacity will be constructed etc
3. On page 21 section 1.1; the justification should be narrowed down to specific project site and not only why NFRA was established
4. Site layout of the proposed project which is presented on page 30-34 should be readable and shifted to the appendices for easy reference
5. On page 37 Table 2; state the actual place where aggregates, sand and water will be sourced
6. On page 39 Table 6; provide an estimation of the quantity of Solid waste and liquid waste during construction phase
7. On page 40
    i. section 2.6.3; clearly state the activities to be done during demobilization
    ii. section 2.6.5; review this section to reflect the actual activities to be done and not only replacement of worn out equipment
8. On page 42 section 3.1; add the following policies
    i. The National Agriculture Policy, 2003

ii. National Irrigation Policy, 2010
iii. National Forest Policy
iv. Plant Protection Act, 1997
v. Fertilizer Act
vi. Seed Act

9. On page 47 section 3.2.2; the Act is not relevant to this project since there is no land conflict
10. On page 52 section 3.2.11; Review Urban Planning Act, No. 8 of 2007 and not Land use Planning Act, No. 6 of 2006
11. On page 53 section 3.2.12; state the objectives of this Act relevant to this project

REVIEW AREA 2: Identification and Evaluation of key Impacts

1. Provide more information on the project including
   i. How will grains be brought to the facility
   ii. Handling of the grains from the receiving end to storage in the silos and cleaning
   iii. Any additional chemicals
   iv. Waste generated and disposal

REVIEW AREA 3: Alternatives, Mitigations, EMP and Commitment

1. Provide linkage between the existing facilities and the new ones to be constructed
2. On page 130 Table 17; provide details on
   i. what will be done as per the fumigation application guidelines instead of just making reference to the guidelines
   ii. the standards operating procedures which will be followed to handle the use of aluminium phosphide and to prevent exposure to phosphine gas

REVIEW AREA 4: Stakeholders Participation and Communication of Results

1. The content and structure of the EIA study should follow
2. The project title should indicate
   i. plot number of the site
   ii. the name of mtaa and ward where the proposed project will be implemented
3. Obtain variation of use Group or change of land use from Industrial Service Trade use group "M" use class (a) to storage warehouse use group "L" use class (a)
4. Consult Dodoma district Agriculture Irrigation and Cooperatives Officer
5. Provide source of information of all figure used in the document
6. Provide the following documents
   i. Non-technical Executive Summary both Swahili and English version as per EIA and Audit Regulations, 2005
   ii. Designs of silos
   iii. Architectural drawings
   iv. Readable site layout plan

v. Relevant Planning Consent and any permit issued by planning authorities for variation

BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL [NEMC]

Mikocheni Regent Estate, Plot 28/29/30, P.O.Box 63154, Dar es Salaam, Tanzania,
Tel: +255 22 277 4852 / +255 22 277 4889, Fax: +255 22 277 4901, Mob: +255 713 608 930
Email: dg@nemc.or.tz / nemc_feesandcharges@nemc.or.tz, Website: www.nemc.or.tz

CODE: 5210

TIN: 101-190-145

RECEIPT

No. 15595

Date 10/5 20 17

RECEIVED from M/S National Food Reserve Agency (NFRA)

The Sum of Shillings Thirty Million Four Hundred Fifty Eight Thousand Two Hundred Fifty One Cents Ninety Eight Only

Being Payment of Review charges for the proposed Grain Storage facilities expansion at Makambako in Njombe district and Dodoma in Dodoma Municipality as per Inv 4195 and 4196

Electronic Transfer (ET) / Cash / Cheque No. 29/4/17 direct banking.

T.Shs. 30,458,251.98/-

With Thanks