ENVIRONMENTAL IMPACT STATEMENT

FOR

THE PROPOSED EXPANSION OF GRAIN STORAGE FACILITIES ON PLOT NO. 92 BLOCK J AT IPANGA MTAA, ICHENJEZYA WARD, MBOZI DISTRICT, SONGWE REGION

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02nd NOVEMBER 2017

EXECUTIVE SUMMARY

(a) Title:

"Environmental Impact Statement for the Proposed Expansion of Grain Storage Facilities on Plot No. 92 Block J at Ipanga Mtaa, Ichenjezya Ward, Mbozi District, Songwe Region"

(b) The Proponent:

NATIONAL FOOD RESERVE AGENCY (NFRA)
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(c) Experts who Conducted EIA:

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Outline and Justification for the proposed Project

(i) Background and Rationale

National Food Reserve Agency (NFRA) is a Public Institution established by the Executive Agencies Act No. 30 of 1997 and came into effect on the 1st day of July, 2008 as an Executive Agency under the Ministry of Agriculture Livestock and Fisheries.

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. Thus the Agency has been established to carry out three main functions. These are; -

- Procuring, reserving and releasing food stocks to address disasters
- Recycling and releasing food stocks in the market in order to stabilize food supply, and
- Marketing food commodities and generating revenue.

Therefore, the main role of the Agency is to procure food stocks, reserve, recycle and respond timely to food shortages in the country. Since its establishment the Agency has been successfully performing obligations by ensuring times procurement of grains from farmers and responding timely to food shortages in the country. NFRA has been a last resort to most farmers during grain procurement season. Furthermore, the Agency succeeded to reserve grain for number of years while observing quality standards which makes Tanzanian to enjoy quality food releasing by NFRA. It is the reverses were consumers within the country and outside the country can find grain with guaranteed quality.

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. Furthermore, the Government has recently changed composition of the administrative regions in the country and has formed additional one region, making a total of 26 regions in Tanzania Mainland. Each zone is equipped with several grain storage facilities. In total NFRA owns 33 storage facilities with a total storage capacity of 246,000 Metric Tons (MT).

One of the major challenge facing NFRA operations is inadequate storage capacity and facilities. In most villages where NFRA procure grains there is inadequate market infrastructure which constrains the whole exercise of procuring, transporting and reserving food stock. It has therefore become imperative for NFRA to increase its storage capacity to meet the food emergency in the country for post disaster needs and improve the efficiency of grain storage management.

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). NFRA is therefore proposing expansion of its storage capacity in its Mbozi storage Site which is under the NFRA Makambako Zone. Currently the site has the warehouses with storage capacity of 17,000 MT. The proposed expansion will include construction of six (6) Silos with total capacity of 20,000 MT. It is expected that, at the end of the project, the Mbozi Site will have the storage capacity of 37,000 MT. The total investment cost for the Mbozi Storage site is estimated to be USD 5,353,257.20.

(ii) Brief Description of the Project Environment

The Mbozi site is located at Latitude 9º07' South of Equator and Longitude 32º56' East of Greenwich Meridian. It is about 1,569m above the mean sea level. Vwawa (Mbozi) is located about 891 km from Dar es Salaam. Vwawa railway station is very close to this site. It can be used for transportation of goods and services. The plot has a total area of 53,691 square meters.

Currently, the Mbozi project site constitutes of one (1) Japanese Godown with storage capacity of 6,000MT, One (1) Italiano Godown with storage capacity of 4,000MT; Two(2) Steel sheet godown each with the storage capacity of 1,000MT; one (1) Ongoing warehouse construction which will have storage capacity of 5,000MT; one slab for open storage; Office building; and transformer.

The project area has a fairly flat land, with dominant gradient of less than 0.002 (0.2%) sloping northern part of the site, with very small storm water gullies. The predominant soil type in and around the project area is mostly grayish in colour and have textures ranging from loams to clay loams or clays. The area is covered by vegetation mainly grass on the eastern side with few trees planted at boundaries. Trees species includes banana trees, Cedar, mango and ornamental plants adjacent to the entrance gate. There are no animals or endangered species observed within the project site.

Mbozi site is on an area designated for industrial activities. On the west is bordered by TAZARA Railway line and Station, on the north, east and south is bordered by settlement neighborhood.

(iii) Stakeholders and their involvement in the EIA process

The stakeholders were identified based on their roles and relevance to the proposed construction of grain storage and its associated facilities. Most of the stakeholders such as central and local government authorities that might have specific interest to the project were

pre-determined while others were unfolding as the study was carried out. These include Ministry of Agriculture, Livestock and Fisheries; Ministry of Land Housing and Settlement and Development (MLHSD); Tanzania Pesticides Research Institute (TPRI); Tanzania Food and Drugs Authority (TFDA); Occupational Safety and Health Agency (OSHA); Mbozi District Council; Vwawa Township Authority; Communities where the project is located include Ichenjezya ward leaders were also consulted.

The study applied different participatory methods, namely interviews, one-to-one discussion and focused group discussions. The consultation was first conducted with the NFRA representative to get the details of the proposed activities. Stakeholders consulted were informed on the proposed project and asked to raise their concern to the consultant.

(iv) Result of public consultation

Generally views from various stakeholders support the development of the proposed project in Ichenjezya ward in view that the project will help in increasing revenue collection from levies and taxes to local government authorities. Major issues that were raised include waste management especially chemical empty containers; Air pollution, Health hazards to workers and nearby community as well as water pollution.

(v) Major Significant Impacts

Several positive and negative impacts are associated with the proposed project. Significant positive impacts include the following:

- Improved storage capacity of the NFRA Mbozi Depot
- Improved NFRA internal and external grain market capacity for farmers and other entrepreneurs.
- Increased employment opportunities during construction and operation.
- Benefits to local producers and suppliers of construction materials

Significant negative impacts include the following:

- Change of Landscape of the Area
- Soil Erosion due to Inadequacies in Backfilling and Resurfacing
- Health hazards to Workers and Users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management
- Health Impacts /Loss of Authentic of the area due to Haphazardly Management of Waste
- Depletion /Degradation at Points of Source of Construction Materials
- Impacts from Delivery of Construction Equipment and Materials
- Loss of Vegetation
- Loss of Aesthetic Value of the Area
- Noise pollution due to Movement of Construction Equipments
- Vibration Impact
- Air pollution due to dust and smoke from Earth Moving Equipment
- Occupational Health and Safety impacts during construction and operation
- Health hazards to Workers and Training Attendees / Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring
- Spread of HIV/AIDS and STIs due to Social Interaction
- Losses of Property/Lives or Injuries due to Fire Break out
- Decommissioning impacts

(vi) Project Alternatives

The choice of site has been dictated by a number of factors listed below:

a) Availability of alternative site. In this respect if the owner has several sites to choose from then assessment of site alternatives make sense. Since the project proponent has one site only, consideration of alternative sites was thought to be an academic exercise.
b) Different technologies and materials in construction facilities
c) The site has to be along the highway or at least within the area where motor vehicles can access easily. This project is located in an area with commercial activities.
d) No-Project alternative is considered as not a plausible alternative.

(vii) Recommendation and plan for mitigation of impacts

The following measures are recommended to be taken by the developer to minimize negative impacts (both real and perceived impacts):

Site Selection Phase

Change of Landscape of the Area

- Engage experts in landscaping, also topsoil will be levelled; grass and trees and plants will planted to all unpaved areas and parking areas.
- Indigenous vegetation and trees in areas that will not be impacted by the project shall not be disturbed
- Rehabilitation by planting trees, grasses and ornamental plants to all areas that will not be occupied by buildings on the project site
- Avoid planting non-native and exotic species on the site

Design Phase

Risk of Flooding and Inundation

- Appropriate drainage system will be included in the facility design
- The site selected for the facilities will be sufficiently higher than the maximum water level during high tides and storm surges.
- Appropriate raising of the foundations will be carried out if the available sites are not currently at the appropriate level.

Health hazards to Workers and Users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management

Water

- Ensure adequate supply of water by drilling borehole onsite.
- Consider harvesting rain water
- Put in place water saving measures including an Education, Information, and Communication (EIC) package with " DO and DON'T"
- Continuously monitoring leakages of distribution pipelines and fixtures
- Pay annual fees for water use permit

Energy

- Institute standby generators and maintain it properly
- The design should consider use of low energy-consuming fluorescent

- Consider use of occupancy sensor light switches, which automatically turn on when people are present and turn off when they leave
- Enhance good day lighting and adequate ventilation in all buildings

Human and Financial Resource
- Recruit adequate number of staff for facilities operation
- Ensure availability of adequate resource particularly finance for running costs, maintenance, and other social services.

Health Impacts /Loss of Authentic of the area due to Haphazardly Management of Waste

Construction Waste
- To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials, for compaction and construction works.
- Instructions to contractor on handling of hazardous waste such as oils, lubricants and non combustible waste during construction process.

General Waste
- Introduction of waste disposal bins, warning notices, “DOs & DoNTs” etc posted at strategic points, through the Grain Storage Facilities area.
- No, on site burial or open burning of solid waste shall be permitted at the project premises.
- Developer shall make sure that they establish good and efficient solid waste and wastewater collection and disposal system within the premises by contracting to the licensed and experience waste management contractor.
- Appoint an environmental manager who will be responsible for day to day environmental management activities within the centre

Hazardous Waste
Disposal of hazardous waste shall follow NEMC guidelines

Mobilization/Construction Phase

Depletion /Degradation at Points of Source of Construction Materials
Developer/Contractor shall procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.

Loss of Vegetation
- Indigenous vegetation and trees in areas that will not be impacted by the project shall not be disturbed
- Rehabilitation by planting trees, grasses and ornamental plants to all areas that will not be occupied by buildings on the project site
- Avoid planting non-native and exotic species on the site

Loss of Aesthetic Value of the Area
- Use the debris in the compaction and construction of the foundations for the structures
- Solid waste should be collected at different points (transfer station), which must be established inside the project compound before final disposal.
- Put in place as many waste bins as possible to discourage uncontrolled waste disposal.

Noise Pollution due to Construction Activities

- Working hours for construction activities within/near the communities will be limited to between 6am and 6pm.
- Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities
- Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution.
- Provided and sensitize use of ear plugs

Vibration Impact

- Silo facility foundation shall be designed to minimize vibration effect.
- Use of equipment designed with vibration control elements will be adopted where necessary.
- Construction work will be carried out in day hours only

Vehicular Traffic due to Transportation of Materials and Equipment

- Transportation and equipment and material will be astutely planned to avoid traffic congestion and other associated problems.
- Speed limits will be enforced for the Project vehicles.
- Safety signage should be placed at the work sites.

Air Pollution due to Dust and Smoke from Earth Moving Equipment

- Water shall be sprayed on unpaved surfaces used by such equipments to suppress dusts during construction
- Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke.
- Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use.
- Routine Inspection of equipments.
- Contractor to ensure compliance with the standard for ambient air quality.

Soil and Water Contamination

- The contractors will assign specific place for waste collection during construction
- 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, broken/used parts, etc.) will be sold to recycling contractors.
- Domestic solid waste from the construction site will be disposed through Vwawa Township Authority waste disposal system so as not to cause soil contamination.
- The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations.

Soil Erosion due to Inadequacies in Backfilling and Resurfacing

- After construction the site will be backfilled and resurfaced as per engineering design and procedure of which a minimum requirement of compaction strength is achieved during construction.
- Embankments and excavated slopes will not be left untreated /unattended for long durations. Appropriate slope stabilization measures will be taken per the design (eg, stone pitching).
- Light compaction to stabilize the soil.

Safety Hazards and Health Impacts of Construction Workers

- Register the site with Occupational, Safety and Health Authority (OSHA)
- The contractors will prepare site specific Health, Safety and Environment (HSE) Plan
- Use of water sprinklers to suppress excessive dust during construction
- Provide proper personal protective gear such as boots, masks, coats, and gloves for workers and enforce its use
- The construction sites will have protective fencing to avoid any unauthorized entry.
- Provide health and safety training to workers upon employment;
- Provide first aid services
- An 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.
- Availability of safe drinking water will be ensured for the construction staff.
- Notify OSHA on the actual day of commencing the project so that the statutory inspections; general workplace inspection, electrical safety inspection, and industrial hygiene survey to the workplace can be carried out.
- Formulate the Health and Safety Committee
- Occupational Health and Safety Risk Assessment
- Notify OSHA of closure or change of workplace project after completion of construction.

Operation Phase

Health hazards to Workers and customers/ Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring

- Construction of underground and installation of overhead water storage tank to harvest rainwater should be considered.
- Whenever possible the standby generator will be instituted
- Recruitment of adequate number of staff
- Availability of adequate resource particularly finance for running costs, water and other social services.
- Institute standby generator adequately to serve the facility especially Silos during power outage.
- Consider harvesting rain water
- Put in place water saving measures including an Education, Information, and Communication (EIC) package with " DO and DON'T"
- Continuously monitoring leakages of distribution pipelines and fixtures
- Pay annual fees for water use permit
- Availability of adequate resource particularly finance for maintenance
- Regular maintenance schedule of the structures should be put in place
- Proper operational and monitoring procedures should be put in place

Health Hazards to Users and Workers/Soil and Water Pollution due to Inadequate Waste Disposal

- Appropriate treatment and disposal system, such as septic tanks and soaking pits, having adequate capacity will be constructed.
- Introduction of waste disposal bins, warning notices, "DOs & DoNTs" etc posted at strategic points, through the Grain Storage Facilities area.
- No, on site burial or open burning of solid waste shall be permitted at the project premises.
- 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, broken/used parts, etc.) will be sold to recycling contractors.
- Domestic solid waste from the construction site will be disposed through Vwawa Township Authority waste disposal system so as not to cause soil contamination.
- The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations.
- Appoint an environmental manager who will be responsible for day to day environmental management activities within the site

Safety Hazards and Health Impacts to Workers during Operation

- Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals.
- Provide staff with appropriate and adequate personal protective equipment including gloves, coveralls, safety goggles, respirators and helmets
- Install first aid facilities in all places
- Making sure that code of practices is observed
- Observe minimum working duration in hazardous areas
- Provide regular training to all staff on HSE matters especially new employees.
- Conduct medical monitoring for its workforce as per OSHA requirements.
- Formulate environmental, health and safety committee
- Prepare and execute an emergency preparedness and response plan to help manage fire incidences
- Warning signs e.g. “No smoking”, Switch off telephone, Switch of Engine, Car speed, fire extinguisher shall be posted all over the project area.
- Emergency Assembly Point shall be allocated
- Ensure proper light in working areas
- Using surfaces that can be easily decontaminated in the washrooms, kitchen and canteen
- Facilitating hand washing with the availability of sinks and alcohol hand rubs
- Controlling the effects of noise

Air Emission from Operation Activities and Equipment

- The steel silos to be constructed will have 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
- The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM
- Standard operating procedures will be formulated and followed to handle and use aluminium phosphide, and to prevent exposure to phosphine gas.
- Fumigate when the grain temperature is between 21 and 32°C.
- Level the grain below the vertical wall of the bins.
- Remove or break up any crust on the grain surface.
- Seal all cracks, making the bin as airtight as possible.
- Keep the bin closed and post warning signs until the gas concentration is below 0.3 ppm.
- DO NOT ENTER the bin during or after fumigation until gases have been reduced to safe concentrations (0.3 ppm).
- Provide respiratory masks to workers who fumigate the warehouse.
- Regular air quality for CO2, SPM, Sox and NOx shall be measure.

- Workers will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.

Noise Pollution and Vibration

- Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities
- Movement of all project vehicles and personnel will be restricted to within work areas, to
- Generator will be confined in a room to minimize noise and vibration impact
- Motors, conveyor belts, bag filters, dryers, generator will be properly maintained
- PPE (ear muffs or air plugs) will be provided to workers

Vehicular Traffic due to Delivery and Dispatch of Grains

- Proper plan for unloading and loading of grains during delivery and dispatch respectively will be developed and implemented
- Liaison will be maintained with the relevant authorities (such as traffic police) regarding the grain transportation particularly during emergencies.

Aesthetic Value due to Installation of Silos

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

Spread of HIV/AIDS and STIs due to Social Interaction

- Developer shall promote broad awareness and open discussion about HIV/AIDS in the community. Activities shall be undertaken to enable patients to learn about prevention and care.
- Respect for people affected by HIV/AIDS shall be promoted; gender stereotypes and discrimination/stigma against people with HIV/AIDS shall be actively opposed.
- Policies and practices regarding recruitment, health care, benefits, learning and others shall take into HIV/AIDS to the maximum extent possible.
- Developer shall designate an employee as a resource person on HIV/AIDS and support her to play her/his role effectively.
- Developer will work with relevant government institution e.g. TACAIDS and relevant NGO to promote awareness among community and staff on the threat of HIV/AIDS

Losses of Property/Lives or Injuries due to Fire Break out

- The architecture of the proposed building will ensure speedy evacuation in the eventuality of a fire. The hallways, corridors and exists from all the buildings will be of sufficient widths and dimensions to enable easy and speedy evacuation.
- Fire plan and evacuation plan will be in place
- The water reservoir specifically for fire fighting shall be installed.
- Fire extinguishers and reels will be placed at strategic locations in all buildings,
- Procedures to follow in emergency cases such as fire outbreak will be displayed along corridors and in public ways to ensure safe and speedy evacuation of personnel,
- Fire alarms will be installed at strategic places.
- All workers shall be educated about the fire hazards, fire fighting methods and precautionary measures against fire outbreak.
- Good housekeeping shall be maintained at all buildings to reduce the fire risk.
- “No smoking” signs shall be posted all over the building.
- Emergency assembly point shall be clearly marked.

Decommissioning Phase

Loss of Aesthetic Value due to Abandonment of Structures

- Convert it to another use or sell the property and use the money for other activities
- Disassemble all equipment and demolish the structures in an environmentally sound manner to restore the environment into its original appearance.
- Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.

Loss of Aesthetics/Contamination and Impaired Environment due to Haphazard Disposal of Demolished Waste

- Metal parts will be sold or given free to smelters
- The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work.

Air pollution due to Dust Generation from Demolition Activities

- The site will be confined before demolition activities starts
- Developer shall provide and enforce the use of appropriate personal protective equipment (PPE)
- All active demolition areas will be watered at least twice a day to reduce dust.
- All trucks hauling demolition debris/wastes shall be covered.
- Exposed demolition debris of e.g. dust and sand, will be enclosed, covered, and watered daily before transported to disposal site.

Noise Pollution from Demolition Activities

- Use of equipment designed with noise/vibration control elements will be adopted where necessary.
- Trucks used during demolition exercise on site shall be routed away from noise sensitive areas in the neighborhood, where feasible.
- Idling time for pickup trucks and other small equipment will be minimized to limited time.
- Use of very noisy equipment will be limited to day time only.
- All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise.
- The demolition exercise will be limited at day time only

Loss of Employment to Workers

To mitigate this impact, the developer will ensure:

- Extensive training and preparations for workers for new /self employment.
- All employees are members of pension fund and the employer shall ensure that the fund contributions are made.

Enhancement of Positive Socio-Economic Impacts

Increased Employment Opportunities

- Optimization of local employment (allocate jobs fairly among the locals through involvement of local leaders)
- Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers

Benefit to Local Producers and Suppliers of Construction Materials

- Ensure procurement of construction materials from local source as much as possible
- Procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.

Enhanced Internal and External Grain Market Capacity for farmer and other Entrepreneurs

- Increase buying centre to reach more farmers/AMCOS
- Farmers shall be offered with competitive prices as per season market

(viii) Environmental and Social Management Plan

The EIS presents an outline Environmental and Social Management Plan (ESMP). Much of the day to day responsibility for implementing developer's environmental and social policy will be closely supervised by the developer Environmental Control Officer.

(ix) Proposed Monitoring and Auditing Plan

The EIS presents an outline Environmental Monitoring Plan (EMP) which will assist stakeholders to monitor (1) Implementation of the proposed mitigation measures and (2) the efficacy of the proposed mitigation measure. The Plan detailed parameters and frequencies as well as institutional arrangement for auditing and monitoring.

(x) Cost Benefit Analysis

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

(xi) Decommissioning

A preliminary decommissioning plan has been developed. It is envisaged that the project removal will begin six months after closure and continue for six months. Within the first six months NFRA will take inventory of all components that need to be removed and or disposed of. This inventory will include racks/shelves structures to be demolished and machinery to be disposed of. Also, mode of disposal and identification of actual contractors for demolition will be finalized within this period. This information will assist in the preparation of the final decommissioning plan, for approval by NEMC. However, the plan is to use for other purposes.

DECLARATION

Names of Consultants who formed the EIA Team

SN	Name of Consultant	Position/Area of Expertise	Signature
1.	Mr. Jamal Kiama	Lead Consultant and Environmental Impact Assessment Expert – Chemical and Process Engineer	
2.	Mr. Godlove George	Registered Environmental Impact Assessment Expert – Ecologist	
3.	Mr. Meshack Osiah	Registered Environmental Impact Assessment Expert – Environmental Management	

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ACKNOWLDEGEMENT

National Food Reserve Agency (NFRA) wishes to acknowledge the following for their invaluable contribution to the success of this EIA study:

- The National Environmental Management Council for reviewing project brief and the scoping study report and Terms of Reference.
- All stakeholders as listed in Appendix 2 are also acknowledged for their invaluable comments, information and data
- Mr. Patrick Swai (Civil Engineer), Mr. Marco Kidika (Sociologist), Ms. Collether Huntchson (Sociologist); Amour Ally (Occupational Health and Safety Expert) and Mr. Innocent Kilenga (Environmental Management) for their invaluable inputs during the initial audit exercise and preparation of report.

ABBREVIATIONS AND ACRONOMY

AIDS	Acquired Immune Deficiency Virus
AMCOS	Agriculture Marketing Cooperatives Societies
CRB	Contractors Registration Board
DOE	Division of Environment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMP	Environmental Monitoring Plan
EPL	EnviroPlanners Limited
ERB	Engineering Registration Board
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EWURA	Energy and Water Utilities Regulatory Authority
GN	Government Notice
HIV	Human Immune Virus
M & E	Monitoring and Evaluation
MALF	Ministry of Agriculture, livestock and Fisheries
MEO	Mtaa Executive Officer
NEMC	National Environment Management Council
NFRA	National Food Reserve Agency
NGO	Non-Governmental Organization
NLUPC	National Land Use Planning Commission
NSGPR	National Strategy for Growth and Poverty Reduction
NSSF	National Social Security Fund
OSHA	Occupational Safety and Health Authority
PFMRP	Public Financial Management Reform Programme
PMO	Prime Minister's Office
SACCOS	Saving and Credit Co-operative Society
SUDP	Dar es Salaam Strategic Urban Development Plan
SUMATRA	Surface and Marine Transport Regulatory Authority
TAC	Technical Advisory Committee
TANDREC	Tanzania National Disaster and Relief Committee
TANESCO	Tanzania Electricity Supply Company
TANROADS	Tanzania National Roads Agency
TBA	Tanzania Building Agency
TBS	Tanzania Bureau of Standards
TIC	Tanzania Investment Centre
ToR	Terms of Reference
TTCL	Tanzania Telecommunication Company Limited
URT	United Republic of Tanzania
VPO	Vice Presidents Office
VTA	Vwawa Township Authority
WEO	Ward Executive Officer
WFP	World Food Program

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND INFORMATION

National Food Reserve Agency (NFRA) is a Public Institution established by the Executive Agencies Act No. 30 of 1997 and came into effect on the 1st day of July, 2008 as an Executive Agency under the Ministry of Agriculture Livestock and Fisheries.

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Therefore, the main role of the Agency is to procure food stocks, reserve, recycle and respond timely to food shortages in the country. Since its establishment the Agency has been successfully performing obligations by ensuring times procurement of grains from farmers and responding timely to food shortages in the country. NFRA has been a last resort to most farmers during grain procurement season. Furthermore, the Agency succeeded to reserve grain for number of years while observing quality standards which makes Tanzanian to enjoy quality food releasing by NFRA. It is the reverses were consumers within the country and outside the country can find grain with guaranteed quality.

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. Furthermore, the Government has recently changed composition of the administrative regions in the country and has formed additional one region, making a total of 26 regions in Tanzania Mainland. Each zone is equipped with several grain storage facilities as indicated in table below. In total NFRA owns 33 storage facilities with a total storage capacity of 246,000 Metric Tons (MT).

Table 1.1: NFRA Total Storage Capacity and Area of Operation by Zones

Zone	Total Storage capacity (MT)	Area of operation (Regions)
Arusha	39,000	Arusha, Kilimanjaro and Manyara
Kipawa	52,000	Dar es Salaam, Pwani, Tanga, Morogoro, Mtwara and Lindi
Dodoma	39,000	Dodoma and Singida
Shinyanga	14,500	Shinyanga, Tabora, Mwanza, Geita, Simiyu, Mara, Kagera and Kigoma
Makambako	34,000	Iringa, Njombe and Mbeya
Songea	29,000	Ruvuma
Sumbawanga	28,500	Rukwa and Katavi
Total	**246,000**	

Source: NFRA, December 2016

NFRA developed Strategic Plan which is operationalized by Business plan for a year after year execution. The Agency Plans explore an intention to increasing the reserve capacity of food stock up to 700,000 MT by 2018 by expanding and introducing use of modern storage facilities and technology. Expected growth in reserve will enable the Agency to increase level of reserved stock toward attaining national optimum food requirement and improving operational efficiently.

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). NFRA is therefore proposing expansion of its storage capacity in its Mbozi storage Site which is under the NFRA Makambako Zone. Currently the site has the warehouses with storage capacity of 17,000 MT. The proposed expansion will include construction of six (6) Silos with total capacity of 20,000 MT. It is expected that, at the end of the project, the Mbozi Site will have the storage capacity of 37,000 MT. The total investment cost for the Mbozi Storage site is estimated to be USD 5,353,257.20.

The Environmental Impact Assessment (EIA) is to be undertaken in accordance with the Environmental Management Act, 2004 and Environmental Impact Assessment and Audit Regulations of 2005. Environmental Impact Assessment and Audit Regulations, 2005, First Schedule, categorize construction and operation of Grain Storage Facilities as project to which a full Environmental Impact Assessment is mandatory.

After reviewing with the letter Ref. NEMC/HQ/EIA/01/0684/Vol.I/04 on 10th February, 2017, the project proponent was required to undertake a full EIA study. As per Environment Impact Assessment and Audit Regulations, 2005, GN No.349 of 2005, scoping was undertaken in order to develop the Terms of Reference (ToR) for the EIA study. National Food Reserve Agency (NFRA) has engaged the service to EnviroPlanners Limited (EPL) of P.O. Box 33151, Dar es Salaam for carrying out the ESIA of the proposed project.

1.1.1 Project Rationale and Justification

One of the major challenge facing NFRA operations is inadequate storage capacity and facilities. In most villages where NFRA procure grains there is inadequate market infrastructure which constrains the whole exercise of procuring, transporting and reserving food stock. It has therefore become imperative for NFRA to increase its storage capacity to meet the food emergency in the country for post disaster needs and improve the efficiency of grain storage management.

Based on the nature of the services offered by NFRA, construction of the modern food storage facilities proposed under this project could considerably improve the efficacy of the government's emergency response and recovery efforts in disaster-prone areas, and if grain stocks are properly managed, could enhance the efficiency of its Public Food Distribution system (PFDS) at the same time. To respond to the above challenges, NFRA seeks to improve its capacity to respond to short- and longer-term post-disaster food and nutrition security needs by enhancing its network of food grain storage facilities and building modern food storage facilities; at the same time, it aims to improve the efficacy and accountability of the public food grain system.

1.2 SCOPING

Scoping was conducted between 10thand 30thJanuary 2017 and involved field visits, consultations with stakeholders and analysis of issues through desk studies. In line with the EIA& Audit Regulations, G.N. No. 349 of 2005, the scoping report identifies key environmental

and social issues and concerns as well as stakeholders requiring special attention during the EIA study. The outcomes of the scoping exercise were used to develop the ToR for the EIA which were approved by NEMC.

Stakeholders' consultations were carried out by the Consultant to ensure that concerns of key stakeholders were addressed by the project design and subsequent implementation of the project. Consultations were made with the following (see Appendix 2):

- National Food Reserve Agency- Dar es Salaam, Head Quarter
- National Food Reserve Agency- Mbozi Branch
- Ministry of Agriculture, Livestock and Fisheries
- Tanzania Food and Drugs Authority (TFDA) – Southern Highland Zone
- Tropical Pesticide Research Institute (TPRI)
- Occupational Safety and Health Agency (OSHA)-Southern Highland Zone
- Mbozi District Council
- Vwawa Town Council
- Ichenjezya Ward, Ilolo Ward and Vwawa Ward Offices

1.3 NATURE OF THE PROJECT

1.3.1 Goal of the Project

The overall purpose of the proposed project is to meet food emergency in the country for post disaster needs and improve the efficiency of grain storage management.

1.3.1.1 Specific Objectives

1. Construct six (6) Silos with total capacity of 46,000 MT at Mbozi Site.
2. Modernization of existing storage facilities at Mbozi Site
3. Provision of technical assistance, training and strategic studies

1.4 OBJECTIVES OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The developer undertook the environmental impact assessment of the Proposed Development of Grain Storage Facilities on Plot No. 92 Block J, Ipanga Mtaa, Ichenjezya ward,Mbozi District, Songwe Region to ensure that the project will not cause significant negative environmental and socio-economic impacts. The main objectives of the EIA Study are to:

- Provide decision-makers with an indication of the predicted consequences of the proposed project so as to assist in the decision making process;
- Provide decision-makers with an indication of the predicted consequences of the cumulative effects that could arise if all four phases of the project were to be developed.
- Identify, assess and where possible mitigate adverse impacts of the project on the natural and social environment; and develop its management and monitoring plan
- Promote sustainable development through the creation and enhancement of positive impacts associated with the project.

1.5 METHODOLOGY OF THE STUDY

The methodology employed in conducting the EIA study is in line with the Environment Impact Assessment and Audit Regulations, 2005, GN No.349 of 2005. The study was undertaken based on checklists developed by Consultants complimented by past experience of similar EIA studies. Observations of the proposed project site and surrounding habitats were made. Also some literature, in terms of reports and documents, were reviewed.

Impact Assessment was done by superimposing project elements onto the existing environmental conditions of the project site. Environmental impacts were then identified, their significance assessed and mitigation/enhancement measures proposed.

The study adopted the following approach:

1.5.1 Stakeholders Consultation

1.5.1.1 Identification of stakeholders
The identification was based on the role and relevance of an organization, group or individual to the proposed project. Some of the stakeholders such as national and local authorities and experts were pre-determined based on the nature of the project, while others unfolded as consultations went along. Consultations were made with stakeholders listed under table 5.1.

The aim of the assessment was to establish the level of consultation of the affected stakeholders e.g. relevant institutions; economic groups and individuals on and in the vicinity of the proposed project site; possible strategies for project monitoring; and establishing a framework for co-coordinating the environmental Impact Assessment with other stakeholders.

1.5.1.2 Stakeholders Participation
The scoping study applied different participatory methods to involve all the concerned stakeholders. Interviews were held with the main stakeholders nearby the project site as well as other institutions that, in one way or another, have interest in, or influence on the project area. One-to-one interviews with individual based upon a list of general topics or questions and partly based on open discussion, were conducted. Focus group discussions were also conducted.

1.5.1.3 Identification of stakeholders' concerns
Through interviews and discussions, stakeholders pointed out a number of issues and concerns. An issue raised by one institution, individual or a group of people was cross-checked by discussing it over with other institutions, individuals or groups. Relevant issues were noted and have been summarized under chapter 5.

1.5.2 Data Collection

1.5.2.1 Process of Identifying Information for EIA
In identifying information and data required for the impact assessment, a strategy for collecting the information before or during the impact assessment study is required to be put in place. The Information on the bio-physical, socio-economic environment, institutional and legal regimes were collected from a variety of sources, namely project documents and general literature review, visual and inspection, expert opinion, consultations with selected stakeholders and discussions with project proponent representatives.

Documents reviewed include:

- ✓ Project documents:
  - Project write-up for the establishment of grain storage facilities at Mbozi depot,
  - Land Occupancy Certificate of the proposed site.
- ✓ National Environmental Policy (1997)
- ✓ Environmental Management Act (EMA, 2004)
- ✓ Environment Impact Assessment and Audit Regulations G.N. No. 349 of 2005
- ✓ Other Relevant National Policies and Acts (chapter three below)
- ✓ Mbozi District Council Socio-economic Profile, 2016
- ✓ Vwawa Town Council Socio-economic Profile, 2016

1.5.2.2 Field data / Information collection

This involved visits to the site earmarked for the project components and activities. The consultants were accompanied by the project Developer representative. Field surveys were done to capture a broad picture of the prevailing situation on the site. Activities included:

- Appraisal of physical and environmental conditions of the project site and areas that may be impacted by or may have influence on the proposed development and its associated facilities and services, namely climate, topography, soils, drainage/hydrology, flora, fauna etc.
- Appraisal of land use and assessment of other relevant socio-economic parameters.
- Development of detailed project description.

1.6 REPORT STRUCTURE

The report is presented in accordance to the format given in Section 18 (1 and 2) of the Environmental Impact Assessment and Audit Regulations, 2005. It is presented in as follows:

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

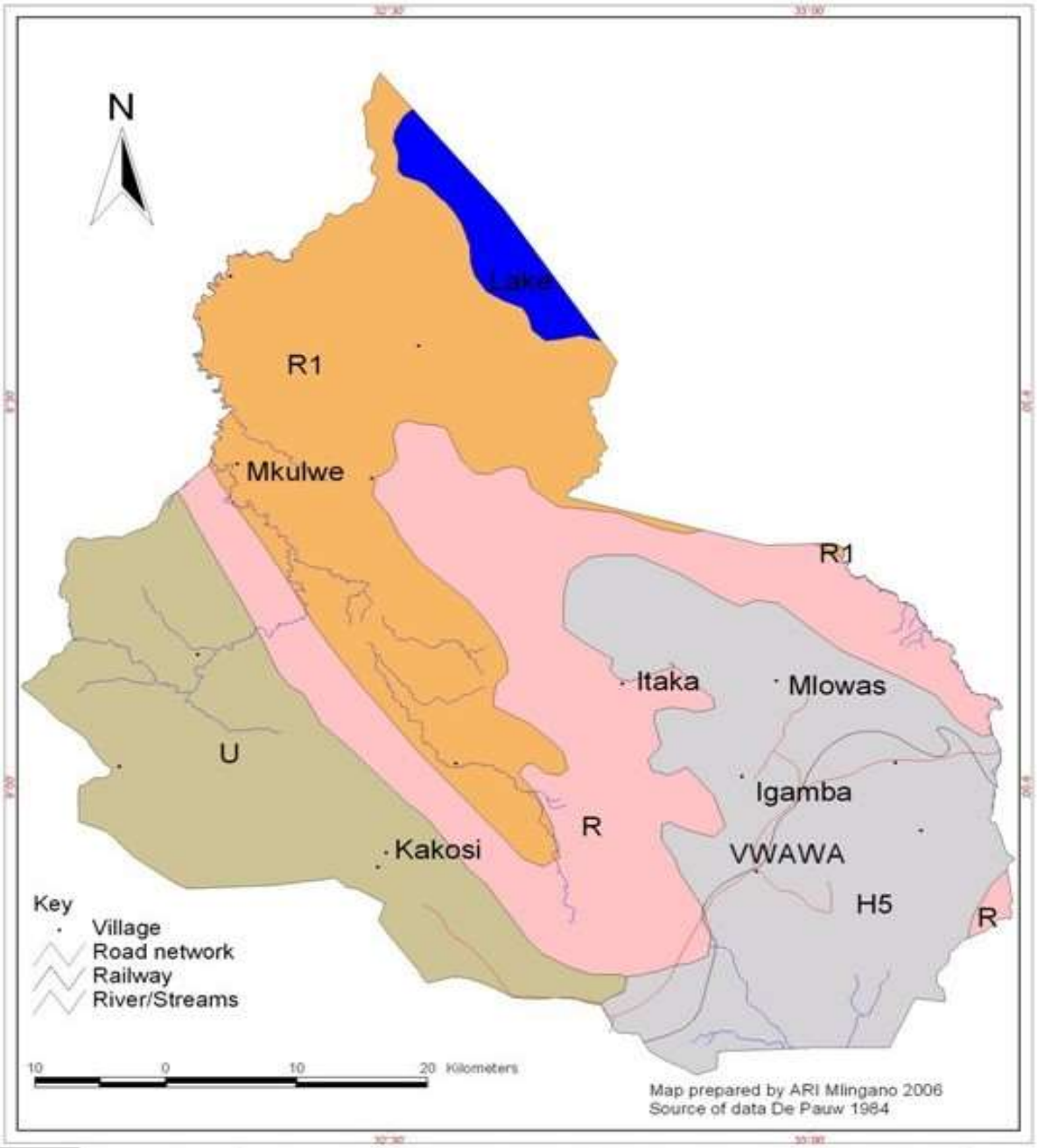
CHAPTER TWO: PROJECT DESCRIPTION

2.1 LOCATION

The Mbozi Depot site is located at Latitude 9º07' South of Equator and Longitude 32º56' East of Greenwich Meridian. It is about 1,569m above the mean sea level. Vwawa (Mbozi) is located about 891 km from Dar es Salaam. Vwawa railway station is very close to this site. It can be used for transportation of goods and services.

The plot has a total area of 53,691 square meters. The existing buildings occupy about 4,364 square meters and the proposed expansion will occupy 13,636 square meters.

Figure 2.1: Map of Tanzania Showing Songwe Region
Source: www.mapsofworld.com, 2017



Aez_code	Altitude (masl)	Rainfall(mm/year)	Physiography
H5	1200-2400	1000 - 2000	Undulating to rolling volcanic plains and plateaux to strongly dissected mts
	Not applicable	1200 - 1400	Not applicable
R	Not applicable	Not applicable	Rocky terrain
R1	800-1000	1000 - 1200	Flat plains covered by riverine or lacustrine alluvium, saline or sodic
U	1400-2300	1000 - 1200	Complex of flat to gently undulating plains developed on various rocks

Figure 2.2: Map of Mbozi District Showing Vwawa Area
Source: www.mapsofworld.com, 2017

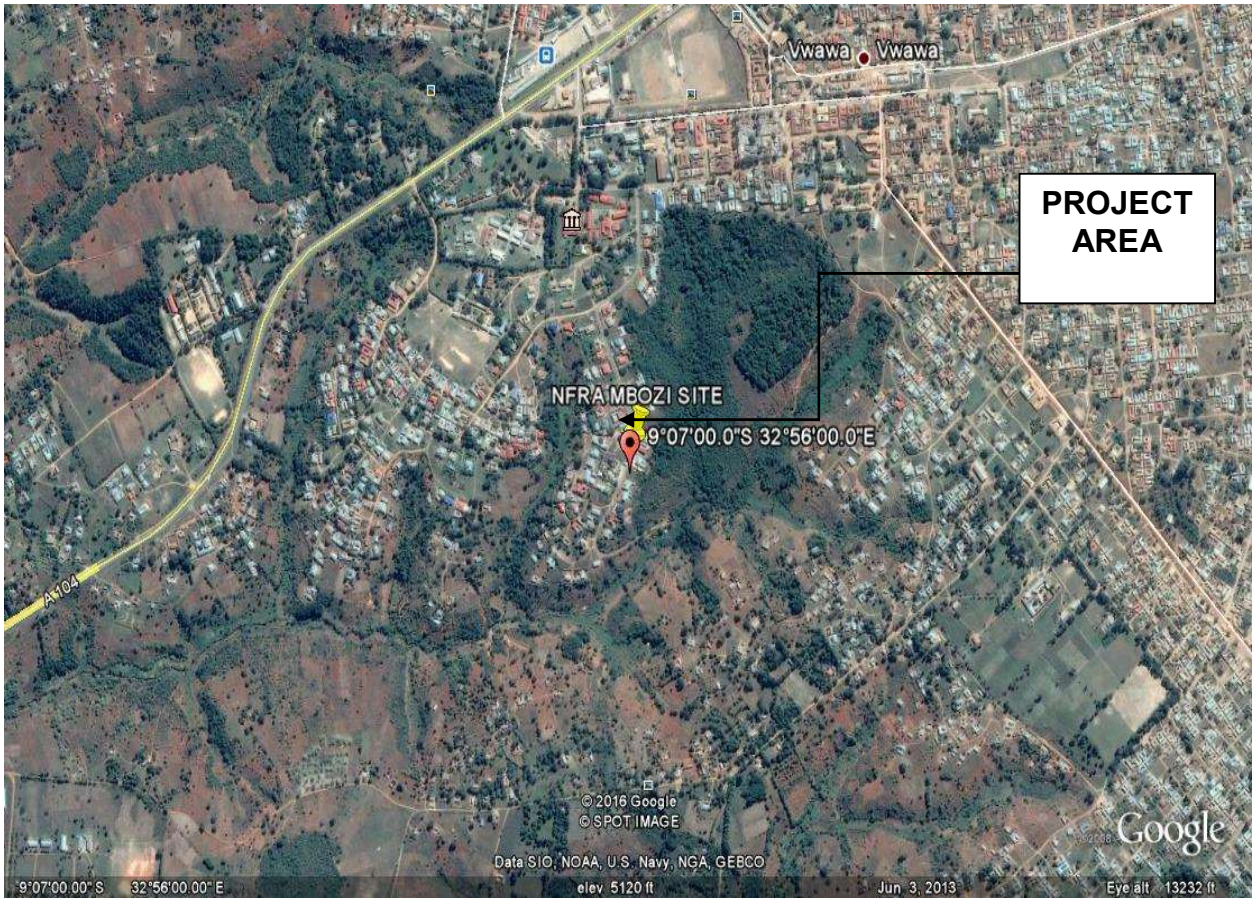


Figure 2.3: Google Map Showing Project Location
Source: Google Earth Map, 20th December 2016

2.2 LAND OWNERSHIP

The proposed project area is legally owned by National Food Reserve Agency Office of Tanzania (NFRA). NFRA is in the process of acquiring title deed for the plot.

2.3 SITE DESCRIPTION

2.3.1 Accessibility

Mbozi project site is located about 891 km from Dar es Salaam, and about 75 km from Mbeya Municipality along the Mbeya - Tunduma Highway. It is within the administrative area of Mbozi District council Vwawa town. The project site can easily be accessed from Mbeya region through the Dar es Salaam - Mbeya – Tunduma highway. Generally, access to Mbozi project site is through railway line and road network.

2.3.2 Development Status of the Site

Currently, the Mbozi project site constitutes of four complete warehouses, one ongoing warehouse construction; one slab for open storage; office building; transformer, partly open fenced side with an entrance gate and access earth road (see site layout attached in appendix 6).

2.3.3 Major Adjacent Developments

Mbozi site is on an area designated for industrial activities. On the west is bordered by TAZARA Railway line and Station, on the north, east and south is bordered by settlement neighborhood.

Figure 2.4: Existing Structures at the Project Site
Source: NFRA, December 2016

2.3.4 Establishment of Project Impact Area

The impact area was distinguished into the core area, immediate impacts area and the area of influence.

2.3.4.1 Project Core Area

The main area for the proposed project and its associated facilities covers all the area where the project structure and facilities will be located. The land planned for the project facility and operation will cover 18,000m^2 (33.5% of the total land) out of 53,691 m^2.

2.3.4.2 Immediate Impacts Area

The immediate impact area is the environment immediate surrounding the project site. These areas will be directly affected by the project development via for example dust, noise and traffic impacts during construction. Such areas include neighbouring developments.

2.3.4.3 Area of Influence

The environmental and socio-economic influence of the project is anticipated to extend beyond the project site. Bio-physical parameters and socio-economic aspects have been used to determine the following region of influence:

i. Local communities employed either permanently or temporarily during construction and operation.
ii. Transportation routes to the site for delivering construction materials.
iii. Mbozi District Council and Vwawa Town Council

2.4 PROJECT COMPONENTS

The project will involve rehabilitation of some of the existing facilities and construction of new storage facilities and supporting infrastructure. To meet requirements of the proposed project, some of the existing infrastructure such as storm water drainage will be rehabilitated and improved and others will be new construction. According to current design plan, main components under the proposed project will include:

2.4.1 Storage Warehouses and Silos

Currently the Mbozi project site has four (4) godows all with total storage capacity of 17,000 MT:

1-Japanese Godown: This godown has been constructed with concrete foundation and floor, with steel sheet walls fixed on top of 1.5m concrete wall. The godown is roofed with iron sheets on top of steel trusses. Ventilation is only provided through the doors. This godown can accommodate up to 4,000MT of grains.

1-Italiano Godown: This godown has been constructed with concrete foundation and floor, with steel sheet walls fixed on top of 1.5m concrete wall. The godown is roofed with iron sheets on top of steel trusses. Ventilation is only provided through the doors. This godown can accommodate up to 4,000MT of grains.

2-Steel sheet godown: These two (2) godowns have been constructed with concrete foundation and floor, with steel sheet walls. The godowns are roofed with iron sheets on top of steel trusses. Ventilation is only provided through the doors as well as at the roof top. Each godown can accommodate up to 2,000MT of grains.

1 Ongoing warehouse construction: This godown is under construction using concrete foundation and floors. There will be a concrete wall of 2 meters above the ground which will be fixed with steel sheet on top. The godown will be roofed with iron sheet on top of steel trusses. The godown will have capacity to store 5,000MT.

The proposed expansion will include construction of six (6) Silos with total capacity of 20,000 MT. It is expected that, at the end of the project, the Mbozi Site will have the storage capacity of 37,000 MT (see site layout attached in appendix 8).

Existing Steel Sheets Godowns

Existing Italiano Godown

Proposed Area for Silo Installation

Figure 2.5: Existing Godowns and Proposed Area for Silo Installation

Source: NFRA, December 2016

2.4.2 Administration Block

Currently the site has a small office that does not have enough space to accommodate current and future staff members. The building is attached to one of the warehouse. This building will be demolished during construction.

The project will therefore construct new administration block of a single story building. The Block will mainly accommodate offices for NFRA workers. The block will also comprise of meeting room and washrooms.

2.4.3 Argo-chemicals Store

Store for storing agrochemicals will also be constructed. Current the Mbozi site uses one room adjacent to the entrance gate as the store for agrochemicals. The building will also be demolished to accommodate washroom building, chemical store and water tank.

2.4.4 Canteen

There will be a canteen connected with a small kitchen for workers. Also there will be a hand washing area.

2.4.5 Washroom Block

Current the project site has 4 toilets. These toilets are not enough during peak season where the site is influxes with casual labours. The expansion will therefore construct a washroom block comprising mainly of bathrooms and toilets. The block will comprise of 10 toilets and 10 bathrooms for Male and 10 toilets and 10 bathrooms for female.

2.4.6 Other Support Facilities and Services

Machines and Equipment

There are other supporting facilities required in the silo complex from grain intake to grain storage. These components 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, instrumentation and control system.

Also, currently the Mbozi site has weighing facilities comprise of one (1) weighbridge of 100 T and 8 small scales. The proposed expansion will includes additional of one (1) weighbridge of 100 T.

The Mbozi project site will also have the following equipments:

Table 2.1: Available Equipments in Mbozi Project Site

S/N	Component	Equipment	Number
1.	Reception Point	Sampling Probe	3
		Moisture meter	2
2.	Weighing Zone	Weighbridge 100 T	1
		Small scale	8
3.	Cleaning	Manual Sieve	100
4.	Staking	Elevators	1
		Ladders	1
		Pallets	1,500
		Packing Bags	60,000

Source: NFRA, 2016

Table 2.2: Proposed Additional Equipments and Machinery for Mbozi Site

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

Source: NFRA, 2016

2.4.7 Access Road and Parking Areas

The Mbozi site has an access road which is not in good condition which provides difficulties of accessibility during rainy season. The access roads and pathways will be upgraded.

Also there will be parking areas in front of the office building and will be paved, parking space will have 5,464m^2.

2.5 PROJECT ACTIVITIES

The development of the project involve various phases: site selection phase, design phase, construction/installation phase and operation phase as well decommission phase though not in a near future.

2.5.1 Site Selection Phase

Mbozi site has enough land allocated for proposed installation of Silos. Topographic survey has revealed that the amount land available is sufficient. The area earmarked for silos installation is within the boundaries of the whole area that belongs to NFRA.

The location of the site has its own value due to the already existing storage facilities and therefore it is viable site selection option for expansion.

2.5.2 Design Phase

The project will involve design of storage facilities and support infrastructure and services. The following has already been done based on the feasibility study conducted earlier:

2.5.2.1 Preliminary Engineering Designs

The Preliminary Project Design establishes a plan which allows the earliest practicable start of final engineering design/ equipment procurement/construction/installation on an uninterrupted basis. Preliminary design provides specific and detailed consideration to each of the basic and supporting facilities required for full operation and maintenance of the facility and its equipment.

The preliminary designs recommend capacities, operating characteristics and principal features required for a coordinated operating facility. In like manner, planning criteria and standards for

general site preparation, site development, earth work and grading, structural excavation, foundations, drainage, site access and utility requirements were given specific consideration.

The parameters of location, site improvement, structures and special features are addressed in the design.

Topographic Map

Site topographic survey was conducted, covered all details of existing features both man-made and natural. Datum system employed was Arc 1960 in UTM format. Network of benchmarks was established. Data were processed in AutoCAD Civil 3D 2014, and generates contour maps that were used for engineering design. Total area owned was found to be 53,691 m^2, whereas area earmarked for silo is 6,000 m^2 (0.6Ha).

Storage capacity and Dimension determination

Based on planed storage, the size (dimensions) for warehouses and silo bins were determined. All design parameters for sizing storage were considered, these include specific volume of maize (1.8 m^3/t); staking height 5m; main handling area 3m wide along the axis of warehouse; a gang way 2m wide across the centre of the warehouse, an inspection space, 1m wide, around the entire stacking area. Whereas determining size of silo bin based on material flow in the bin using the formula $H = m/(\rho_{avg}A)$ where H is the height of bin; m is the mass of grain ρ_{avg} is average bulk density of grain and A is the cross section of the bin. According to available space designed silo complex will have storage bins of diameter ø= 17 m, height to eve = 18.8 m, overall Height = 23.6; Bin storage capacity = 3,350 MT.

Silo Structure

The silos will be flat bottomed.

The roofs of the silos will consists of trapezoidal elements made of hot-galvanised sheets with reinforcing bars to withstand the loads caused by conveyor devices and inspection gangways. The roofs will be fixed to the cylinder by means of galvanized steel plates in order to guarantee the circulation of air and to reduce condensation.

The cylinder is made of structural steel sheets with Z275 galvanised covering (equivalent to 275g/m^2 of zinc) that guarantees long-term resistance to atmospheric agents.

The structure is externally reinforced with structural steel upright columns with omega section anchored to the base using rawl bolts or anchor bolts.

Accessories

The silos will be equipped with the following accessories:

- A roof hatch for the control of the stored cereal
- Double inspection door usually positioned on the second ring, connected to a micro switch to stop the rotating extractor placed in the internal part of the silo and ensure safe access by maintenance personnel
- An anti-bird circumferential net positioned in between the roof and the cylinder
- Maximum and minimum level gauges
- Motorized air extraction fans
- Support for temperature control cables
- Thermometric plants
- Ventilation systems
- Rotating extractors for the unloading of the residual

- Side unloading channels can be fitted for partial silo unloading without the aid of mechanical devices
- Vertical ladder with guards and stirrups
- Roof ladder with side guards and circular platform
- Hanging gangways for inspection and conveyor support
- Gangway supporting structures
- Descents from gangways

Table 2.3: Silo Design Data

SN	Description	
1.	Silo Bin Capacity (MT)	3,350
2.	Bin Diameter (m)	17.0
3.	Bin Height (m)	18.8
4.	Overall Height (m)	23.90
5.	Materials	Galvanized Steel (275g/m^2)
6.	Silo Type	Flat bottomed
7.	Number of Silo Bins	6
8.	Grain Type	Maize

Source: NFRA, 2016

Site layout

After dimensioning the structure, the design layout arrangements for silos complex only was developed accordingly. After fitting the facilities in the available area, drainage system layout, internal roads (hardstand) pavements, office, washrooms, canteen and other stores as well as traffic plan were developed (see site layout attached in appendix 8).

The design of site layout for major facilities (silos) is based on operational flow and best approach of space optimization. The arrangement follows the logical flow of materials in the sequence of grain storage technology. Silos were arranged basing on the proper manoeuvring of vehicles both during offloading and loading of grains.

2.5.2.2 Construction Materials

The project will use locally available materials for easy maintenance of the facility in the future.

Table 2.4: Sources and Estimated Quantities of Construction Materials

Type of Materials / Natural Resource	Quantity/ Rate of Extraction	Potential Source
Aggregates	1000m^3	Existing quarry sites in Mbozi District
Sand	800m^3	Existing quarry sites in Mbozi District
Gravel	1000m^3	Existing quarry sites in Mbozi District
Water: - Construction phase - Operation phase	2,000m^3 per day 10,000L per day	Borehole (already on site)
Steel	7638.44m^3	Local suppliers
Power: Electricity	50-100 kW per day	TANESCO

Source: NFRA, 2016

2.5.3 Mobilization Phase

2.5.3.2 Materials and Construction Equipments

The construction materials such as sand, stone, and clay expected to be obtained from authorized quarry sites in Mbozi District. Building materials such as cement, tiles, pavement, sanitary ware, roofing sheets, paints, paving blocks and steel will most likely be procured from various sources in Mbozi or Mbeya City.

The project will employ various standard construction equipments for the performance of the works. The major equipments will include excavators, trucks, motor grader, compactors etc.

2.5.3.3 Transportation

The contractor will be responsible for transportation of all construction materials and equipments from point source to the site mainly by using the Mbeya-Tunduma Highway. Most of the construction materials such as cement, steel, wood, sand, stones and aggregates etc. will be brought from places far away from the project site.

2.5.3.4 Construction Crew

There will be employment of workers during construction as shall be determined by the Contractor. The crew will comprise of both qualified personnel and casual workers.

Health and Safety Issues during Mobilization
Noise and air pollution generation will essentially result from the movement of trucks and activities. Trucks will be covered to minimise pollution from carried materials.

The proposed project will require the use of public roads while transporting materials. This project requirement will add to the amount of heavy vehicle traffic along Mbozi - Tunduma Highway and local roads. However, this increase is not expected to significantly affect traffic volumes.

2.5.4 Construction Phase

2.5.4.2 Site Preparation

Site preparation will involve excavation of the foundations and trenches. The preparation will also involve vegetation clearance and removal of overburden/topsoil which will be disposed in approved site.

2.5.4.3 Backfilling

It is expected that spoil materials will be generated from excavations therefore backfilling and resurfacing will be conducted when constructing foundations of different facilities.

2.5.4.4 Structure Erection and Silo Installation

The construction will involve erection of proposed structures and paving of other areas as per design. During construction there will be installation of equipment/machinery to the site that will be used for construction purposes.

The flat bottomed six (6) silos will be mounted on a concrete base in which ventilation channels will be obtained.

The sheets and the uprights will be assembled using high mechanical resistance bolts, treated against corrosion. The infiltration of water through the sheet joints will be prevented by inserting a sealing bead.

Health and Safety Issues during Construction
Haphazard disposal of waste generated from clearance and excavation works may degrade / cause pollution and loss of aesthetic value of the receiving areas.

Movement of trucks loaded with construction materials such as sand and aggregates, cement, steel and roofing sheets etc. will generate noise. Furthermore, anthropogenic noise sources are associated with constant human activities in the area, particularly from motor vehicles. The contractor will therefore perform construction activities during day hours.

Construction machinery and project vehicles will release exhaust emissions. The contractor will use water reels to suppress dust at the 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 result in injury to the head, eyes, and extremities.

Unhygienic condition and unavailability of safe drinking water for the construction staff will expose them to health risks.

2.5.5 Operation Phase

The overall purpose of the proposed project is to meet food emergency in the country for post disaster needs and improve the efficiency of grain storage management.

Activities during operation of the project are as follows:

2.5.5.1 Procurement and Transportation of Food Stocks

NFRA operates with private sectors in procurement, transportation, storage and distribution of the maize stocks to the population affected by food shortages. Farmers and traders are the main sources of the grain reserve.

The procurement of food stocks starts in July and ends in December with a peak in October. The grains procured should meet the minimum quality requirement. Provided the products meet the minimum requirements, it will be purchased at a pre-determined price based on prevailing market price and unit cost of production. Modes of grain procurements are mainly:

i. Use of existing collection/buying centres
ii. Appointing and entering into contracts with buying agents.
iii. Entering into forwarding contracts with farmers groups and organizations such as SACCOS and AMCOS.
iv. Procuring through open public tender especially in areas with low production level.

The procurement of the grains for Mbozi site is through Agricultural Marketing Co-operatives Societies (AMCOS) as well as from individuals. There are more than 50 AMCOS in Mbozi District. The site has only three (3) buying centres.

Nationally, at present NFRA has about 60 permanent buying centres at the village level located in seven NFRA zones as indicated in table 2.5 below. Care is taken to limit the number of buying centres so that private sector traders are not discouraged from entering the market as well as minimizing operational costs. In 2016/2017 the Agency is intending to increase the number of buying centres to 62 so as more farmers can have direct access to sell at buying centres. The plan is to have 50 permanent buying centres and 12 mobile buying centres.

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 zonal headquarters. Most of the goods and services required for smooth operations of the Agency are procured and supplied by private sectors.

Table 2.5: Number of NFRA Buying Centres at Village Level

Zone	District	Number of Buying Centre
Sumbawanga	Sumbawanga (M)	3
	Sumbawanga (R)	4
	Nkasi	3
	Kalambo	3
	Katavi	3
	Mlele	3
Songea	Songea (R)	9
	Songea (M)	3
	Namtumbo	5
	Nyasa	1
	Mbinga	7
Makambako	Njombe	2
	Makambako	1
	Ludewa	2
	Iringa	1
	Momba	1
	Mbozi	1
	Ileje	1
Arusha	Babati	1
	Hanang	1
	Mbulu	1
	Arusha	1
Dodoma	Kiteto	1
	Manyoni	1
	Dodoma	1
Kipawa	Morogoro	1
	Tanga	1
Total		**62**

Source: NFRA, 2016

2.5.5.2 Unloading and Loading

Food grain purchased at buying centres where it is unloaded from farmers' bags for inspection, sieving and cleaning. The sieving and cleaning is done using steel sieves.

After quality inspection and grading, the grains are bagged in 90 kg bags, loaded in trucks and transported to the storage site where it is weighed, unloaded to storage warehouses and stacked before being fumigated and stored. NFRA use 90 kg bags instead of 50 kg because the later consume a lot of storage space during arrangements and hence minimise storage capacity.

The unloading of the grains bags from trucks is done both manually and using elevator or ladder for transfer and staked at the warehouse.

The loading of the bags during dispatch is done by placing bags from the warehouse through elevators and ladders to the trucks.

The installation of silos will have a different mechanism for unloading and loading of grains. In the storage flat bottom grain bins loading will be performed through the central dome both by means of pipes and conveyor devices positioned on dedicated gangways.

Silo unloading will be by means of mechanical conveyor devices positioned both in the subterranean tunnels or in the channels obtained in the base. Also side unloading channels will be fitted (installed on the 10th ring) for partial silo unloading without the need for mechanical devices.

2.5.5.3 Stock Storage, Maintenance and Quality Control

Warehouse
Food grain staked at the warehouse is fumigated when first stored. Fumigants and agro-chemicals mostly used by the Agency are as indicated in table 2.6 below.

During storage life time of the grains, inspection is done regularly to ensure that its condition remains within specifications and that it is not subject to pests and rodents attack.

Fumigation is done after every three months while spraying and dusting is done once per week inside and outside the warehouses. Inspection is done regularly to ensure that its condition remains within specifications and that it is not subject to pests and rodents attack.

The personnel responsible for spraying i.e. quality assurance officers are equipped with personal protective equipments such as gloves, respiratory masks and overalls/overcoats.

Steel Silos
In silos operation grains moisture and temperature monitoring are two key components of proper storage management practices. Moisture and Temperature will be monitored through automated system with sensor installed.

Grains will be dried to safe storage moisture levels by in-bin natural air drying without exposing to high heat in high temperature dryers. The aeration systems with automated fan and heater control will effectively and timely dry and aerate (cool) the grains using optimal ambient air conditions and minimum energy consumption. An aeration system with automated fan control will also rehydrate over-dried grains using natural air to manage 'shrink'.

Insect density and growth will also be automatically monitored and timely fumigation treatment will be applied if insect density increases.

Table 2.6: Fumigants and Agro-chemicals mostly used by NFRA

SN	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

The Agency ensures that desired quality standards are attained throughout procurement period and storage time. Responsibility of inspections and undertaking the necessary corrective measures/actions rests with the Agency's quality control specialists. Acceptable quality standards are as indicated in table 2.7.

Table 2.7: Acceptable Quality Standards

SN	Parameters	Maximum allowed Content	
1.	Moisture Contents (MC)	Less than	13%
2.	Foreign Matters (FM)	Less than	0.5%
3.	Broken Grains (BG)	Less than	2.0%
4.	Pest Damaged Grains (PDG)	Less than	1.0%
5.	Rotten and Diseased Grains (RDG)	Less than	2.0%
6.	Immature & Shrivelled Grains (ISG)	Less than	1.0%
7.	Other Coloured Grain (OCG)	Less than	0.5%

Source: NFRA, 2016

2.5.5.4 Storage and Handling of Agro-chemicals

The storage and handling of agro-chemicals is one activity that can harm and contaminate the environment, especially ground and surface water. However, if stored safely in a secure location, agro-chemicals (pesticides) pose little danger to the environment and human body. NFRA will use the Best Management Practices (BMPs) for handling, storage and use of all the agro-chemicals in the depot.

Agro-Chemical Handling

To ensure that there is minimal contamination of the environmental from handling of agro-chemicals, the following measures will be put in place:

- **Protective Attire:** NFRA will provide protective attire for all employees working with agro-chemicals. The employees will be trained in the BMPs of handling and storage of agro-chemicals.

- **Mixing and Loading Activities*:*** Extreme caution will be taken when handling concentrated agro-chemicals as spills could result in expensive hazardous waste cleanups. The mixing and loading operations of pesticides will be located away from ground water wells and areas where runoff may carry spilled pesticides into surface water bodies. All mixing and loading areas will be placed close to storage facilities, to minimize the distance that agro-chemicals are transported before filling the sprayers.

- **Equipment Calibration and Loading:** All application equipment will be properly calibrated and kept in good repair. All calibration will be done according to the measure of the amount of pesticides per related spaces.

- **Spill Cleanups:** Agro-chemical spills will be cleaned up immediately to avoid contamination of the water bodies.

- **Container Disposal*:*** Before disposal, containers and bags will be cleaned and shaken out respectively. The containers and bags will then be transported to approve disposal sites.

- **Record Keeping:** NFRA will keep records of all agro-chemicals used on the warehouses and silos. These will include records of all agro-chemicals available and those that have been used in the past, where and how they will/were disposed of. Record keeping is intended to ensure that all agro-chemicals used on the premises are accounted for as a measure towards BMPs of handling and storage of these agro-chemicals.

Storage

The following will be done for proper storage of agro-chemicals:

- Storage facilities will be built to keep agro-chemicals secure and isolated from the surrounding environment. These storage facilities will be located down slope away from the boreholes and well on the premises.

- Herbicides, insecticides and fungicides will be segregated and their respective labels kept during storage to prevent cross-contamination and minimize the potential for is application.

- All agro-chemicals (pesticides) will be kept out of the way of activities that might rip open a bag or puncture a liquid storage container.

- All agro-chemicals will be maintained in their original well labelled containers, securely closed and regular inspections will be carried out for splits, tears, breaks, or leaks.

- Apart from handling agro-chemicals, employees will also be trained on the BMPs of storing agro-chemicals.

2.5.5.5 Food Recycling

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.

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 (3) years, after which it is 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. Part of the food stock is released to the market for the purpose of stabilizing supply of food commodities.

The Major Stakeholders of NFRA includes Millers, Prisons, WFP and PMO. They purchase maize from the Agency targeting on fulfilment on their basic objectives such as PMO in food relief and millers in ensuring the availability of food in the economy.

Health and Safety Issues during Operation

During operation, workers and occupiers will be exposed to different situations that could be detrimental to their health and safety. These may include electrocution, fall, cuts and other body injuries.

The storage and handling of agro-chemicals for fumigation, spraying and dusting activities can harm workers if done inappropriately. Poor handling can cause skins irritation or burns. Also workers responsible for fumigation activities will particularly be exposed to the fumigants which may cause severe respiratory irritation.

Safety hazards and health impact may also include ergonomic hazards in the office environment and from manually lifting of grain bags.

The spraying activities will cause emission of gases such as Phosphine gas from aluminum phosphine granules.

Transportation of food grain to and from warehouse and silos complex will cause additional traffic on the access routes. This increased traffic can also pose safety hazards for the nearby population particularly children.

2.5.6 Decommissioning Phase

Decommissioning is the final phase in the life cycle of the project after sitting, design, construction, commissioning and operation. Most often, it is a process involving activities such as dismantling and demolition of unwanted structures, and management of resulting materials

and people going out of job. All these activities take into account of the environmental, health and safety requirements for the operating personnel, the general public and any implications to the environment. The activities during decommissioning will include.

a) Carry out an inventory of all components that need to be removed and/or disposed.
b) Dismantling and demolition of structures
c) Landscaping of open areas. Such areas will be sealed from pits and other depressions and vegetation introduced.
d) All waste materials will be cleared and removed from the site and be disposed appropriately.
e) General rehabilitation of any excavated areas; quality vegetation will be introduced to add aesthetic value to the site. This will be regularly watered.
f) The structures will be cleared and rubbed of any dust particles
g) Workers will be pre-warned just before decommissioning and suitably compensated and recommended and if possible, assist in seeking opportunities elsewhere.

The Proponent will all be responsible for the decommissioning of the project. During decommissioning, the Proponent will submit the plan to the National Environment Management Council (NEMC) for approval. After approval of the plan, the project proponent and owner will proceed with decommissioning.

Health and Safety Issues during Decommissioning

Solid waste, dust and noise are expected from demolition works of the structures. Haphazard disposal may cause contamination/impaired quality of the receiving body such as land. Also demolition activities will cause safety to workers in terms of hot by falling items etc.

2.6 UTILITIES AND OTHER SUPPORTING INFRASTRUCTURE

2.6.1 Water Supply

Mbozi site is connected to Vwawa town water supply network; water is available with little water shortage. The site serves 13 workers during normal operation period and is populated with about 300 labourers during peak season and water shortage impairs their hygiene and health conditions. During normal operation period water demand is estimated to be 1,000 L per day while during peak season water demand is estimated to be 10,000 L per day. Water is used for domestic and other sanitation activities.

To complement the existing supply the project will also obtain water from the borehole to be established at the site. There will be an overhead reservoir tank of 100,000L.
The project will also consider construction of rain water collection tank and conveyance system.

2.6.2 Power Supply

Mbozi site is connected to the national grid system. There is already existing 33kV HT line near the site. Construction of a silo complex will require an increased supply of electricity.

Electrical power requirement calculations based on total number of motors required to run silo complex with associated load capacities; lightning system both in warehouse, office, canteen, and all buildings; as well as security lights. Silo complex proposed, requires power between 500 kVA to 800 kVA.

Therefore, based on general requirement of the proposed and existing facilities, 1,000 kVA 330.4 kV Transformer will be installed to cater for the electricity supply needs of the new silo

complex, new warehouse(s), current existing storage facilities, construction of the new office, laboratory, canteen room and sanitary facilities plus slight future expansions. 1,600A Main LV Distribution Panel Board will be installed for power distribution system within the site. Alternatively, 1 MVA 33/0.4 kV Distribution substation (Free Breathing 1MVA, 33kV transformer complete with MV/LV switchgear) is preferred.

Storage in silos is of power sensitive system; therefore, the design has considered a standby power supply as an alternative during power blackouts. Based on the general requirement of the proposed facilities, existing facilities and using a diversity factor, one 810 kVA Standby Generator (Prime rated) is preferred to cater for the standby/ back-up electricity supply. 1,600A Automatic Transfer Switch will be installed to switch between the utility's (TANESCO) supply and the output of the standby generator and Main LV Distribution Panel Board required.

A secure enclosure/shade with a concrete plinth/ base of around 11m by 8m will be constructed to house the standby generator. Proposed location is designed to be near the Silos complex so as to reduce the length of the armoured cables required to connect various motors and LV Main Distribution Panel Board.

The project will use gas and electricity for cooking purposes in the kitchen.

2.6.3 Information and Communication Technology (ICT)

Telephone Connection
The area is well covered by telephone communication facilities such as main lines (landlines and their broadband) that are managed by the government agency (TTCL). Also, there are about five private companies (TiGO, Vodacom, Airtel, Zantel and Halotel) which operate mobile telephone networks in Tanzania. All these will facilitate communication during the project cycle, construction, and during operation of the project.

Radio and TVs
There are a number of radio and television stations in the country mostly based in Dar es Salaam and Mbeya.

Internet Connection
Internet service is available and is normally provided by the telephone companies both public and private though broadband connections. Also, there are private companies with their sole business being provision of internet connections and email accounts for office use.

Currently, Mbozi site internet access depends on TTCL modems installed. In order to modernize the information system, investment in new equipment and operation of Management Information System is required. This will include, integrating records from built silos complex with management information system; improving information gathering, processing and sharing and improving records management mechanism.

Records Management System
At the moment all records at the site are manually managed; although weighbridge currently installed are digital but not interlinked with other offices due to lack of proper internet connections. The construction of silos and warehouses will involve installation of modern grain processing system with integrated inbuilt equipment and stocking systems to assist in record management.

Security System
The project will install modern security system to enhance security in the site.

To fulfil the above the project will:

- ✓ Installation of communications systems (Data and Voice);
  - Data - Strong and stable Internet access connection for sharing of information in Silos operation
  - Voice - Digital telephone system
- ✓ Installation of CCTV cameras to enhance security

Gadgets will include:

- Router
- Switch
- IP-Cameras
- Patch panel
- PABX and Digital Telephone
- Cat 6e cables

2.6.4 Transportation

Generally transportation to the Mbozi site is through airways, railways and highways. There is no airport in Mbozi District and the site. However, there is an airport at Mbeya City which is about 75km from the Project site. The TAZARA Railway system operates from Dar es Salaam to upcountry regions through Makambako, Mbeya, Mbozi to Tunduma town and is well developed. Vwawa town thus uses Dar es Salaam ports and harbour for shipment of items and commodities when required. There is a widespread network of surfaced roads and railway lines which are commonly used. The road distance from Dar es Salaam to Mbozi is about 981km.

2.7 WASTE MANAGEMENT

2.7.1 Solid waste

Construction waste from this proposed Project will include waste arising from land excavation, formation, and civil/building construction activities. Waste includes various types of construction debris, rubble, earth, concrete, timber and mixed site clearance materials.

Much of the excavated soil and rubble materials (if suitable) will be reused as initial filling materials, for compaction and construction works or during landscaping of the project area. Also if the materials will not be needed for onsite construction activities will be used to fill the pot-holes along the earth road leading to the project site.

Different kinds of wooden materials will be essential during construction of the proposed project structures, such as wooden boards used as false work and formwork for concrete structures, erection of site boundaries, as well as bamboo for scaffolding. Wooden materials are important and valuable resources.

All wooden materials used on site should be kept separate from other wastes. Wooden boards will be reused on site several times until the quality of the boards is no longer suitable for re-use. Boards used will be capable of being reused at least five times, thus keeping the wastage rate down to around 20%. Timber which cannot be reused again will be sorted and stored separately from other wastes before being given away for recycling or disposed of to dumpsite. On-site burning of wooden waste will be prohibited.

Currently from the operation of existing facilities the predominant type of solid waste at the project site includes pesticides containers (3 containers per week), papers (0.5kg/day) and other unwanted materials that are usually buried or burned locally. Currently, these wastes are burned or buried onsite.

The expansion will result into generation of pesticides containers (6 containers/week), papers (0.5kg/day), organic waste from kitchen (5kg/day); residue from silos cleaning (4kg/month).

Solid waste collection will be through bins that will be strategically located onsite. The collected waste will then be delivered to designated collection area before final disposal. Empty chemical containers will be collected and stored at the Chemical storage room waiting final disposal without dressing.

The area is within the jurisdiction of the Mbozi District Council and Vwawa Township Authority, which has the responsibility of disposal of waste. Vwawa Township Authority has five areas designated for collection of waste. The waste is usually collected by waste collection groups using large trolleys that send the collected waste to centralized areas. From the centralized areas, the Council use a hired tractor with Trailer to send all collected waste to disposal to the dumpsite located at Miti Upepo which is 5km from the town centre.

Pesticides empty containers will be disposed as per TPRI and NEMC guidelines as they may contain hazardous material. Sound waste management systems will be provided in the anticipated impacts and the EMP. The proponent will do the best to reduce, reuse and recycle waste from the source and also get in touch with enterprises dealing with recycling to collect the segregated waste in the proposed project.

Table 2.8: Types, Sources and Estimated Quantities of Waste Generation Rates

Phase	Waste	Types	Estimated Amount	Treatment /Disposal
Construction	Solid waste (Degradable)	Wooden materials	10-30kg/day	Shall be reused as false work and formwork for concrete structures, erection of site boundaries, as well as bamboo for scaffolding. Reused in other construction site. Sold/given away for recycling or disposed of to dumpsite
		Food remains	14 kg/day (based on generation rate of 0.2kg/day/person and 70 people)	To be collected in the large skip bucket at site ready to be disposed at the dumpsite or given away to composters or construction workers for livestock feeding.
		Packaging materials (Cardboards, wrapping papers/film)	50 bags/day	Shall be given to recyclers or disposed together with other general solid waste

	Solid waste (Non-Degradable)	Spoil Soil, rubble materials	100m^3 per site	Reused as initial filling materials, for compaction and construction works or during landscaping of the project area. To fill the pot-holes along the earth road leading to the project site.
		Scrap metals, steels, Tins, glasses , plastics and drums	20kg/week	To be sold to Recycles
Operation	Solid waste (Degradable)	Food remains	5-65 kg/day (based on generation rate of 0.2kg/day/ person and 25-325 people)	To be collected in the large skip bucket at site ready to be disposed at the dumpsite.
		Papers	0.5kg/day	
		Residue from silos cleaning	4kg/month	
		Packaging materials (Cardboards, wrapping papers/film) and other recyclable materials	10kg/day	Shall be given away to contracted recyclers
	Hazardous	pesticides containers	6 containers/week	

*Total Waste generation in Tanzania - Urban Areas is estimated at 0.02kg/person-day of general waste.
Source: New WHO handbook on Healthcare Waste Management, 2013

2.7.2 Wastewater

Empty containers will not be dressed before its further disposal, as such there will be no wastewater to be treated.

The wastewater from washrooms, canteen and kitchen will be disposed onsite using septic tank and soak away pit. It is estimated that the project will produce wastewater amounting to 800 L per day during normal operations period and 8,000 L per day during peak season.

There will be storm water drainage network to handle all rain water. At the moment the Mbozi site is faced with a challenge of managing both storm water and rooftop drainage systems. The area is fairly flat, and bordered by TAZARA railway on north, while topography which is flat collect all storm water from the road and crosses on site, the size as well as condition for most of drainage channels are not adequate to handle storm water passing at site. Due to this situation, gulling and damage of structure and commodity was evident. Therefore, design and resizing of existing drainage channels will be done basing on the current hydrological pattern and design storm drain for fifty years return period to accommodate future scenarios.

2.8 PROJECT MANAGEMENT AND OTHER SUPPORT SERVICES

2.8.1 Management and Supervision

Overall management and supervision of the project will be done by the NFRA.

The Agency is headed by the Chief Executive Officer (CEO) who is assisted by Director of Operations and Logistic (DOL), Director of Business Development (DBD), Director of Human Resource and Administration (DHRA), Zonal Managers and Heads of Finance, Legal, Procurement and Internal Audit Units.

DOL is assisted by Operations Manager, Quality Control and Storage Manager and Planning and Investment Manager; DBD is assisted by the Marketing Manager and ICT Manager. On other hand, DHRA is assisted by the Human Resources and Administration Manager and Estate Manager.

Makambako Zonal Manager is the responsible person to oversee the Mbozi Site. The Mbozi Depot Manager is responsible manage and supervise day-to-day activities (see appendix 5 for NFRA Organization Chart).

2.8.2 Manpower

The labour force of 70 people will be employed during construction while 13 people (9 males and 4 females) are currently employed for daily operations of the project. During peak season casual labour of 300 people are employed for unloading of grains.

2.8.3 Security, Health and Safety

The area partly has an open barbed wire fence. The expansion will install fence for the whole area to enhance security in the project area. NFRA has own security guards. The developer will install fire fighting systems in all buildings. The system will comprise of fire detection system, alarm, portable extinguishers, fire hydrant system and sprinkler system.

There will be clean and enough toilet facilities for men and women.

Full equipped first aid kits will be installed in strategic areas of the project site and the staff will be trained accordingly.

2.9 THE PROJECT COSTS AND FUNDING

The total investment cost for the Songea Storage site is estimated to be USD 5,353,257.20.

2.10 LIFE SPAN OF THE PROPOSED PROJECT

The estimated lifespan of the proposed project is at least 50 years.

CHAPTER THREE: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 INTRODUCTION

In construction and operation of the proposed development of Grain storage facility, various environmental and social issues may arise at any phase of the project development i.e. from site selection to decommissioning phases. These issues needs to be addressed so that the envisaged operations do not impair the integrity of the environment and project impacted people and also ensure that they are in line with policies and legal regime operating in Tanzania as well as international standards. This chapter discusses Tanzania national and sectoral policies and legislation and international standards and guidelines pertaining to the planning and implementation of the proposed project.

3.2 NEED FOR ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment is one of the planning tools which are used to facilitate and promote sustainable development by integrating environmental consideration in the decision making process and ensuring that unnecessary damage to the environment is avoided and optimises resources use and management opportunities. Due to the importance of Environment Impact Assessment, most sector policies and legislation have incorporated the requirement of undertaking EIA prior to the implementation of development projects.

The following sections will discuss relevant sector policies, legislation and regulations relevant to the proposed project:

3.3 RELEVANT POLICIES

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

3.3.1 National Environmental Policy (1997)

The National Environment Policy provides a framework for environmental protection in Tanzania. The policy requires that project development be done in a way that does not compromise the environmental integrity. It stipulates that the chosen technologies should be environmentally sound, socially acceptable and economically viable. Relevant provisions of this policy to proposed Grain Storage Facilities operations are:

- Sections 28 and 29, which state that in all projects, environmentally sound technologies (i.e. those that generate no or low waste or protect environment) should be used).
- Section 48 (c), which advocates for technologies that use water efficiently and provides wastewater treatment.
- Section 56 (f), which states that workers' health should be adequately protected from environmental health hazards.

Proponent shall comply with all of above and other relevant provisions.

3.3.2 National Health Policy (2003)

The overall objective of the National Health Policy is to improve the health and well being of all Tanzanians with a focus on those most at risk. One of the main objective of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in workplaces, promote sound use of water, promotes construction of latrines and their use, encourage maintenance of clean environment; working environment which are conducive to satisfactory work performance. The policy puts more emphasis on workers protection against all health hazards which occur in workplaces. It is the responsibility of the management to offer medical and preventive health services to their employees.

3.3.3 National Policy on HIV/AIDS (2001)

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

3.3.4 The National Energy Policy (2003)

This policy outlines measures to adopt clean technology and minimize pollution in developing Tanzania's energy sector. It focuses on utilization of various energy resources among others including water, gas, coal, petroleum and wind in a sustainable and environmentally friendly manner. The policy states that energy is a prerequisite for the proper functioning of nearly all sub-sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of development endeavours. The policy objectives are to ensure availability of reliable and affordable energy supplies and their use in a rational and sustainable manner.

Developer shall endeavour to abide by the energy policy.

3.3.5 National Land Policy (1995)

The National Land Policy advocates for the protection of land resources from degradation for sustainable development. Among other things, the policy requires that project development take due consideration of land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Important sections of the policy relevant to the developer are 2.4 (on use of land to promote social economic development) and section 2.8 (on protection of land resources).

Developer shall observe these provisions.

3.3.6 The National Employment Policy (1997)

The major aim of this policy is to promote employment, mainly for Tanzania citizens. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and (ii) 10.6 which deals with employment of special groups i.e. women, youth, persons with disabilities and (iii) 10.8 which deals with the tendencies of private sectors to employ expatriates even where there are equally competent nationals. Developer shall abide by this policy.

3.3.7 National Water Policy (2002)

The National Water Policy recognises that there is a growing scarcity, misuse and wastage of water resources in many places of Tanzania, which may become a serious threat to sustainable availability of the resource. The National water policy advocates that project performance depends, among other factors, on reliable water supply. However, the growth in demand have significant impact on water supply, and also in terms of potential pollution and degradation of water resources due to solid wastes and effluents if not properly disposed of, but are allowed into water bodies without adequate treatment.

Pollution of water sources from increasing discharge of untreated and partially treated wastewater contributes to the deterioration of the quality of the water resources. The National water policy requires all water users to avoid contaminating water sources. The policy also supports the application of the “polluter pays principle” and has a specific objective to “have in place water management system which protects the environment, ecological system and biodiversity”.

Developer is connected to water supply from Vwawa town water supply network and later will also use water from Borehole to be drilled on-site and will adhere to this policy.

3.3.8 The National Human Settlements Development Policy (2000)

The policy provides for coordination of the land policy, land development, human settlements development, surveys, valuation, sites and services, land registration of documents, chattels transfer, formulation and implementation of national housing policy, building research, urban physical structure policy, town planning, master plans, maps and regional physical planning. Although the project is established in an area designated for industrial activities, this policy will apply due to operation of the project.

3.3.9 The National Construction Policy (2003)

This policy promotes among other things, application of cost effective and innovative technologies and practices to support socio-economic development including utilities and ensure application of practices, technologies and products which are not harmful to both environment and human health. This EIA is undertaken to ensure that the project proponent uses technologies and products not harmful to both the environmental and human health by providing feasible alternative and appropriate mitigation measures.

3.3.10 National Agriculture and Livestock policy (1997)

The Policy states that “ It is crucial for the long-term future of the country that Tanzanian’s natural resources (soils, water, forests, wildlife) be managed so that agricultural production is sustainable and negative externalities are kept to a minimum”. With this understanding, NFRA

has a responsibility of working with local communities (Village governments) to conserve these natural resources that are found within the earmarked area for project development.

3.3.11 The National Transport Policy of 2003

The proponent will be involved in transportation of grains to the project site and distribution of the same etc. The Vision of the National Transport Policy is to have an efficient and cost-effective domestic and international transport services to all segments of the population and sectors of the national economy with maximum safety and minimum environmental degradation". In addition the mission of the policy is to develop safe, reliable, effective, efficient and fully integrated transport infrastructure and operations which will best meet the needs of travel and transport at improving levels of service at lower costs in a manner, which supports government strategies for, socio-economic development whilst being economically and environmentally sustainable".
Proponent shall observe requirements of this policy.

3.3.12 The National Agriculture Policy of 2013

The importance of agricultural sector in the national economy cannot be overemphasised owing to its relationship between its performance and that of key economic indicators like GDP and employment. Since this relationship is there to stay for some time to come, it justifies the argument that any attempts to improve living standards of the people must give particular attention to increased production and productivity in the agricultural sector. The National Agriculture Policy 2013 (NAP 2013) revolves around the goals of developing an efficient, competitive and profitable agricultural industry that contributes to the improvement of the livelihoods of Tanzanians and attainment of broad based economic growth and poverty alleviation. The Government is committed to bring about a green revolution that entails transformation of agriculture from subsistence farming towards commercialization and modernization through crop intensification, diversification, technological advancement and infrastructural development

3.4. RELEVANT NATIONAL PLANS AND STRATEGIES

The following national plans/strategies have a bearing on the proposed project

3.4.1 The 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 increasing involvement of the people in working for their own development. The thrust of these objectives is to attain a sustainable development of the people.

The Vision 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 by year 2025.

3.4.2 The National Strategy for Growth and Reduction of Poverty (NSGRP)

The strategy is viewed as an instrument for channelling national efforts towards broadly agreed objectives and specific inputs and outputs. The poverty reduction strategy is to large extent, an

integral part of ongoing macro-economic and structural reforms. Among the areas of the concentration the following are relevant to this study:

- Achieving the target of accelerated growth will require significant efforts to enhance productivity and increase investment in both human and physical capital.
- Further improvements in policy environment and market friendly Institutional framework are keys to scaling up growth and reducing poverty to a significant extent. However, the key to significant poverty reduction in Tanzania is accelerated growth. Estimates of responsiveness of poverty reduction to growth indicates that such accelerated growth could lead to reduction in the share of population living below the poverty line from around 50 percent currently to 30 percent by year 2015.

3.4.3 Agricultural Sector Development Programme (ASDP, 2002)

The ASDP, which was formulated through a broad based consultative process, aims at transforming the agricultural sector into a modernized, commercial, highly productive and profitable sector that shall utilize natural resources in a sustainable manner and shall act as an effective basis for intersectoral linkages.

ASDP addresses the key weaknesses facing the agricultural sector, which include low productivity, poor co-ordination and limited capacity, underdeveloped supporting facilities, erosion of the natural resource base, inappropriate technology, dependency on rain fed agriculture, impediments to food market access as well as low public and private expenditure levels.

ASDP was prepared in 2002 in order to operationalize the Agricultural Sector Development Strategy (ASDS). Among other issues the programme emphasizes on agricultural productivity, profitability, sustainability, increased rural income, increased Food Security and reduction of Rural Poverty. One of the tasks towards implementation of ASDP is to review the current performance of the existing irrigation schemes and the introduction of low cost technology for irrigation based on institutional support, capacity building, irrigation agronomy, environment assessment, irrigation schemes market linkages, scheme viability, community participation and irrigation infrastructure development. The high turnover in NFRA grain storage facilities project is in line with this program.

3.4.4 Tanzania Agriculture and Food Security investments plan (TAFSIP) 2011/12 to 2020/21

The Tanzania Agriculture and Food Security Investment Plan (TAFSIP) is an historic initiative that brings all stakeholders in the agricultural sector both in the mainland and in Zanzibar to a common agenda of comprehensively transforming the sector to create wealth, reduce poverty and achieve food and nutrition security.

The TAFSIP is a product of years of consultative processes between the Government, the private sector, Development Partners, farmers, civil society organizations and non□state actors, the African Union Commission (AUC), NEPAD/NPCA; the East African Community; CAADP Pillar Institutions; ReSAKSS/IFPRI and other regional and international bodies on how to promote agricultural growth and food and nutrition security in Tanzania under the framework of the Comprehensive Africa Agriculture Development Programme (CAADP).

These consultative processes culminated into the signing of the CAADP Compact on the 8th of July 2010 with the aim of promoting increased production and productivity in the agricultural sector towards reduction of poverty and achieving food and nutrition security.

The preparation of the TAFSIP is one of the Post compact activities identified in the roadmap. It builds on a series of analytical work done by various institutions as well as on the stock taking exercise that was done by the CAADP Task Force in May 2010.

3.4.5 Tanzania Climate Smart Agriculture Programme (CSA) 2015-2025

Climate-smart agriculture, forestry and fisheries (CSA), as defined by FAO 2010, contributes to the achievement of sustainable development goals and integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges. CSA has three main pillars;

- Sustainably increasing agricultural productivity and incomes
- Adapting and building resilience to climate change.
- Reducing and/or removing greenhouse gases emissions, where possible

The CSA programme has outlined programmatic result areas and component for the aim of encouraging and developing the base of the programme. Component three (3) explain on "**Improved and expanded rural marketing and value addition promoted by a thriving competitive private sector and effective farmer organization"** which address some of the requirement of improved appropriate storage facilities and technologies along the value chain. NFRA shall observe the CSA programme and its components e.g. on Improved Food Storage and Distribution. The project will also contribute to the increased markets to farmers in Mbozi District.

3.5 RELEVANT LEGISLATIONS

The following are relevant legislations and regulations which provide directives on how projects should be implemented in relation to concerned environmental and socio-economic settings. The project proponent will consult these legislations and regulations in the course of designing and implementing the proposed project activities.

3.5.1 Environmental Management Act of 2004

The Environmental Management Act, 2004 seeks to provide for legal and institutional framework for sustainable management of the environment in the implementation of the National Environmental Policy. Under this Act NEMC is mandated to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision making, exercise general supervision and coordinating over all matters relating to the environment. Article 82 makes EIA mandatory to all projects that fall under the EIA mandatory list (Schedule 3).

This Act also provides a legal framework necessary for coordinating harmonious and conflicting activities with a view to integrating such activities into an overall sustainable environmental management system by providing key technical support to sector Ministries. This is a framework legislation supplemented with other sector legislations. Specifically section 232 stipulates that where the provision of this Act is in conflict or is otherwise inconsistent with a

provision of any other written law relating to environmental management the provision of this Act shall prevail to the extent of such inconsistency.

NEMC is currently the designated authority to carry out the review of EIA, EA, monitoring and auditing of environmental performance of the project (periodic and independent reassessment of the undertaking). Environmental Impact Statement (EIS) will be submitted to the Technical Advisory Committee (TAC) for evaluation. Developer has observed requirement of this Act and will continue to observe during the life cycle of the project.
As per the EMA, 2004 among others, the following obligation on the project Proponent have been imposed:

- 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 waste (Part IX)

Proponent shall observe requirements of this Act.

3.5.2 The National Fertilizer Act of 2009

The Act makes provisions for regulation of manufacturing, importation, exportation, sale and utilization of agricultural fertilizers and to provide for other related matters. There is established an authority to be known as the Tanzania Fertilizer Regulatory Authority or in its acronym "TFRA". The authority shall manage and regulate all matters related to agricultural fertilizers.

3.5.3 The Industrial and Consumer Chemicals (Control and Management) Act, 2003

The Industrial and Consumer Chemicals Act provides for proper management and control of industrial and consumer chemicals in mainland Tanzania. It requires that any person dealing in industrial chemicals has to register with the Industrial and Consumer Chemicals Management and Control Board. The Third Schedule of the Act provides a long list of chemicals that need to be registered. NFRA will comply with this Act.

3.5.4 The Public Health Act, 2009

This Act provide for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. The Act sets out duties of the Minister responsible for health in facilitating the effective provisions of public health services in the country. The Act also spells out the duties and functions of the Local Government Authorities in the promotion, implementation and powers to enforce public health standards within their jurisdictions. It further empowers the Local Government Authorities to make by-laws for the smooth operation of public health services.

Part IV of the Act is more relevant to the proposed project as it related to sanitation, housing and hygiene. The Part makes provisions for matters relating to nuisance, housing and human settlement, waste management, sewerage and drainage. The Act prohibits direct discharges of

wastewater to public drainages. It is an offence to emptied or to pass into any sewer or into any drain any matter likely to injure the sewer or drain, or to interfere with the free flow of its contents, or to effect prejudicially the treatment and disposal of its contents. Part VII of the Act contains provisions relating to powers of the Minister to make regulations relating to notification of infectious diseases and communicable diseases, prevention and control of infectious diseases, control of mosquitoes and vaccinations. It also provides for general penalty where specific penalty has not been specified. Developer will ensure to comply with the above provisions.

3.5.5 Energy, Water Utilities Regulatory Authority (EWURA) Act, 2002

The purpose of this Act is to regulate electricity, water, petroleum and gas trading in Tanzania. This act consolidates the laws in relation to energy and water utilities in Tanzania Mainland. Under this Act, the EWURA with prior approval of the minister, make rules in respect of the regulated goods and services. The Act gives EWURA the legal mandate to issue, renew and cancel licenses of service providers in the regulated sectors (Electricity, Petroleum, Natural Gas, Water etc).

3.5.6 Occupational Health and Safety Act, 2003

This Act deals with the protection of human health from occupational hazards. It specifically requires the employer to ensure the safety of workers by providing safety gears at the work place. Relevant sections of the ordinance to the project activities include Part IV which deals with general health provision, such as provision of regular medical examination of employees; Safe means of access and safe working place, prevention of fire etc.; and Part V on health and welfare provisions, which includes provision of supply of clean and safe water to workers, sanitary convenience, washing facilities and First Aid facility. Section 50 deals with fire prevention issues.

Section 15 gives powers to the Registrar of workplace to enter any workplace to perform his/her duties as provided by the Act. Section 16 requires that projects be registered with the Registrar of workplaces before commencing operations. Developer shall observe the provision of this Act during all stages of the project development and operation.

3.5.7 The Land Act No. 4 of 1999

The Land Act of 1999 outline among other things, the administration of land, the role of local government in land administration, land allocation and occupancy. The Land Act contains provisions of critical environmental importance. This Act translates the “fundamental principles of land policy” into the body of the law. One of these fundamental principles is “to ensure that land is used productively and that any such use complies with the principles of sustainable development”. This means the project proponent will have to return the land to its useful state on decommissioning of the project. As a first step, the project proponent agreed to conduct the EIA to guide project operations.

Section 4 of the Act for the purposed of management of land, public land is in the following categories:

a) General land
b) Village land
c) Reserved land

Section 19 (1) of the Act stipulates that the rights to occupy land which a citizen, a group of two or more citizens whether formed together in an association under this Act or any other law or not, a partnership or a corporate body, in this Act called right holders' may enjoy under this Act are hereby declared to be :-

a) granted right of occupancy;
b) a right derivative of a granted right of occupancy, in this Act is called a derivative right;

NFRA has acquired the land legally and is in the process for transfer of Plot. No. 106 (see appendix 6).

3.5.8 Land Acquisition Act of 2002

The Act gives the power to the President to acquire any land for any estate or term where such land is acquired for any public purpose. The Act goes on to define the circumstances in which public interest could be invoked, e.g. for exclusive government use, public use, for or in connection with sanitary improvement of any kind; for or in connection with laying out any new city, municipality, township or minor settlement or extension or improvement of any existing city.

Other purposes are in connection with any development; for use by the community or corporation within community; for use by any person or group of persons as the President may decide to grant them such land. Further the Act specifies other requirements prior to the acquisition of the land such as investigation for the land to be taken, issuing notice of intention to take land and mode in which notices will be served. It further defines the requirements for and restrictions on compensation.

3.5.9 The Local Government (Urban and Authorities) Acts Cap 288 of the Revised Edition of 2002

This act provides for a detailed responsibility for the urban councils on administration of day-to-day activities. Urban authorities have the duty of taking measures to safeguard and promote public health and take all necessary and reasonable practicable measures for maintaining the area of the authority in clean and sanitary condition and for preventing the occurrence of or for remedying or causing to be remedied any nuisance or condition likely to be injurious or dangerous to health. Since the project area is within the Mbozi District Council, the provisions under this Act and other enacted subsidiary legislation and by-laws relevant to the issue of Grain Storage Facilities and environmental pollution have bearing to the proposed project.

3.5.10 The Urban Planning Act No. 8 of 2007

The Act provides for control of urban and sub rural development while implementing a project for land development. Important aspects include the designation and allocation of adequate land for solid waste disposal in any urban and sub rural areas. The law empowers local authorities to enforce such schemes and punishments as stipulated in the Act. The law further empowers neighbours and any individual to take to court anyone who injuriously affects others due to his/her unhygienic activities.

Section 29 of the Act requires the developer to not develop any land within a planning area without planning consent granted by the planning authority or otherwise than in accordance with planning consent and any conditions specified by the Act. The applicant also is required to submit together with the application of an environmental impact assessment report.

Under Section 31 of the Act, the land owner is not allowed to subdivide any land unless obtains written approval from the Director and a copy of the written approval shall be forwarded by the Director to the Commissioner for Lands, together with a plan of the approved subdivision on which dimensions of all lots, widths of streets and back lanes and such other particulars as the planning authority may consider necessary has been shown.

Section 32 of the act requires that an application for planning consent to develop land or approval to subdivide land or change use of land shall be made to the planning Authority.

Section 33 of the Act states that planning consent shall lapse if the development which has been provided by planning consent is not completed within three years from the date of the grant of consent.

Developer will observe good provision of this act when implementing the project.

3.5.11 Water Resource Management Act, 2009

The Act provides for institutional and legal framework for sustainable management and development of water resources; outlines principles for water resources management; for prevention and control of water pollution; and provides for participation of stakeholders and general public in implementation of the National Water Policy. Its main objective is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that among others meets the basic human needs of present and future generations, prevents and controls pollution of water resources and protects biological diversity especially the aquatic ecosystems.

According to section 39 (1) of this act, owner or occupier of land on which any activity or process is or was performed or undertaken, or any other situation exists which causes has caused or is likely to cause pollution of a water source, shall take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. It is stated under section 39 (2) that a Basin Water Board may direct any person who fails to take the measures required under subsection (1) to;-

(a) commence taking measures before a given date;
(b) diligently continue with those measures; and
(c) Complete the measures before a given date.

Section 40 (1) states that where a person fail to comply or comply inadequately with a directive given under Section 39 (2), the Basin Water Board may take measures as it considers necessary to remedy the situation. Section 40 (2) provide more that the responsible person, any other person involved in the incident or any person with knowledge of the incident must, as soon as is practicable after obtaining knowledge of the incident, report the incident to the Basin Water Board or any public officer and the a responsible person shall:-

a) take all reasonable measures to contain and minimize the effects of the incident;
b) undertake clean-up procedures; and
c) Take such measures as the Basin Water Board may verbally or in writing direct, and any verbal directions shall be confirmed in writing within fourteen days to have effect under this subsection.

Since the developer intends to drill boreholes on-site will obtain water use permit to the appropriate water basin office.

3.5.12The Water Supply and Sanitation Act of 2009

This legislation provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; provides for establishment of water supply and sanitation authorities as well as community owned water supply organizations; and provides for appointment for service providers. The main aim of this law is to ensure the right of every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interest of customers. Under this law, the Minister responsible for water affairs shall establish water authority and cluster water authorities in order to achieve commercial viabilities. Developer is connected to water supply from Vwawa town water supply network and will therefore comply with this Act.

3.5.13The Standards Act, 2009 (Act No. 2/09)

An Act to provide for the promotion of the standardization of specifications of commodities and services, to re-establish the Tanzania Bureau of Standards (TBS) and to provide better provisions for the functions, management and control of the Bureau, to repeal the standards Act, Cap.130 and to provide for other related matters. The Act recommend rules/conditions related to specifications, codes of practice, safety, trade descriptions, sampling methods, and testing methods about: Production of a commodity and any component, raw material, machinery, instrument or apparatus used directly or indirectly in production of a commodity.

Specific standards exist for galvanized steel materials as follows: TZS 353:2014/EAS 11:2014: Galvanized plain and corrugated steel - sheets specification.

The East African Grain (Maize) – Specification: EAS 2:2005/ICS 67.060 which have also been adopted by TBS have set some grading criteria of maize to ensure some quality aspects. So far the grading levels are three that are 1, 2 and 3. If the quality of acteric is beyond grade 3, it means that such maize would be condemned. By having these grades the following advantages can be realized by both buyers and sellers:

- A farmer can get a higher price for a bag of Grade 1 grain than if the grain has not been graded.
- A buyer is confident that the grain is of a particular quality, so is willing to pay a higher price.
- A warehouse operator can check the grain when it arrives, and make sure its quality is maintained while it is in the warehouse.
- A trader can announce she wants to buy Grade 2 grain, and everyone knows exactly the quality of grain she is interested in.

Also, specific TBS standards exist for treatment of industrial effluents, e.g. TZS 90:1980 (Water, sewage and industrial effluents); TZS 91:1980 (Lays down the bioassay method for evaluating the acute toxicity of industrial effluents and wastewater to the ecosystems); TZS 92:1980 (Sewage effluents sampling and test methods).
NFRA shall observe the grains standards and other standards e.g. on effluents during operations through monitoring plan.

3.5.14The Engineers Registration Act, 1997

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

3.5.15The Contractors Registration Act, 1997

The Act establishes the Contractors Registration Board (CRB). CRB has a mandate to register contractors, regulate the conduct of the contractors and for related matters. Amoung other things CRB is required to take legal action against unregistered contractors who undertake construction; installation, erection or alteration works; ensure that all construction sites are hoarded; and labour laws, occupational health and safety regulations in the construction industry are adhered to. On executing its construction activities developer shall therefore appoint a registered contractor and make sure that the provisions of the Act are adhered to.

3.5.16The Employment and Labour Relations Act, 2004 - (Act No.6/04)

This Act guarantees fundamental labour rights and establishes basic employment standards. The Act provides broad protection against discrimination. Specifically, the Act mandates that employers "promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice." It prohibits direct or indirect discrimination by employers, trade unions and employers' associations on a number of grounds, including gender, pregnancy, marital status or family responsibility, disability, HIV/AIDS and age. Harassment of an employee on any of these grounds is equally prohibited. The Act also requires employers to take "positive steps" to guarantee women and men the right to a safe and healthy environment. Since the project will employment, therefore shall observe these and other relevant provisions in this Act.

3.5.17The Workers Compensation Act, 2008

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

3.5.18 The HIV and AIDS (Prevention and Control) Act of 2008

The law provides for public education and programmes on HIV and AIDS. Section 8(1) of the law states that "The Ministry (Health), health practitioners, workers in the public and private sectors and NGOs shall for the purpose of providing HIV and AIDS education to the public, disseminate information regarding HIV and AIDS to the public". Furthermore, Section 9 states that "Every employer in consultation with the Ministry (Health) shall establish and coordinate a workplace programme on HIV and AIDS for employees under his control and such programmes shall include provision of gender responsive HIV and AIDS education…." Developer will abide to HIV/AIDS Act.

3.5.19 Fire and Rescue Services Act, R: E 2007

The act established a Fire and rescue Force (National Fire Brigade) for the Mainland Tanzania. General Duties of the force shall be to prevent and minimize death rates, injury to the people and damage to properties arising from fire, floods, earthquakes, road traffic accidents and other disasters.

Under the Act, The fire and rescue force is mandated to plan inspection and security of construction and operation of any facilities. Also it is mandated to issue certificate and raise public awareness on fire prevention and fire services; and provide trainings.

The certificate issued by the Fire and Rescue Force shall be valid for a period of one year from the date of issue, thereafter the property owner shall apply for it to be renewed. Any owner of the property, premises, vehicle, vessel who fails to renew his Fire Safety certificate within one month after its expiry will be required to pay the principle amount payable in respect of that property plus penalty of twenty five percent (25%) for late payment. The Developer will respect the provision of the Fire and Rescue services act, R: E 2007.

3.5.20 The Plant Protection Act No. 13 of 1997

This Act has made provisions for consolidation of Plant Protection Act, to prevent 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 export and imports of plant and plant products and ensure fulfilment of international commitments, and to entrust all plant protection regulatory functions to the government and for matters incidental thereto or connected therewith.

As regards to this Act, the activities of Tanzania Pesticides Research Institute have been incorporated into the Plant Protection Act. In relation to Grain storage facilities, importation of biological control agents is not allowed unless under the prescribed permit by the Ministry.

3.5.21 The Tropical Pesticides Research Institute Act No.18 of 1978

This is an Act to establish the Tropical Pesticide Research Institute, to provide for the research and pesticide control. The key functions of the Institute include; i) to carry out and to promote pesticides research and to evaluate and disseminate the findings on the fundamental aspects of pesticides application and behaviour in relation to the control of tropical pests; ii) to supervise and regulate the manufacture, importation, distribution, sale, and use of pesticides in the country; and iii) to administer regulations made under the provision of this Act.

The NFRA will ensure that any chemicals imported in this project are approved by TPRI and are applied as per TPRI guidelines.

3.5.22 Warehouse Receipts Act No. 10 of 2005

This Act establishes the Tanzania Warehouse Licensing Board as a body corporate and provides rules relative to warehousing of goods in Tanzania and a system of warehouse receipts for trading and credit purposes and negotiation and transfer of warehouse receipts. It also sets out rights and obligations of warehouse operators. The Act shall apply to Mainland Tanzania in respect of all agricultural commodities and to such other goods as the Minister may declare by Order published in the Gazette. Since NFRA operated warehouses in Mbozi depot will observe requirement of this act.

3.5.23 Grazing Land and Animal Feed Resources Act 2010

This Act concerns quality of feed resources for livestock in Tanzania. It establishes the National Grazing-land and Animal Feed Resources Advisory Council and provides for appointment of inspectors and a Director within the Ministry who shall be responsible for the administration of grazing-land utilization and animal feed resources. The Act furthermore provides for, among other things, the development and management of grazing lands, the control on manufacture of and trade in animal feed.

3.6 RELEVANT REGULATIONS

3.6.1 The Environmental Impact Assessment and Audit Regulations of 2005

Alongside the EMA 2004, the Government has also prepared Regulations for EIA (2005) that lists potential projects that require mandatory EIA. The Regulations further describe how EIA should be carried out and provide guidance on the practice of EIA in Tanzania.

The objectives of the National Environmental Impact Assessment and Audit Regulations of 2005 concerning Environmental Audit are to determine how far activities and programmes of a processes of a project or undertaking conform with the approved environmental and social management plan of that specific project or undertaking and environmental management practices and environmental quality standards; provide a mechanism to learn from experience, and to refine design and implementation procedures of a project or undertaking so as to mitigate adverse environmental impacts; and provide regulatory bodies with a framework for checking compliance with, and the performance of an Environmental and Social Management Plan, being part of Environmental Impact Assessment.

3.6.2 Environmental (Registration of Environmental Experts) Regulations (2005)

The objectives of the regulations are to establish a system for registration of environmental experts; provide for a system of nurturing competence, knowledge, professional conduct, consistency, integrity and ethics in the carrying out of environmental impact studies and environmental audits; ensure that the conduct of environmental impact assessments or environmental audits is carried out in an independent, professional, objective and impartial manner; and provide for a code of conduct, discipline and control of environmental experts. The NEMC maintain a registry of EA and EIA experts. These regulations also set code of practice of the experts for which the Environmental Audit experts for this project subscribe. Developers are required to use registered experts under the law. Developer has complied with this regulation.

3.6.3 Environmental Management (Fees and charges) (Amended) Regulations, 2016

The National Environment Management Council (NEMC) is a body corporate established by Environmental Management Act Cap 191 to undertake enforcement, compliance, and review and monitoring of environmental impact assessments, environmental research, raising awareness and collecting and disseminating environmental information.

Sections 99 (1) (b) and 101 (1) of the EMA and Regulations 46 (4) and 57 (1) of the EIA and Audit Regulations, 2005 mandate the Council to monitor operations of any industry, project or undertaking with a view to determining its immediate and long term effects on the environment.

In order to enforce this requirement, the Environmental Management (Fees and Charges) (Amended) Regulations, 2016 stipulates, "Annual charges for environmental compliance monitoring and audit", payable to the Council by all proponents whose projects have been issued with environmental certificates. Developer will comply with provision of this regulation by paying annual fees.

3.6.4 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009

These regulations apply to all categories of hazardous waste and to the storage and disposal of hazardous waste and their movement into and out of Mainland Tanzania. According to this Act any person handling or transporting hazardous waste or any person exercising jurisdiction under this Act shall, in relation to any decision, order, exercise of any power or performance of any function, be guided by the following principles of environment and sustainable development relevant to hazardous waste management:

- The precautionary principle;
- Polluter pays principle; and
- The producer extended responsibility.

The regulations further emphasizes that any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles:

i) Improvement of production process through conserving raw materials and energy by:
   (i) Eliminating the use of toxic raw materials within such times as may be prescribed by the Minister; and
   (ii) Reducing toxic emissions and wastes to a level prescribed in the applicable national environmental quality standards.

ii) Monitoring the product cycle from beginning to end by-
   (i) Identifying and eliminating potential negative impacts of the product; and
   (ii) Enabling the recovery and re-use of the product where possible; and
   (iii) Reclamation and recycling.

Since NFRA use pesticides and generated empty chemicals containers shall follow this guideline when disposing them so as not to cause harm to the environment.

3.6.5 Environmental management (Standards for Control of Noise and Vibration) Regulations, 2015

The objectives of the regulations are to set standards for the Control of Noise and Vibrations Pollution from various sources. The regulation is applicable among other areas to the construction sites, plants, machinery, motor vehicles, and aircraft, including sonic booms, industrial and commercial activities. The regulation strictly forbids the making or causing of any loud and unnecessary noise that annoys, disturbs, injures or endangers the comfort, health or safety of others and that of the environment. Developer will observe these regulations by carrying construction activities only at Day hours. Also they will observe the regulations during the operation of the centre.

3.6.6 Environmental Management (Air Quality Standards) Regulations G.N.No. 237 of 2007

The objectives of the Air Quality Standards Regulations are to set baseline parameters on air and emissions based on a number of practical considerations and acceptable limits; enforce minimum air quality standards prescribed by the National Environmental Standards Committee; help developers such as industrialists to keep abreast with environmentally friendly technologies; and ensure protection of human health and the environment from various sources. Developer will observe these regulations.

3.6.7 Environmental Management (Water Quality Standards) Regulations G.N.No. 238 of 2007

The objectives of the Water Quality Standards Regulations are to protect human health and conservation of the environment; enforce minimum water quality standards prescribed by the National Environmental Standards Committee; enable the National Environmental Standards Committee to determine water usages for purposes of establishing environmental quality standards and values for each usage; and ensure all discharges of pollutants take account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned. Developer will observe these regulations.

3.6.8 Environmental Management (Soil Quality Standards) Regulations G.N.No. 239 of 2007

The objectives of the Soil Quality Standards Regulations are to set baseline parameters on soil limits for soil contaminations 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; enforce minimum soil standards prescribed by the National Environmental Standards Committee for such purposes as agricultural practices. Developer will observe these regulations.

3.6.9 Environmental Management (Control of Ozone Depleting substances) Regulations G.N.No. 240 of 2007

The objectives of the Control of Ozone Depleting Substances are to eliminate the production and consumption of ozone depleting substances in accordance with the phase out schedule of the Montreal Protocol; regulate the production, import, export, trade, disposal and use of ozone

depleting substances and its products; control and monitor the amount of ozone depleting substances entering or leaving the United Republic of Tanzania and provide a system of data collection that will facilitate compliance with relevant reporting requirements under the protocol; promote measures, strategies, programmes, incentives, equipments and technologies in favour of the use of ozone friendly substances, products and equipment in line with national obligation specified by the Montreal protocol; and facilitate the link between National ozone Unit and the Ozone Secretariat of the Protocol. Developer will comply with these regulations.

3.6.10 Environmental (Solid Waste Management) Regulations of 2009

These Regulations apply to all matters pertaining to solid waste management. According to this Act any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles -

- Improvement of production process through conserving raw materials and energy by -
- Eliminating the use of toxic raw materials within such times as may be prescribed by the Minister; and
- Reducing toxic emissions and wastes to a level prescribed in the applicable national environmental quality standards.

The Act further, emphasizes that, every person living in Tanzania shall have a stake and a duty to safeguard the environment from the adverse effects of solid wastes and to inform the relevant authority on any activity and phenomenon resulting from solid waste that is likely to adversely affect the public health and environment. NFRA will be managing all solid wastes it's generating appropriately.

3.7 INTERNATIONAL AGREEMENTS AND TREATIES

3.7.1 International Code of Conduct on the Distribution and Use of Pesticides

The International Code of Conduct on the Distribution and Use of Pesticides was first adopted in 1985 at 23rd Session of the FAO Conference and amended to include PIC article in 1989 at the 25th FAO Session. Adoption of Rotterdam Convention in 1998 made PIC article (9.7 to 9.11) in CODE redundant and the revised version adopted in 2002 at 123rd Session of the FAO Council. The Code sets standards for pesticide management; testing; reducing health hazards; regulatory and technical requirements; availability and use; distribution and trade; information exchange; labelling, packaging, storage and disposal; advertising. The aims of the CODE is to establish voluntary standards and shared responsibilities to all stakeholders through the distribution and use of pesticides (especially where there is inadequate or no legislation) so as to ensure effective and safe use of pesticides. In Tanzania the implementation of FAO Code of Conduct is spearheaded by the Ministry of Agriculture, Livestock and Fisheries and TPRI.

NFRA shall observe this convention since they are utilizing pesticides for pests control in its storage facilities.

3.7.2 Stockholm Convention on Persistent Organic Pollutants

The Convention set out measures to eliminate both intentionally produced and use of POPs and un-intentional production or releases of POPs including from incineration of wastes and stockpiles in order to protect human health and the environment.

Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to protect human health and the environment from persistent organic pollutants (POPs).

The Convention set out measures to eliminate both intentionally produced and use of POPs and un-intentional production or releases of POPs including from wastes and stockpiles.

On the measures to reduce or eliminate releases from intentional production and use the Convention require each Party to prohibit and/or take legal and administrative measures necessary to eliminate production and use of the chemicals listed in Annex A and their import and export. Also each Party to ensure that a chemical listed in Annex A or Annex B is imported only for the purpose of environmentally sound disposal.

The Convention has provisions for the Parties to develop and endeavour to implement a plan for the implementation of its obligations the National Implementation Plans (NIP) which include plans on production, transportation, trade, use and disposal that minimise and ultimate eliminate releases of POPs. Information exchange on the production, use and release of POPs, their risks as well their economic and social costs and existing alternatives have been given due consideration. In addition, the Convention highlights important areas including public information, awareness and education, research, development and monitoring as well as provision for technical assistance and promoting the transfer of technology to developing countries. Tanzania has ratified this convention on 30 April 2004.

NFRA shall observe this convention by not importing and using POPs which can pose risks to human health.

3.7.3 The United Nations' Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal (1992)

This Convention is recognized as the most comprehensive and significant international treaty on hazardous wastes currently in effect. The Convention sets rules for controlling the trans boundary movement and disposal of hazardous wastes.

The underlying principle and goal of the Basel Convention is the environmentally sound management of hazardous wastes. To this end, the convention pursue three key objectives: to reduce transboundary movements of hazardous wastes to a minimum; to dispose of hazardous wastes as close as possible to where they are generated; and to minimise their generation. Prohibit all persons under its national jurisdiction from transporting or disposing of hazardous wastes or other wastes unless such persons are authorised or allowed to perform such types of operations.

NFRA will observe this convention by not disposing hazardous waste from Agrochemicals without Authorization of NEMC.

3.7.4 The Rotterdam Convention on the Prior Informed Consent (PIC) for certain Hazardous Chemicals and Pesticides in the International Trade (1998)

The Rotterdam Convention (formally, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade) is a multilateral treaty to promote shared responsibilities in relation to importation of hazardous chemicals. The convention promotes open exchange of information and calls on exporters of hazardous chemicals to use proper labelling, include directions on safe handling, and inform

purchasers of any known restrictions or bans. Signatory nations can decide whether to allow or ban the importation of chemicals listed in the treaty, and exporting countries are obliged to make sure that producers within their jurisdiction comply.

The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by Parties and which have been notified by Parties for inclusion in the PIC procedure. One notification from each of two specified regions triggers consideration of addition of a chemical to the PIC procedure, with the regions to be determined by the first meeting of the Conference of the Parties. Severely hazardous pesticide formulations that present a hazard under conditions of use in developing countries or countries with economies in transition may also be nominated for inclusion in the procedure.

Since NFRA use pesticides for pest control in its storage facilities shall observe this convention by sharing responsibilities in relation to importation of proposed agrochemicals.

3.7.5 The Bamako Convention on the Ban of the Import to Africa and the Control of Trans-boundary Movement and Management of Hazardous Wastes within Africa

The Bamako Convention is a treaty of African nations prohibiting the import into Africa of any hazardous (including radioactive) waste. The convention came into force in 1998 with the following purposes;

- Prohibit the import of all hazardous and radioactive wastes into the African continent for any reason;
- Minimize and control transboundary movements of hazardous wastes within the African continent.
- Prohibit all ocean and inland water dumping or incineration of hazardous wastes.
- Ensure that disposal of wastes is conducted in an “environmentally sound manner ".
- Promote cleaner production over the pursuit of a permissible emissions approach based on assimilative capacity assumptions
- Establish the precautionary principle.

The NFRA will ensure that any chemicals imported in this project are not hazardous (including radioactive) waste as per convention guidelines.

3.8INSTITUTIONAL FRAMEWORK

3.8.1 Overall Management Responsibility

The Tanzania EIA Procedure confers different roles and responsibilities to all parties involved in the EIA process of any proposed development undertaking to which EIA is obligatory. Important institutions to the proposed project are as summarized in Table below.

Table 3.1: Key Institution to the EIA Process

Level	Institution	Roles and Responsibility
National level	Vice President’s Office (Division of Environment)	• Advise Government on environmental matters • Coordinate the implementation of the National Environmental Policy

Level	Institution	Roles and Responsibility
		• Approval of EIS and issuing of certificates • Coordinate environmental management activities within the country
	National Environment Management Council(NEMC)	• Registration of project, screening and assigning the level of impact assessment • Review of scoping report and approval of terms of reference, • Review of EIS and recommendation to the government. • Monitoring the proposed measures • Carry out environmental auditing
	Ministry of Agriculture, Livestock and Fisheries	• Formulating, coordinating, monitoring and evaluating the implementation of relevant policies in the agriculture sector and monitoring crop regulating institutions. • Collaborates with private sector, local government and other service provider to provide relevant technical services in extension, irrigation, plant protection, crop promotion, land use, mechanization, agricultural inputs and information services. • Play an important role on pesticides management in Tanzania through TPRI. • Raising awareness of farmers and cooperatives officers during the whole chain of pesticide and fertilizer demand. • The Ministry is the DNA for PIC-Rotterdam Convention and is responsible for PIC implementation related to pesticides for agricultural activities.
	Ministry of Land and Urban Development	• Land use planning • Issuing of Right of Occupancy; • Valuation and compensation.
	Occupational Safety and Health Authority (OSHA)	• General understanding and views about the project • Requirements of the project in terms of safety and health at the workplace • Land use in the area of vicinity in terms of safety and health • General views
	Tropical Pesticides Research Institute (TPRI)	• Carry out, and promote the carrying out, of research. • Evaluates and disseminates the findings on the fundamental aspects of pesticides application and behaviour in relation to the control of tropical pests by both ground and aerial spraying techniques in the fields of agricultural entomology; plant pathology; bird pests; rodents; tsetse entomology; mosquito

Level	Institution	Roles and Responsibility
		entomology; malacology; ticks; pesticides toxicology; chemistry; physics; engineering; botany; environmental pollution, and photographic service. • Supervise and regulate the manufacture, importation, distribution, sale and use of pesticides in the country
	National Food Reserve Agency	• EIA Study • Management of project Implementation • Environmental project Monitoring • Environmental project auditing
Regional	Songwe Regional Secretariat Office	• Oversee enforcement of laws and regulations • Advice on implementation of development project activities • Oversee and advice on implementation of relevant national policies
District and Municipal Council	Mbozi District Commissioner's office	• Oversee enforcement of laws and regulations • Advice on implementation of development project activities • Oversee and advice on implementation of relevant national policies
	Mbozi District Council and Vwawa Township Authority	• Baseline data on social and economic conditions • Extension services • Plan and coordinate activities on community-based natural resource and environment management • Enforcement of laws and regulations
Ward Level	Ichenjezya Ward Office	• Oversee general development plans for the Ward. • Provide information on local situation and extension services • Technical support & advice • Project Monitoring
Mtaa Level	Ichenjezya	• Rendering assistance and advice on the implementation of the project • Project Monitoring (watchdog for the environment), • Ensure well being of residents

CHAPTER FOUR: BASELINE DATA AND INFORMATION

The baseline data and information on biophysical and socio-economic settings at the site(s), where a given undertaking is located, provides important benchmarks necessary for future project environmental performance monitoring. Appraisal was made at the core project areas, including the premises of the proposed project site and its immediate environs as well as broad description of the area of influence i.e. Mbozi District. The latter, include areas that are recipient of liquid discharges, and solid waste as well as sources of support services, such as water and energy.

To get the big picture of the existing situation on the project sites, this chapter provides a comprehensive description of areas that may be impacted by the project activities or vice versa. A more general description that attempt to capture the different settings is presented.

4.1 LOCATION

Mbozi district is located at the south western part of Mbeya Region, between latitudes 8^0 and 9^0 12' south of the Equator and Longitudes 32^0 7' 30'' and 33^0 2' 0'' East of the Greenwich Meridian. Mbozi District lies between 1,400 – 2,750 meters above the sea level. The District covers an area of approximately 3,404 square kilometres of which 75% is arable land.

4.2 BOUNDARIES

The District is one of four districts in Songwe Region, others being Songwe, Ileje and Momba. It shares borders with Mbeya district to its eastern part, Ileje district to the south, Momba district to its western part and Chunya district to the north.

4.3 BIOPHYSICAL FEATURES

4.3.1 Climate

The project area on average receives rainfall between 1350 mm and 1550 mm per annum. The rainy season usually starts in October and ends in May. Temperature ranges between 20^0C to 28^0C. The climate condition is moderately hot during the months of August, September, October, November and December. The district experiences cold weather in June and July. The remaining period which covers the months of January, February, March, April and May is on average warm.

4.3.2 Topography, Geology and Soils

The project area has a fairly flat land, with dominant gradient of less than 0.002 (0.2%) sloping northern part of the site, with very small storm water gullies. The predominant soil type in and around the project area is mostly grayish in colour and have textures ranging from loams to 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.

4.3.3 Hydrology

There are no major rivers or seasonal stream in the general project area.

4.3.4 Air Quality

The prime objective of the baseline air quality study was to establish the existing ambient air quality of the area. The following activities are present in 0.5 km radius of the project site and are responsible for the background air quality (sources of air emissions).

- Vehicular movement and human activities
- Industrial activities

Multiple measurement of Carbon Monoxide(CO), Oxide of Nitrogen(NO and NO_X), Sulphur dioxide (SO_2), PM_{10} by using industrial scientific IBRID MX6 multigas Monitor with 6 gas monitor instrument part number MX6-D125Q101, Instrument serial number 11084H-003. Table 4.1 presents the sampling points and levels of gaseous emissions.

Table 4.1: Ambient Air Quality at the Project Site

Project site	**Average Concentration of Pollutants**				
	mg/m³				
Sampling Point (Day Hours)	**NO_x**	**NO**	**SO_2**	**PM_{10}**	**CO**
N1 (Eastern Side)	2.00	3.00	0.00	0.167	3.00
N2 (Western Side)	1.00	1.00	0.00	0.135	1.00
N3 (Southern Side)	1.00	3.00	0.00	0.111	2.00
N3 (Northern Side)	2.00	3.00	0.01	0.176	4.00
TBS Limit	150	100	125	0.2	5

Source: Consultant Measurements, December 2016

4.3.5 Noise Level

Noise is defined as unwanted sound and is considered as an occupational hazard. The high noise level intensity disturbs the ambient environmental quality and affects people at both work places and in hospital/medical centre areas. Noise monitoring was carried out at four locations to identify the impacts due to the existing sources on the surroundings and in the study area. Noise levels were recorded during the day times to compute the day equivalent level. No measurement was done at night.

In order to know the baseline noise levels in and around the site noise levels were measured at the nearby industrial area and onsite. Results of the noise monitoring are shown in Table 4.2 Noise was recorded by measuring sound level using an integrated Sound Level Meter (SLM) that gave readings of instantaneous sound level and also maximum sound level.

The noise levels measured at the project site were observed to be between 35dB (A) and 43 dB(A). Observations during the field assessment found out that noise level can be high when Train is passing along the TAZARA Railway line which is very close to the project site. In general the day time equivalent noise level in the monitoring sites were well within the permissible limit specified for medical centre area, as well as within the permissible limit specified for mixed residential with other activities such as commercial and entertainment.

Table 4.2: Noise Levels dB(A) at the Project Site

Location	Day Time (Hourly Equivalent)	Industrial area	
		Noise Limits dBA (Leq)	
		Day (6:00 am – 10:00 pm)	Night (10:00 pm-6:00 am)
N1 (Eastern Side)	43	70	60
N2 (Western Side)	35		
N3 (Northern Side)	42		
N4 (Southern Side)	42		

Source: Consultant Measurements, December 2016

4.4 BIOLOGICAL CHARACTERISTICS

4.4.1 Flora and Fauna

The area is covered by vegetation mainly grass on the eastern side with few trees planted at boundaries. Trees species includes banana trees, Cedar, mango and ornamental plants adjacent to the entrance gate. There are no animals or endangered species observed within the project site.

Figure 1.1: Vegetation Cover at the Project Site
Source: NFRA, December 2016

4.5 SOCIO-ECONOMIC SET - UP

4.5.1 Population Density and Size

It is a well established fact that a population is a source of labour for the production of goods and services, more importantly; it is also responsible for the consumption of various products. The size, structure, distribution and well-being of a population, among others are pre-requisites for sustainable economic development. Admittedly, population growth usually leads to an ever increasing demand for basic necessities such as food, water, energy and other natural resources for its survival and development, which subsequently increases depletion of natural resources.

The population distribution pattern in the District is by and large influenced by land fertility, climatic condition and availability of social economic services.

According to the 2012 population census, Mbozi district had a population of 446,339 people of which 213,217 were males and 233,122 females. The overall sex ratio is 91. The average household size was 4.3.

Table 4.3: Population of Mbozi District Council by Sex, Number of Households and Average Size, 2012

No.	City/Ward	Population (Number)			Average Household Size	Sex Ratio
		Male	Female	Total		
1.	Hezya	5863	6685	12548	4.3	91
2.	**Ichenjezya**	**4575**	**3793**	**8368**	4.3	91
3.	Igamba	12896	12969	25865	4.3	91
4.	Ihanda	10088	11267	21355	4.1	90
5.	Ilolo	4043	7686	11729	4.3	91
6.	Isansa	8277	9845	18122	4.4	91
7.	Itaka	8704	9766	18470	4.5	95
8.	Msia	6096	6136	12232	4.3	95
9.	Myovizi	7148	8590	15738	4.3	93
10.	Bara	9591	10515	20106	4.5	91
11.	Hasamba	2318	3355	5673	4.3	91
12.	Isandula	6952	7597	14549	4.2	92
13.	Nanyala	1467	1927	3394	3.9	87
14.	Shiwinga	4173	4784	8957	4.3	88
15.	Vwawa	15436	15561	30997	4.2	88
16.	Wasa	5764	6294	12058	4.3	88
17.	Nambinzo	12610	13341	25951	4.7	95
18.	Nyimbili	5622	5733	11355	4.3	92
19.	Iyula	15266	15518	30784	4.2	92
20.	Mlangali	8489	9166	17655	4.5	94
21.	Halungu	13023	14128	27151	4.3	92
22.	Ruanda	3771	4112	7883	4.1	93
23.	Itumpi	18666	19350	38016	4.3	90
24.	Ipunga	4401	4966	9367	4.0	89
25.	Mlowo	17978	20038	38016	4.0	90
	TOTAL	**213,217**	**233,122**	**446,339**	**4.3**	**91**

Source: 2012 Population and Housing census General Report.

4.5.2 Ethnicity

The major ethnic groups in terms of their number are Nyiha. They account for over 50% of the total population. The other ethnic groups are Nyamwanga, Wanda, Nyakyusa, Ndali, Lambya, Malila, and Safwa.

4.6 ECONOMIC BASE

4.6.1 Agriculture

Agriculture is the main economic activity in the district. 88% of its inhabitants depend on agriculture and livestock production that accounts for over 80% of the district earnings. Agricultural production is mainly done by small holder farmers (Peasants) of whom 50% use hand hoes, 40% use animal draught power and 10% using motorized equipment such as tractors.

Coffee is the main cash crop. Production of this crop used to increase over time. The produce of coffee (in tons) were as follows in the past five years: 42,109,99 (2011); 22,053.16 (2012); 21,023.51 (2013); 29,125.25 (2014); and 30,307.71 (2015).

The main food crops produced in the district are maize, beans, potatoes, sweet potatoes, and beans. Production of these crops depends on availability of rainfall; hence it is unstable with a slightly increasing trend over years.

4.6.2 Livestock Keeping

Livestock keeping is also practiced by large population. The district has the following as of 2015: cattle (110,741); Goats (61,931); sheep (6,219); Donkeys (649); Pigs (29,769); and Chicken (670,567). In recent years, Mbozi district has observed a slight increase of improved dairy cattle and goats. Due to the existing climatic condition and population density; promoting dairy cattle, goats, pigs and chicken production is favourable in this high land area. Livestock development is being humered by existence of some livestock diseases especially the tick borne diseases and new castle disease which is a threat to livestock production.

4.6.3 Forestry

Forests covers a total of 61,406.3 Ha of which 5,306.48 Ha are natural forest and 6,199.8 Ha are planted trees. The total areas of 9,784.5 Ha is being conserved as National and District forest reserves while 51,621.81 Ha is being conserved by the village through the assistance of "participatory forest management" programme.

Forest conservation and afforestation is one of the priorities of the District for sustainable development. This is envisaged in all development plans of the District. For the previous three years, the average minimum trees targeted for afforestation was 1,600,000 trees per annum. On average actual trees seedlings and planted trees surpassed the target, and stood at 1,700,000 trees per annum. However, the achievements has been highly affected by low survival rates which stands at 35% implying an average of only 595,000 trees per annum.

4.6.4 Industries

The district has two medium scale industry used for coffee processing and one maize mill for maize flower process and packing industry. Other industrial activities are very small in nature and are mainly carpentry, and oil seed extracting mills, milk processing, Iron smith, maize mills and rice hulls.

Since the district has high potential for agricultural and livestock activities, food-processing industries such as oil extraction and coffee processing units constitute potential areas for investment.

Table 4.4: Type of Small Scale Industries in Ichenjezya ward 2015

Ward	Type of Industry	Number of industries	Total no. of staff
ICHENJEZYA	Sunflower oil processing mill	4	5
	Service industry – garage	12	63
	Carpentry	9	19
	Food processing	0	0

	Maize milling	9	12
	Blacksmith	5	7
	Welding	6	11
	Total	**45**	**117**

Source: Mbozi District Council socio-economic Profile, 2016

4.6.5 Tourisms

Mbozi district has unique tourism sites; these are:-

- Geographical tourism: meteorite commonly known as 'kimondo cha Mbozi' at Ndolezi, Hot water spring, Rift valley scenery at Nanyala.
- Wild animal tourism: Red monkey at Iyula forests.

Hotels and clubs offer pleasant drinks, meals and entertainment in Vwawa and Mlowo urban centers. However development of the tourism industry is low. The district need local and foreign investors to dwell in and invest on camping sites, hotels, conference facilitates real estates and environmental conservation activities.

4.7 ECONOMIC INFRASTRUCTURE

4.7.1 Road Networks

The district has a road network of 1982.89 kms classified as follows: Trunk (42.9km); Regional (201.35km); District/Urban (516.63km); and feeder road (1222.01km). Road network is also classified by type of road surface as follows: Tarmac (56.9km); Gravel (354.09km); and earth (1539.13km). Out of the total road network 528.43km are passable throughout the year; 419.39km passable great part of the year; 693.18km not passable most of the year.

Transportation of grains to the NFRA Mbozi site depends very much on the road network of the district and other neighbouring districts.

4.7.2 Communications Network

Tanzania Telecommunication Company Limited (TTCL), which operates a Subscriber Truck Dial (STD) telephone system, is the main telephone service provider. Likewise various villages and township centres of Mlowo and Vwawa which are along and near to the Tanzania – Zambia highway road enjoy the services of cell phones of VODACOM, AIRTEL, TIGO, ZANTEL, HALOTEL and TTCL (Mobile).

4.7.3 Railway Services

Mbozi district enjoys railways service of the Tanzania Zambia Railway (TAZARA) line commencing from Tunduma to Songwe 105 km. There is a station at Vwawa town just adjacent to the NFRA Mbozi site which can also be used to transport grains from tunduma, or to Makambako and other areas in the country. Since the railway line runs parallel to the Tanzania-Zambia trunk road transporters prefer to transport their goods by road service, because it is faster, though expensive compared to the railway. The TAZARA Station at Mbozi is adjacent to the project area.

4.7.4 Energy

Vwawa and Mlowo town centre are connected to the National grid together with six villages of Ihanda, Ukwile, Iyula, Malonji, Mahenje, Ruanda and Igamba. Other sources of power to very small population are solar energy; and biogas. The majority of the population uses firewood, charcoal and fuel lamps as their source of energy.

4.8 SOCIAL SERVICES INFRASTRUCTURE

4.8.1 Health Sector

There are two (2) hospitals owned by Government and Private respectively; dispensaries 59 (government) and 8 (private); and health centers 3 (Government) and 3 (Private). Top ten diseases encountered in outpatient department in 2015 are Upper respiratory infection; Diarrhea; Pneumonia; Skin Infection; Malaria; Urinary tract infection (UTI); Intestinal worms; Eye disease infection; Surgical Condition; and GIT Disease and other non infection.

4.8.2 Water Supply

The district has a total of 5164 water schemes consisting of 66 charcoal dams; 749 springs; 3904 shallow wells; 45 rain water harvest tanks; 159 boreholes; 111(permanent) and 130 (seasonal) river water supply; 8 (permanent) and 2 (seasonal) dam; and 101 piped scheme.

The number and type of technology used for water schemes are as follows: 9 electricity pump; 10 diesel pumps; 930 Hand pump; and 1110 Gravity piped. 59.8% of the District population is served with clean water.

4.8.3 Education and Training

The ward has 2 pre-primary schools; 3 primary schools with 7 houses for teachers. There is no secondary school in the ward. The district has 160 pre-primary schools; 164 primary schools with 848 houses for teachers; and 56 secondary schools. The education sector faces some challenges like deficit of classrooms, desks, laboratories, staffs and houses for teachers.

4.8.4 Police, Security, and Fire Services

There is a police station and a private security services in the district. The police force is under the Ministry of Home Affairs. Police stations are available in many Vwawa Town which is close to the project site.

The district also has fire service department although it is not equipped with necessary facilities to provide services required.

CHAPTER FIVE: STAKEHOLDERS CONSULTATION AND PUBLIC PARTCIPATION

5.1. THE STAKEHOLDERS

During scoping, stakeholder consultations were undertaken to identify and respond to project issues of concern to stakeholders. Details of the meetings and discussions with individuals and groups of stakeholders are found in Appendix 2. Stakeholders consulted included all individuals, groups or organizations that might be affected or might affect (positively or negatively) the proposed project in one way or the other. They are found at national, Regional, District council, Township Council, ward and hamlet "*mtaa"* levels.

At the ward level, Ward Executive Officer, Health Officer and Ward Social Welfare Officer were consulted. At the *Mtaa* level, key stakeholders including the chairman of the *Mtaa* government, *Mtaa* Executive Officer (MEO) and Members.

The list of interviewed stakeholders at all levels i.e. from the national to *Mtaa* is summarized in the table below.

Table 5.1: List of Consulted Stakeholders

Level of consultation	Institution	Names of Individuals
National	Ministry of Agriculture, Livestock and Fisheries	Mr. Elimpaa Kiranga – Ag. Permanent Secretary Mr. Oswald Ruboha – AD. M & E Mr. Paulo Tarimo – DLUP Mr. Sospeter Mtemi – AD. LM Mr. Richard Kasuga – HGCU Mr. Beatus Maleme – ADCPS Mr. B.A. Shaban – DPMU Mr. Seushi Mburi – DAHRM Mr. George Mandera
	Tanzania Food and Drugs Authority (TFDA) – Southern Highland Zone	Mr. Paul Sonda – Inspector
	Occupational Safety and Health Authority (OSHA) – Southern Highland Zone	Mr.Renatus A. Qalqal – Industrial Hygiene Inspector
	Tropical pesticides Research Institute (TPRI)	Mr.Samwel Mmary – Pesticides Inspector
District	Mbozi District Council	Mr.Hamis P. Nzunda-DEMO
Township	Vwawa Township Authority	Mr. Joel G. Kaminyoge – Town Executive Director Mr. Fredrick F. Masawe – Agriculture Officer
Ward	Ichenjezya Ward, Ilolo Ward, Vwawa Ward	Mr.BlayaMsongole – WEO Ichenjesya Mr.TulianiMalahalende – WEO Ilolo

Level of consultation	Institution	Names of Individuals
		Mr.KassimMyombe – WEO Vwawa
Proponent	National Food Reserve Agency (NFRA)	Ms. Vumilia Zikankuba – Ag. CEO Mr. Joseph Ogonga – Ag. DBD Mr. Bright E. Mollel – Makambako Zonal Manager Eng. Nzobonariba, F.S. – HQ Mr. Elias Nicholas – Manager Mbozi Site Mr. Alfred Mongi – Quality Officer

5.2 STAKEHOLDERS CONCERNS

Participation is a process through which different stakeholders influence and share their views regarding development initiatives and the decisions and resources that affect them. The participation of different social groups directly affected by a project is a prerequisite of any project planning nowadays. The involvement of the project affected persons (PAP) in the design of the mitigation and/or resettlement plan increases the probability of project acceptance and success.

The overall goal of the consultation process was to disseminate Project information and to incorporate the views of PAP in the design of the mitigation measures, and management plan. The specific aims of the consultation process were to:

(a) To introduce the project to the stakeholders and potential affected and benefited people
(b) Improve Project design and, thereby, minimize conflicts and delays in implementation;
(c) Increase long term Project sustainability and ownership;
(d) Improve institutional coordination;
(e) Address some of the concerns stakeholders may have regarding the proposed project.
(f) To identify social and environmental impacts of the project and by sharing knowledge and experience design methods of mitigating the impacts.

During the consultations, the following issues were discussed:

- Project overview and acceptability;
- Presentation of the proposed site using layout maps;
- Regional/District institutional framework that might assist in some aspects of project implementation;
- Listening to the authorities of their environmental and socio-economic concerns and perceptions regarding the proposed project; and
- Discussion on the role of the authorities in public information dissemination, monitoring and the EMP implementation
- Through sharing of knowledge and experience device mitigation measures suitable for the project

Issues raised by specific stakeholder during the consultations include are as follows:

5.2.1 Ministry of Agriculture, Livestock and Fisheries

This stakeholder was consulted by the study team so as to hear the concerns about the proposed project. The following were raised:

- NFRA is an agency of the ministry of Agriculture Livestock and Fisheries, the main task of the ministry to this agency is capacity building for the storage facilities.
- NFRA is currently having storage of 246,000 tons of crops at per; the deficit is 154,000 tons the future expansion is having a storage capacity of 400,000 tons of crops.
- The expansion of the warehouses and silos will ensure market for the agro products hence it will boost market for the agro products.
- NFRA is working closely with "BODI YA NAFAKA & MAZAO MCHANGANYIKO (CPB)"; this is aiming at stabilizing the market for the products, it is contributing to the government goals of poverty eradication and national economic development.
- The ministry insist on the use of silos rather than warehouses because of the following advantages of silos over warehouses in storage purposes:
  - Silos are more effective as they occupy less area,
  - They are cheaper to establish than the warehouses
  - It is easier to keep the optimum storage conditions for the grain by controlling the temperature, insects, mould, birds which in long term storage facilities could result in an important economic loss.
- Plans are in place to rehabilitate the road that leads to the site so that it can be passable throughout a year.

5.2.2 Occupational Safety and Health Authority (OSHA)

This stakeholder was consulted by the study team so as to hear the concerns about the proposed project. The following were raised:

1. The Occupational Safety and Health Authority (OSHA) is a Government Agency established under the Executive Agency Act No. 30 of 1997. OSHA is responsible for enforcing the Occupational Health and Safety (OHS) Act No. 5 of 2003 and its associated rules/regulations/orders.
2. The applicability of OHS Act has extended to cover all premises or work areas with employer and employees or in places whereby hazardous materials including explosive, flammables, toxics of offensive emissions is involved. However, enforcement of OHS Act excludes safety or health or welfare of public traffic and domestic/households unless the household constitute a workplace or factory. NFRA should therefore adhere to this requirement by registering its workplace.
3. The following have to be adhered with the NFRA project based on the requirements of OHS Act No. 5 of 2003
   i. NFRA/Contractor should registrar the construction project to OSHA with submission of three copies of drawings both architectural and service drawings as per section 16 and section 21 of the said act.
   ii. The occupier (NFRA) should notify OSHA on the actual day of commencing the project so that the statutory inspections; general workplace inspection, electrical safety inspection, and industrial hygiene survey to the workplace can be carried out.
   iii. The occupier (NFRA) should have or prepare the Occupational Health and Safety policy (OHS Policy) and display it in conspicuous area at the workplace, the guidelines should be distributed to all employees as per Section 96 of the said Act.
   iv. There should be trained first aiders from recognized institution (currently OSHA) as per Section 58 of OHS Act

v. NFRA should formulate the Health and Safety Committee as per Sections 11, 12, 13 and 14 of the OHS Act so as to coordinate and report issues of safety. The representative should attend the training from OSHA
vi. The occupier should do Occupational Health and Safety Risk Assessment before starting the construction activities, the activity shall be done by approved Inspection Authority as per Section 60 of the OHS Act.
vii. NFRA should adhere to Section 62 of the OHS Act on Personal Protective Equipment (PPE's) which should be but not limited to Safety Boots; Overalls; Hand Gloves (lather or plastic depending on the activity); eye safety glasses; Ear muffs (depending on exposure to noise); nose masks (depending on activity); hard hats and alike.
viii. Other Welfare provision as per part V of the OHS Act requires the provision of safe and wholesome drinking water at the site, clean and adequate toilet for both sex, change room and lockers, facilities for sitting are advices
ix. The notification of closure or change of workplace project to OSHA after completion of construction as per section 21 of the OHS Act, so that the workplace can be registered to as new workplace.

5.2.3 Tanzania Food and Drugs Authority (TFDA)

This stakeholder was consulted by the study team so as to hear the concerns about the proposed project. The following were raised:

1. There are requirement for NFRA to meet as far as TFDCA cap. 219 and regulations are concerned regarding running of its grain storage facilities.
2. NFRA have been inspected by TFDA but have never voluntarily applied for TFDA registration and therefore contravene with section 18 of TFDCA cap. 219 for being not registered.
3. The standard requirements for the warehouse that store grains/food are as stipulated in the checklist attached with this email.
4. TFDA kindly support implementation of the project but would also like to ask NFRA Authority to understand and recognize the mandatory need of TFDCA cap.219 section 18 that, they will have to apply for registration of all grain/food storage facilities they own for them to comply.

5.2.4 Vwawa Township Authority (VTA)

This stakeholder was consulted by the study team so as to hear the concerns about the proposed project. The following were raised:

1. The project area belongs to NFRA and they were finalizing the process of obtaining title deed as it was not present previously.
2. The project has multiply effect to the community especially farmers by offering potential market, as well as ensure adequate, easy availability and affordable food to communities
3. NFRA pay Crop CESS of 5% to the Township Authority
4. There are plan to rehabilitate access road from Vwawa Town that provide access to the project site. Already request has been sent to TANROADS for rehabilitation that will not only grant easy accessibility to the project but also to other neighbouring villages and Momba District as well as enhance transportation of cargo to and from the TAZARA Vwawa Station which is adjacent to NFRA project area.
5. The Township Authority has allocated five (5) places with solid waste collection facilities and there in the process of increasing more collection points. When these facilities are

full, the Authority use Tractor with trailer to collect waste and transport to dumpsite located at MitiUpepo (5km from Vwawa Town).

5.2.5 Ichenjezya Ward, Ilolo Ward, Vwawa Ward

This stakeholder was consulted by the study team so as to hear the concerns about the proposed project. The following were raised:

1. NFRA has good relationship with surrounding neighbours and the community of Ichenjezya ward
2. There is no any complain reported from the community regarding NFRA operations
3. The expansion of the storage facility will increase the potential markets for farmers for their produce (maize) as previously it was difficult to most farmers with large produce to sell to NFRA Mbozi site due to limitation in storage
4. The project will provide employment opportunities
5. NFRA grain grading system which has been established to control quality is seen as challenge to most farmers
6. NFRA established buying centres in various villages has increased market opportunity to farmers by providing easy accessibility to sell
7. There are more than 50 farmers' corporative unions and purchasing is done through these unions or from individuals.

5.2.6 Tropical pesticides Research Institute (TPRI)

The team consulted Mr.Samwel Mmary, an officer from TPRI and his comments are summarized as follows

1. TPRI (Tropical Pesticides Research Institute) is an Institute under the Ministry of Agriculture, Fisheries & Livestock Development that deals with conducting researches on agrochemicals and their control. It deals with research, training, consultation and registration of pesticides. Pesticides is a general term, it includes; herbicide, insecticide, nematicide, termiticide, rodenticide, and fungicide.
2. It is advised that, the fumigator (the one who will do fumigation to cereals in the godowns) should be a well trained person with knowledge in pesticides. Appropriate protective gears should be provided to the fumigator.
3. Spraying of the compound before the cereals are stored in the godowns in and outside to chase away insects and animals is advised. The recommended fumigants for domestic compound control are; Nuvan 500EC, Carate 5EC, Dursban 4E Icon 10WP. If there is shrub or a bush nearby Rogol 40 can be sprayed but not very much recommended, however it controls and chase away snakes, lizards, scorpions, alligators etc.
4. The recommended fumigants are; Baluphos 56% (Aluminum Phosphide), Degesch Plate (Magnessium Phosphide), Detia EX-B (Alluminium phoshide), Phostoxin tablets (Alluminium phoshide), Quickphos (Alluminium phoshide), Fumitoxin tablets (Alluminium phoshide). It should be noted that fumigation should be done at the recommended standards as per instructions, the cereal stakes had to be well covered.
5. Personal protective gears should be provided and their use be enforced especially in loading and storing of the fumigants, this include; dust masks, gloves, sun goggles, overcoats, helmets, safety boots etc.
6. NFRA should consult TPRI who will collect the containers and chemicals to their site which later on will be sent to the incinerator in Wazo Hill-Twiga Cement.

5.6 ADDRESSING STAKEHOLDERS' CONCERNS

The EIA report identified main concerns and issues raised by different stakeholders. The EIA addressed all concerns. Table 5.2 shows a summary on how the issues were addressed.

Table 5.2: Response to Stakeholders Concerns/Comments

CONCERN/ISSUES	EIA RECOMMENDATIONS	SECTION
The expansion of the warehouses and silos will ensure market for the agro products hence it will boost market for the agro products.	Enhanced Market of Grains • Increase buying centre to reach more farmers/AMCOS • Farmers shall be offered with competitive prices as per season market	7.6.3
The ministry insist on the use of silos rather than warehouses because of the following advantages of silos over warehouses in storage purposes: ✓ Silos are more effective as they occupy less area, ✓ They are cheaper to establish than the warehouses ✓ It is easier to keep the optimum storage conditions for the grain by controlling the temperature, insects, mould, birds which in long term storage facilities could result in an important economic loss.	• Steel Silo facility requires less ground space, which is important if space is not available or if its cost is high. • With steel silo it is easy to keep the optimum storage conditions for the grain, by controlling the temperature, insects, mould, birds, which in long term storage facilities could result in an important economic loss. • The third advantage consists of lower costs than that incurred from using warehouses, which entails the automation of the grain transport equipment. The loading as well as the unloading can be completely automated using a SCADA system and at a lower cost. • Steel silo has lower assembling costs, since this element is designed specifically for this purpose and weighs less than a storage facility. • Steel silo is less expensive overall, and this is probably the main advantage in comparison to grain warehouses.	6.8.2
4. The Occupational Safety and Health Authority (OSHA) is a Government Agency established under the Executive Agency Act No. 30 of 1997. OSHA is responsible for enforcing the Occupational Health and Safety (OHS) Act No. 5 of 2003 and its associated rules/regulations/orders. 5. The applicability of OHS Act has extended to	Construction Phase • Register the site with Occupational, Safety and Health Authority (OSHA) • The contractors will prepare site specific Health, Safety and Environment (HSE) Plan • Use of water sprinklers to	7.3.10 and 7.4.3

CONCERN/ISSUES	EIA RECOMMENDATIONS	SECTION
cover all premises or work areas with employer and employees or in places whereby hazardous materials including explosive, flammables, toxics of offensive emissions is involved. However, enforcement of OHS Act excludes safety or health or welfare of public traffic and domestic/households unless the household constitute a workplace or factory. NFRA should therefore adhere to this requirement by registering its workplace. 6. The following have to be adhered with the NFRA project based on the requirements of OHS Act No. 5 of 2003 x. NFRA/Contractor should registrar the construction project to OSHA with submission of three copies of drawings both architectural and service drawings as per section 16 and section 21 of the said act. xi. The occupier (NFRA) should notify OSHA on the actual day of commencing the project so that the statutory inspections; general workplace inspection, electrical safety inspection, and industrial hygiene survey to the workplace can be carried out. xii. The occupier (NFRA) should have or prepare the Occupational Health and Safety policy (OHS Policy) and display it in conspicuous area at the workplace, the guidelines should be distributed to all employees as per Section 96 of the said Act. xiii. There should be trained first aiders from recognized institution (currently OSHA) as per Section 58 of OHS Act xiv. NFRA should formulate the Health and Safety Committee as per Sections 11, 12, 13 and 14 of the OHS Act so as to coordinate and report issues of safety. The representative should attend the training from OSHA xv. The occupier should do Occupational Health and Safety Risk Assessment before starting the construction activities, the activity shall be done by approved Inspection Authority as per Section 60 of the OHS Act. xvi. NFRA should adhere to Section 62 of the OHS Act on Personal Protective Equipment (PPE's) which should be but not limited to Safety Boots; Overalls; Hand Gloves (lather or plastic depending on the activity); eye safety glasses; Ear muffs (depending on exposure to noise);	suppress excessive dust during construction • Provide proper personal protective gear such as boots, masks, coats, and gloves for workers and enforce its use • The construction sites will have protective fencing to avoid any unauthorized entry. • Provide health and safety training to workers upon employment; • Provide first aid services • An 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. • Availability of safe drinking water will be ensured for the construction staff. • Notify OSHA on the actual day of commencing the project so that the statutory inspections; general workplace inspection, electrical safety inspection, and industrial hygiene survey to the workplace can be carried out. • Formulate the Health and Safety Committee • Occupational Health and Safety Risk Assessment • Notify OSHA of closure or change of workplace project after completion of construction. <u>Operation Phase</u> • Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals. • Provide staff with appropriate and adequate personal protective equipment including gloves, coveralls, safety goggles, respirators and helmets • Install first aid facilities in all	

CONCERN/ISSUES	EIA RECOMMENDATIONS	SECTION
nose masks (depending on activity); hard hats and alike. xvii. Other Welfare provision as per part V of the OHS Act requires the provision of safe and wholesome drinking water at the site, clean and adequate toilet for both sex, change room and lockers, facilities for sitting are advices xviii. The notification of closure or change of workplace project to OSHA after completion of construction as per section 21 of the OHS Act, so that the workplace can be registered to as new workplace.	places • Making sure that code of practices is observed • Observe minimum working duration in hazardous areas • Provide regular training to all staff on HSE matters especially new employees. • Conduct medical monitoring for its workforce as per OSHA requirements. • Formulate environmental, health and safety committee • Prepare and execute an emergency preparedness and response plan to help manage fire incidences • Warning signs e.g. “No smoking”, Switch off telephone, Switch of Engine, Car speed, fire extinguisher shall be posted all over the project area. • Emergency Assembly Point shall be allocated • Ensure proper light in working areas • Using surfaces that can be easily decontaminated in the washrooms, kitchen and canteen • Facilitating hand washing with the availability of sinks and alcohol hand rubs • Controlling the effects of noise	
1. It is advised that, the fumigator (the one who will do fumigation to cereals in the godowns) should be a well trained person with knowledge in pesticides. Appropriate protective gears should be provided to the fumigator. 2. Personal protective gears should be provided and their use be enforced especially in loading and storing of the fumigants, this include; dust masks, gloves, sun goggles, overcoats, helmets, safety boots etc. 3. NFRA should consult TPRI who will collect the containers and chemicals to their site which later on will be sent to the incinerator in Wazo Hill-Twiga Cement.	• Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals. • Provide staff with appropriate and adequate personal protective equipment including gloves, coveralls, safety goggles, respirators and helmets • Install first aid facilities in all places • Making sure that code of practices is observed • Observe minimum working duration in hazardous areas • Provide regular training to all staff on HSE matters	7.4.3 and 7.4.4

CONCERN/ISSUES	EIA RECOMMENDATIONS	SECTION
4. Spraying of the compound before the cereals are stored in the godowns in and outside to chase away insects and animals is advised. The recommended fumigants for domestic compound control are; Nuvan 500EC, Carate 5EC, Dursban 4E Icon 10WP. If there is shrub or a bush nearby Rogol 40 can be sprayed but not very much recommended, however it controls and chase away snakes, lizards, scorpions, alligators etc. 5. The recommended fumigants are; Baluphos 56% (Aluminum Phosphide), Degesch Plate (Magnessium Phosphide), Detia EX-B (Alluminium phoshide), Phostoxin tablets (Alluminium phoshide), Quickphos (Alluminium phoshide), Fumitoxin tablets (Alluminium phoshide). It should be noted that fumigation should be done at the recommended standards as per instructions, the cereal stakes had to be well covered.	especially new employees. • Conduct medical monitoring for its workforce as per OSHA requirements. • Formulate environmental, health and safety committee • Standard operating procedures will be formulated and followed to handle and use aluminium phosphide, and to prevent exposure to phosphine gas.	
6. The Township Authority has allocated five (5) places with solid waste collection facilities and there in the process of increasing more collection points. When these facilities are full, the Authority use Tractor with trailer to collect waste and transport to dumpsite located at MitiUpepo (5km from Vwawa Town).	<u>Waste Management</u> • Appropriate treatment and disposal system, such as septic tanks and soaking pits, having adequate capacity will be constructed. • Introduction of waste disposal bins, warning notices, “DOs &DoNTs” etc posted at strategic points, through the Grain Storage Facilities area. • No, on site burial or open burning of solid waste shall be permitted at the project premises. • 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, broken/used parts, etc.) will be sold to recycling contractors. • Domestic solid waste from the construction site will be disposed through Songea Municipal Contractor so as not to cause soil contamination.	7.4.2 and 7.4.6

CONCERN/ISSUES	EIA RECOMMENDATIONS	SECTION
7. There are plan to rehabilitate access road from Vwawa Town that provide access to the project site. Already request has been sent to TANROADS for rehabilitation that will not only grant easy accessibility to the project but also to other neighbouring villages and Momba District as well as enhance transportation of cargo to and from the TAZARA Vwawa Station which is adjacent to NFRA project area.	• The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations. • Appoint an environmental manager who will be responsible for day to day environmental management activities within the site <u>Vehicular Traffic</u> • Proper plan for unloading and loading of grains during delivery and dispatch respectively will be developed and implemented • Liaison will be maintained with the relevant authorities (such as traffic police) regarding the grain transportation particularly during emergencies.	
8. The expansion of the storage facility will increase the potential markets for farmers for their produce (maize) as previously it was difficult to most farmers with large produce to sell to NFRA Mbozi site due to limitation in storage 9. The project will provide employment opportunities 10. NFRA grain grading system which has been established to control quality is seen as challenge to most farmers 11. NFRA established buying centres in various villages has increased market opportunity to farmers by providing easy accessibility to sell 12. There are more than 50 farmers corporative unions and purchasing is done through these unions or from individuals.	<u>Employment</u> • Optimization of local employment (allocate jobs fairly among the locals through involvement of local leaders) • Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers <u>Enhanced Market of Grains</u> • Increase buying centre to reach more farmers/AMCOS • Farmers shall be offered with competitive prices as per season market	7.6.1 and 7.6.3

CHAPTER SIX: ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1 INTRODUCTION

This section entails assessment of impacts of the Grain Storage Facilities project as identified based on stakeholder's concerns and experts judgement. Potential environmental and social impacts to the receiving environment at different stages of the project development are identified. The criteria for predicting and judging the extent of the impacts of the project include:

- 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 public concern; and Political repercussions of the proposed development.

In assessing the significance of potential impacts, various measures were used. These include the use of checklists/matrices, expert knowledge and keen assessment of the project plans and details. Each parameter is evaluated according to the following:

I. Potential impact – any change to the environment, whether adverse or beneficial, wholly or partially resulting from the proposed activities, products or services;
II. Environmental receptor – sensitive component of the ecosystem that reacts to or is influenced by environmental stressors;
III. Magnitude – a measure of how adverse or beneficial an effect may be;
IV. Duration – length of time needed to complete an activity;
V. Significance – a measure of importance of an effect.

The table below summarises the criteria used in analysis of identified impacts

Table 4.1: Methodology/Criteria for Impact Analysis on Magnitude/Significance

Criterion	Description	Possible Results	
		Term	Description
Significance of the Impact	An indication of the severity of the impact, either positive or negative.	Very High	Extreme effect – where natural, cultural or social functions or processes permanently cease.
		High	Severe effect – where natural, cultural or social functions are altered to the extent that they temporarily cease
		Moderate	Moderate effect – the affected environment is altered but natural, cultural or social functions continue, albeit in a modified way
		Low	Minimal effect – affects the environment in such way that natural, cultural or social functions and processes are not affected.
		Very Low	Minimal or negligible effect
		Unknown	Magnitude of the impact unknown
Duration of the Impact	An indication of the duration or time over which the impact will be experienced.	Permanent	Will remain permanently
		Long term	Extends into the post- closure phase, but not permanently
		Medium term	During the operational life of the project
		Short term	Shorter than the operational life of the project
		Transient	Very short duration
		Unknown	Duration of the impact is unknown

The approach taken in this chapter is to identify, describe and analyse all anticipated impacts or issues that are expected throughout the project cycle – planning/formulation, design,

implementation (mobilisation, construction and operational activities), monitoring and possible decommissioning. The following potential impacts are related to the key aspects of the proposed project. The potential environmental impacts identified for the proposed project are as shown in the following sections:

6.2 SITE SELECTION PHASE

Site selection phase presents the overarching impacts of the presence of the project on the general natural settings at the project area. At this phase the main impacts sources relate to change of landscape and general appearance of the area.

6.2.1 Change of Landscape of the Area

The project site earmarked for the warehouse and silo construction is predominantly in its natural state, covered with a mixture of green vegetation. The selection of the site for the project and erection of buildings and structures will inevitably change natural setting and landscape of the area.

This impact is considered negative, long-term and of high significance.

6.3. DESIGN PHASE

The architectural design took in consideration requirement for having a simple and efficient Grain Storage Facilities within the project area befitting environment for safety and security. To achieve this concept a number of design considerations have been incorporated.

6.3.1 Risk of Flooding and Inundation

The project area has a fairly flat land, with dominant gradient of less than 0.002 (0.2%) sloping northern part of the site, with very small storm water gullies. Due to this there is potential of water stagnation that can result into floods in the area if the design will inadequately address drainage system. Any flooding and inundation will altogether undermine and negate the very purpose of these storage facility and installation of silos.

This impact is considered negative, long term and of high significance.

6.3.2 Health hazards to Workers and Training Attendees / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management

Most of the environmental problems associated with project activities and actions should under normal circumstances be addressed during the design stage of the project. Problems, which could arise during operations, may be due to inadequacies in the organizational, operational, maintenance, management and monitoring aspects of the entire project operation system.

Maintenance of Building/Sanitation Facilities

Lack of inadequate financial resources for maintenance will inevitably affect the smooth operations of the Grain Storage Facilities. During peak season the site is populated with about 300 people. Inadequate number of sanitation facilities will pose health risks to workers as well as surrounding communities as people can opt to serve themselves in the surrounding areas.

Scarcity of Water Supply

Mbozi site is connected to Vwawa town water supply network; water is available with little water shortage. The site serves 13 workers during normal operation period and is populated with about 300 labourers during peak season and water shortage impairs their hygiene and health conditions. During normal operation period water demand is estimated to be 1,000 L per day while during peak season water demand is estimated to be 10,000 L per day. Water is used for domestic and other sanitation activities.

To complement the existing supply the project will also obtain water from the borehole to be established at the site. There will be an overhead reservoir tank of 100,000L.

Availability of water is considered to be of primary importance as far as hygiene at the Mbozi Depot is concerned. Inadequate water supply or supply of poor quality water will expose the staff to health risk.

Lack of Energy/ Electricity

Mbozi site is connected to the national grid system. There is already existing 33kV HT line near the site. Silo complex proposed, requires power between 500 kVA to 800 kVA. Storage in silos is of power sensitive systems; therefore, the design has considered a standby power supply as an alternative during power blackouts. Based on the general requirement of the proposed facilities, existing facilities and using a diversity factor, one 810 kVA Standby Generator (Prime rated) will be installed to cater for the standby/ back-up electricity supply.

Electricity is necessary to ensure that the project and associated facilities are operating in perfect conditions. Lack of electricity will have severe consequence to operation of the grain storage facility.

Personnel

Lack of expertise of running the facility will mean that the safety measure put in place will be ineffective. Negligence, fatigue due to understaffing and long working hours may result in otherwise avoidable accidents. Poor remuneration not only results in low morale of the workforce but also to lack of concentration which may result in accidents.

By way of summary, impacts due to inadequacies in management and operation are:

a) Hazards to health/safety of workers and the public due to frequent accidents
b) Damage to structures and property
c) Increased service delivery costs
d) Pollution of soil and general environment
e) Leakage to pipes and tanks

This impact is considered negative, long term and of high significance.

6.3.3 Health Impacts /Loss of Authentic of the area due to Haphazardly Management of Waste

During design phase there are many factors for consideration related with management of waste which if not well considered could lead to detrimental effects particularly to health hazards. Design for associated infrastructures such as storm water drainage system, sewage system and removal of waste are important for the planned components so as to maintain the sanitation, hygiene and aesthetics. The generated waste, if not properly disposed of, may provide sites for reproduction of vermin and rodents. Effluents from various point of water use if

not properly discharged it becomes a focal point for the spreading of diseases. This is not only in the close vicinity of the project area but also at considerable distances since bacterial, viral and parasitically infected material is carried away by scavengers, flies and mosquitoes. Inadequacy in the management of waste will result into health hazards to patients, workers and public, reduce aesthetic of the area and can severely degrade ground and reduce the land/property value.

This impact is considered negative, long term and of high significance.

6.4 MOBILIZATION

Mobilization will include preparation of the project site and if necessary sites for support facilities (storage, crew); labour; and setting up and operation; delivering of fuel and water; arranging and connecting tanks, pumps, generators etc.

6.4.1 Increased Noise and air pollution

During the mobilization stage of the project, noise associated with equipment working on site will be generated, which will affect the nearby receptors/offices and also the working personnel. Noise and air pollution generation will essentially result from the movement of trucks and activities

However, the noise from this machinery does not constitute what is referred to as excessive noise. Likewise the amount of dust from moving equipment is insignificant to cause any hazards in the surrounding area.

This impact is therefore considered to be negative, cumulative and of short-term duration and of low significance.

6.4.2 Increased traffic along Mbozi - Tunduma Highway

The proposed project location is already a very busy area with operations of a number of vehicles and motorcycles. The proposed project will require the use of public roads while transporting materials. This project requirement will add to the amount of heavy vehicle traffic along Mbozi - Tunduma Highway and local roads. However, this increase is not expected to significantly affect traffic volumes. Access points to the proposed site are located along the Mbozi - Tunduma Highway road and traffic flow along the road is high during peak hours and in case it is found out that during mobilisation there is a need to plan for transporting fill materials during low traffic flow, the transport contractor will be instructed accordingly.

This impact is considered to be negative, cumulative and of short-term duration and of moderate significance.

6.4.3 Employment opportunities

One of the main positive impacts during projects mobilization phase will be the availability of employment opportunities especially to casual workers and several other specialized workers (including designers and other related workers). It is also estimated about 70 people will be employed during construction phase. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production. Several workers including casual

labourers are expected to work for the period from the start of the project to the end. Apart from casual labour, semi-skilled and unskilled labour, formal employees are also expected to obtain gainful employment during the period of construction.

This impact is considered to be positive, cumulative, and short-term to long-term and of moderate significance.

6.5 CONSTRUCTION PHASE

Assessment of the impacts during mobilization and construction phase has been based on transportation of construction equipment to the site, actual works during construction itself and future expansion of the centre buildings and associated structures.

During construction phase, there will be erection of steel and concrete structures, construction of ingress and egress routes, installation of underground tanks and piping duct systems and paved surfaces. In this regard, there are a number of potential environmental impacts that might occur as a result of inadequacies in the construction of such structures.

6.5.1 Depletion /Degradation at Points of Source of Construction Materials

The building contractor will obtain materials e.g. aggregates and stones for construction purposes from licensed suppliers/ authorized area in Mbozi District. However, the sources of these materials are known to face environmental challenges – depleted resources, rampant clearance of vegetation and profuse emissions of dust. Thus, environmental impacts associated with extraction of materials for construction of the project structures is a matter of cumulative effect because it will only be contributing to a problem that has other root causes.

This impact is negative, cumulative and long term of medium significance.

6.5.2 Benefit to Local Producers and Suppliers of Construction Materials

Construction of the Grain Storage Facilities will consider the use of local contractors as well as local building materials available in Mbozi, Songwe Region and Mbeya Region. This will contribute to the boosting of income among local suppliers of materials, labourers and the economy of the country as a whole.

This impact is considered positive, short term and of moderate significance.

6.5.3 Loss of Vegetation

The clearance of the site during construction will result in loss of indigenous/mature trees species and associated change in species diversity of the area. The vegetation species in the area include banana trees, Cedar, mango and ornamental plants. The changes of the land use of the area will have significant negative impacts on those fauna.

This impact is considered negative, long term and of high significance.

6.5.4 Loss of Aesthetic Value of the Area

The clearance of area to be occupied by buildings and their respective parking areas and onsite roads and paths will produce debris/spoils materials. Haphazard disposal of waste generated

from clearance and excavation works may degrade / cause pollution and loss of aesthetic value of the receiving areas.

This impact is considered negative, medium-term and of high significance.

6.5.5 Noise Pollution due to Movement of Construction Equipments

Movement of trucks loaded with construction materials such as sand and aggregates, cement, steel and roofing sheets etc. will generate noise. Furthermore, anthropogenic noise sources are associated with constant human activities in the area, particularly from motor vehicles. The noise levels measure in towns is usually around 50 to 55 dB during the day and 40 to 45dB during the night. Therefore, it is expected that given the size of the proposed centre, average day time noise level will be around 53dB and 43dB at night.

This impact is negative, cumulative and short term of medium significance.

6.5.6 Vehicular Traffic due to Transportation of Materials and Equipments

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 (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.

Moreover, containers with silo equipments will be transported from Dar es Salaam port to the Mbozi Site. However, there will not be any regular traffic congestion due to movement of these container vehicles.

This impact is negative, cumulative and short term of medium significance.

6.5.7 Damage to Structure nearby the Site due to Vibration

Vibration impact during the construction phase will predominately emanate from earthworks and the erection of structures and will be short term in nature.

The effects of vibration can vary according to a number of factors including: the magnitude of the vibration source, the particular ground conditions between the source and receiver, the foundation-to-footing interaction and the large range of structures that exist in terms of design (e.g. dimensions, materials, type and quality of construction, and footing conditions). The intensity, duration, frequency and number of occurrences of a vibration all play an important role in both the annoyance levels caused and the strains induced in structures.

This impact is negative and short term of medium significance.

6.5.8 Air Pollution due to Dust and Smoke from Earth Moving Equipments

Construction machinery and project vehicles will release exhaust emissions, containing carbon monoxide (CO), sulfur dioxide (SO_2), oxides of nitrogen (NO_X), and particulate matter (PM). These emissions can deteriorate the ambient air quality in the immediate vicinity of the project sites. 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 to construction workers and the nearby communities.

This impact is considered negative, short term and of high significance.

6.5.9 Soil and Water Contamination

The contractors' materials storage area/workshop will generate waste oils, oily rags, and other similar wastes. Also it 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 aquatic flora and fauna.

This impact is considered negative, short term and of high significance.

6.5.10 Soil Erosion due to Inadequacies in Backfilling and Resurfacing

The project site is sloping southern part of the site with very small storm water gullies and therefore it is prone to soil erosion. Also certain construction activities can potentially soil erosion at the proposed sites particularly during the rainy season. Soil erosion can potentially affect the integrity of the existing and proposed buildings at the sites and can also affect the trees and natural vegetation of the area.

Also if the backfilling and resurfacing will be inadequate and not done in accordance with the design instructions, it may result into erosion.

This impact is considered negative, long term and of high significance.

6.5.11 Increased Employment, Income, Skills and Knowledge to Local Labours

Labour force comprising skilled and unskilled labours will be needed to construct the centre. It is estimated that 50 (40 male and 10 females) workers will be employed during construction. It is anticipated that all unskilled labourers will be recruited locally. Recruitment of skilled labour will vary; some from the area residents but mostly people of the contractor's choice. Employment opportunities during construction work will increase the income, skills and knowledge to local labour force. Mostly men will benefit in this respect. Food vendors who are mostly women will benefit through supplying of food to the labourers.

This impact is considered positive, short-term and of moderate significance.

6.5.12 Safety Hazards and Health Impacts of Construction Workers

The flat bottomed six (6) steel silos will be constructed on the base a concrete in which ventilation channels will be obtained. The pre-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 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, excavation, filling operations and demolition of structures. These activities may pose some safety hazards to

the local population. Stockpiling of construction material in all sites and debris from the demolished structure may cause serious accident to the construction worker 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, may cause lots of accidents at construction sites.

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 result in injury to the head, eyes, and extremities.

Unhygienic condition and unavailability of safe drinking water for the construction staff will expose them to health risks.

In summary during construction of warehouses and silos, workers will be subjected to situations that could be detrimental to their health and safety. A few examples include:

- Injuries/death due to fall of worker or parts from high heights
- Injuries caused by handling of construction equipment, spills and leakage of hazardous materials.
- Emissions of dust from clearing and excavation works and fumes from vehicles and other machinery
- Noise from construction equipment

This impact is considered negative, short-term and of high significance.

6.6 OPERATION PHASE

During operation of the centre it is anticipated that there will be both negative and positive environmental, social and economic impacts.

6.6.1 Increase Employment and the Development of Skilled Labour

It is envisaged that the Grain Storage Facilities will provide employment opportunity to Tanzanians and promote human resource development. During operation there will be 13 workers during normal operation period and about casual 300 labourers during peak season.

This impact is considered positive, long-term and of high significance.

6.6.2 Health hazards to Workers / Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring

Availability of resource, proper management and monitoring of the project is considered to be of primary importance as far as project operation and hygiene is concerned. Apart from external condition that may cause the unavailability of the resources, the project developer is responsible to ensure that all bills are paid to suppliers to ensure availability of resources. Failure to do so will result into the inefficiencies in operation of the project components. Also environmental impacts may arise due to inadequacies in the organisational, operational, maintenance, management and monitoring aspects of the entire project operation system.

Maintenance of Building/Sanitation Facilities

Lack of inadequate financial resources for maintenance will inevitably affect the smooth operations of the Grain Storage Facilities. During peak season the site is populated with about 300 people. Inadequate number of sanitation facilities will pose health risks to workers as well as surrounding communities as people can opt to serve themselves in the surrounding areas.

Scarcity of Water Supply

Mbozi site is connected to Vwawa town water supply network; water is available with little water shortage. The site serves 13 workers during normal operation period and is populated with about 300 labourers during peak season and water shortage impairs their hygiene and health conditions. During normal operation period water demand is estimated to be 1,000 L per day while during peak season water demand is estimated to be 10,000 L per day. Water is used for domestic and other sanitation activities.

To complement the existing supply the project will also obtain water from the borehole to be established at the site. There will be an overhead reservoir tank of 100,000L.

Availability of water is considered to be of primary importance as far as hygiene at the Mbozi Depot is concerned. Inadequate water supply or supply of poor quality water will expose the staff to health risk.

Lack of Energy/ Electricity

Mbozi site is connected to the national grid system. There is already existing 33kV HT line near the site. Silo complex proposed, requires power between 500 kVA to 800 kVA. Storage in silos is of power sensitive systems; therefore, the design has considered a standby power supply as an alternative during power blackouts. Based on the general requirement of the proposed facilities, existing facilities and using a diversity factor, one 810 kVA Standby Generator (Prime rated) will be installed to cater for the standby/ back-up electricity supply.

Electricity is necessary to ensure that the project and associated facilities are operating in perfect conditions. Lack of electricity will have severe consequence to operation of the grain storage facility.

Personnel

Lack of expertise of running the facility will mean that the safety measure put in place will be ineffective. Negligence, fatigue due to understaffing and long working hours may result in otherwise avoidable accidents. Poor remuneration not only results in low morale of the workforce but also to lack of concentration which may result in accidents.

By way of summary, impacts due to inadequacies in management and operation are:

a) Hazards to health/safety of workers and the public due to frequent accidents
b) Damage to structures and property
c) Increased service delivery costs
d) Pollution of soil and general environment
e) Leakage to pipes and tanks

These impacts are negative, long term and of high significance.

6.6.3 Health Hazards to Users and Workers/Soil and Water Pollution due to Inadequate Waste Disposal

The predominant type of solid waste at the project site includes pesticides containers (3 containers per week), papers (0.5kg/day) and other unwanted materials that are usually buried or burned locally. Currently, these wastes are burned or buried onsite.

During construction waste will include cleared rubble materials wooden off-cuts, glass, plastics etc). All solid wastes will be dumped in approved dumpsites and in accordance with the regulations.

The expansion will result into generation of pesticides containers (6 containers/day), papers (0.5kg/day), organic waste from kitchen (5kg/day); residue from silos cleaning (4kg/month).

Solid waste will be though bins that will be strategically located onsite. The collected waste will then be delivered to designated collection area before final disposal. Empty chemical containers will be collected and stored at the Chemical storage room waiting final disposal.

The area is within the jurisdiction of the Mbozi District Council and Vwawa Township Authority, which has the responsibility of disposal of waste. Vwawa Township Authority has five areas designated for collection of waste. The waste is usually collected by waste collection groups using large trolleys that send the collected waste to centralized areas. From the centralized areas, the Council use a hired tractor with Trailer to send all collected waste to disposal to the dumpsite located at Miti Upepo which is 5km from the town centre.

Pesticides empty containers will be disposed as per TPRI and NEMC guidelines as they may contain hazardous material. Sound waste management systems will be provided in the anticipated impacts and the EMP. The proponent will do the best to reduce, reuse and recycle waste from the source and also get in touch with enterprises dealing with recycling to collect the segregated waste in the proposed project.

The wastewater from washrooms, canteen and kitchen will be disposed onsite using septic tank and soak away pit. It is estimated that the project produce wastewater amounting to 800 L per day during normal operations period and 8,000 L per day during peak season.

Although the project will incorporate a comprehensive solid waste and wastewater collection and disposal system, during the operation of the planned components overloading and overflowing of waste and lack of maintenance especially for the sewage system may result in inadequate management of waste that will result into Health hazards to workers and users of the facilities.

These impacts are negative, long term and of high significance.

6.6.4 Safety Hazards and Health Impacts to Workers during Operation

During operation, workers and occupiers will be exposed to different situations that could be detrimental to their health and safety. These may include electrocution, fall, cuts and other body injuries.

The storage and handling of agro-chemicals for fumigation, spraying and dusting activities can harm workers if done inappropriately. Poor handling can cause skins irritation or burns. Also

workers responsible for fumigation activities will particularly be exposed to the fumigants which may cause severe respiratory irritation.

Safety hazards and health impact may also include ergonomic hazards in the office environment and from manually lifting of grain bags.

Unhygienic condition and unavailability of safe drinking water for workers will also expose them to health risks.

This impact is considered negative, long term and of high significance.

6.6.5 Air Emission from Operation Activities and Equipment

The silos will be equipped with several ancillary facilities like commercial scale grain dryer; commercial scale fumigation system; mechanical handling system; generator as power back up system. Carbon dioxide (CO_2), Nitrogen Oxide (NO_x) and Sulfur dioxide (SO_x), Suspended Particulate Matter (SPM) will be the typical pollutants which are expected from the operation of these equipment.

These emissions can deteriorate the ambient air quality in the immediate vicinity of the project sites. These emissions pose health hazards for the workers and nearby communities.

In storage of food grains during operation of warehouses and silos, aluminium phosphide (AP), will be used as a fumigant to prevent infestation so that the warehouse and silo complex will not be cross contaminated. Also other pesticides will be sprayed during the operation. The spraying activities will cause emission of gases such as Phosphine gas from aluminum phosphine granules.

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 workers may be exposed to phosphine.

This impact is considered negative, long term and of high significance.

6.6.6 Noise Pollution and Vibration

The operation and maintenance activities (running of motors, conveyor belts, bag filters, dryers, generator and others) at the Warehouse and silos complex and vehicular traffic during unloading and loading of grains will generate noise and vibration which are likely to affect the workers and nearby communities.

This impact is considered negative, long term and of high significance.

6.6.7 Vehicular Traffic due to Delivery and Dispatch of Grains

Transportation of food grain to and from warehouse and silos complex will cause additional traffic on the access routes. This increased traffic can also pose safety hazards for the nearby population particularly children.

This impact is considered negative, long term and of high significance.

6.6.8 Aesthetic Value due to Installation of Silos

The project will install six (6) silos at the site each with an overall height of 23.9m. Presence of silos may potentially affect the aesthetic value of the area.

This impact is considered negative, long term and of medium significance.

6.6.9 Spread of HIV/AIDS and STIs due to Social Interaction

The social interaction including intimate interaction may not be ruled out. This is a potential source for the spread of HIV/AIDS. Considering the nature with which HIV/AIDS is contracted and spread, this makes a significant contribution to the pandemic. The local people especially youth and women are the most venerable group to that social interaction due to their social economic background.

These impacts are negative, long term and of high significance.

6.6.10 Losses of Property/Lives or Injuries due to Fire Break out

The proposed project will be prone to fire hazards because of different types of combustible materials e.g. emitted Phospine gas from use of aluminum phosphine granules during fumigation which can form explosive mixtures with air and also self-ignite; and electrical fault that is by large the main culprit of fire accidents in buildings in Tanzania. The components of a fire are fuel (combustible substance like gas that will be used for cooking purposes in restaurants kitchens), heat and oxygen. Unless all three are present fire will not occur. Fire can cause effects such as loss of lives, serious Injuries and Loss of properties etc.

This impact is negative, long term and of high significance.

6.6.11 Benefits to Farmers due to Increased Grain Market

Currently the Mbozi site has the total storage capacity of 17,000 MT. The proposed expansion will raise the storage capacity to 37,000 MT which is almost three times the current capacity. Since NFRA procures grains mainly maize from various individual and AMCOS, therefore the increase in storage capacity will result into increase in potential market to farmers.

This impact is considered positive, long term and of high significance.

6.6.12 Contributions to National Food Security from Increased Grain Storage Capacity

Tanzania has the potential for a strong agricultural based economy. This has been attributed to Tanzania's heavy dependence on rain fed agriculture which most times have been unreliable. NFRA, being the grain storage agency, therefore contributes positively to national food security through sustainable grain storage. The proposed increase in the storage capacity of Mbozi Depot will ensure food security not only at national level, but at the region as well.

This impact is considered positive, long term and of high significance.

6.7 DECOMMISSIONING PHASE

The Grain Storage Facilities infrastructure might remain in operation for many years provided maintenance of the facility is given due attention. However, even if maintenance is done as it should, a time will come when the facility may be dilapidated and deemed unsuitable for proposed operations. This is what is meant by decommissioning phase. Abandoned of the proposed project may also set in anytime due to financial challenges, high operating costs, decision of the investor to change the line of business etc. If this happens environmental as well as socio-economic impacts may occur.

6.7.1 Loss of Aesthetic Value due to Abandonment of Infrastructure

The proposed project is planned to run for a long time unless there happens unforeseeable events which may curtail the project life span. Developer may abandon buildings and other project facilities that may permanently render the project site unattractive.

This impact is considered negative, long-term and of high significance.

6.7.2 Air and Noise Pollution from Demolition Activities

In closure of the project the proponent may decide to demolish the structures. Solid waste, dust and noise are expected from demolition works of the structures.

This impact is negative, short term and of high significance

6.7.3 Loss of Aesthetics/Contamination and Impaired Environment due to Haphazard Disposal of Demolished Waste

Loss of aesthetics may result from the demolished waste remaining on site for a long time to the extent of becoming an eyesore. Also haphazard disposal may cause contamination/impaired quality of the receiving body such as land.

These impacts are considered to be negative, short/medium term and of high significance.

6.7.4 Loss of Employment to Workers

If for whatever reason the project is closed down, the people employed by the project will lose their jobs. This will have significant impact to these people and their dependants.

This impact is negative, long term and of high significance.

6.8 SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR SIGNIFICANCE

Table 6.2 presents some of the known and foreseeable impacts of the project. They range from potential impacts of site acquisition, mobilization of materials/construction equipments, construction/installation, operations and decommissioning.

Table 5.1: Methodology/Criteria for Impact Analysis on Magnitude/Significance

Table 6.2: Impact Summary

Phase	Potential Direct Impacts	Significance Value
SITE SELECTION	Change in Landscape of the area	Negative, long-term and of high significance
DESIGN	Risk of Flooding and Inundation	Negative, long term and of high significance.
	Health hazards to Workers and Training Attendees / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management	Negative, long term and of high significance
	Health Impacts /Loss of Authentic of the area due to Haphazardly Management of Waste	Negative, long term and of high significance
MOBILIZATION / CONSTRUCTION	Depletion /Degradation at Points of Source of Construction Materials	Negative, cumulative and long term of medium significance
	Benefit to Local Producers and Suppliers of Construction Materials	Positive, short term and of moderate significance
	Loss of Vegetation	Negative, long term and of high significance
	Loss of Aesthetic Value of the Area	Negative, medium-term and of high significance
	Noise pollution due to Movement of Construction Equipments	Negative, cumulative and short term of medium significance
	Damage to Structure nearby the Site due to Vibration	Negative and short term of medium significance.
	Air pollution due to dust and smoke from Earth Moving Equipment	Negative, short term and of high significance
	Vehicular Traffic due to Transportation of Materials and Equipment	Negative, cumulative and short term of medium significance.
	Soil and Water Contamination	Negative, short term and of high significance.
	Soil Erosion due to Inadequacies in Backfilling and Resurfacing	Negative, long term and of high significance
	Income, Skills and Knowledge Increase to Local Labours	Positive, short-term and of moderate significance
	Safety Hazards and Health Impacts of Construction Workers	Negative, short-term and of high significance
OPERATION	Increase Employment and the Development of Skilled Labour	Positive, long-term and of high significance
	Health hazards to Workers / Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring	Negative, long term and of high significance
	Health Hazards to Users and Workers/Soil and Water Pollution due to Inadequate Waste Disposal	Negative, long term and of high significance

Phase	Potential Direct Impacts	Significance Value
	Safety Hazards and Health Impacts to Workers during Operation	Negative, long term and of high significance
	Air Emission from Operation Activities and Equipment	Negative, long term and of high significance.
	Noise Pollution and Vibration	Negative, long term and of high significance.
	Vehicular Traffic due to Delivery and Dispatch of Grains	negative, long term and of high significance
	Aesthetic Value due to Installation of Silos	Negative, long term and of medium significance
	Spread of HIV/AIDS and STIs due to Social Interaction	Negative, long term and of high significance
	Losses of Property/Lives or Injuries due to Fire Break out	Negative, long term and of high significance.
	Benefits to Farmers due to Increased Grain Market	Positive, long term and of high significance.
	Contributions to National Food Security from Increased Grain Storage Capacity	Positive, long-term and of high significance
DECOMMISSIONING	Loss of Aesthetic Value due to Abandonment of Infrastructure	Negative, long-term and of high significance
	Dust and Noise Pollution from Demolition Activities	Negative, short term and of high significance
	Loss of Aesthetics/Contamination and Impaired Environment due to Haphazard Disposal of Demolished Waste	Negative, short/medium term and of high significance
	Loss of Employment to Workers	Negative, long term and of high significance

6.9 CONSIDERATION OF PROJECT ALTERNATIVES

In analyzing the environmental impacts, there are usually two or more development alternatives to consider for each issue. The alternatives may encompass a wide range of consideration and can represent a choice between the construction and operation of a development and the non development option.

With this in mind, the general principle involved in identifying the option(s) of the proposed Grain Storage Facility is to ensure that the option chosen would result in optimal social, economic and environmental returns. In effect the option chosen should corroborate well not only for the developer, but also for the environment and stakeholders in the area. The option with the highest cost benefit factor, the most technically feasible and with least residual impact is identified as the preferred option.
Alternatives in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- The property on which or location where it is proposed to undertake the activity;
- The type of activity to be undertaken;
- The design or layout of the activity;
- The technology to be used in the activity; and

- The operational aspects of the activity.

For the proposed development the following alternatives have been considered:

6.9.1 Alternatives Site

The ADB EIA Guidelines, Annex 2 (1992) states that "*project options should be provided within the constraints of the aim and broad economic, technical and environmental factors*". In the context of this study therefore the choice of site has been dictated by the following the factors:

a) The land earmarked for the proposed expansion legally belongs to NFRA. Already there are existing facilities in the area. The area still has enough space to accommodate the proposed expansion and therefore alternative site was not considered.
b) The site is connected with utilities such as electricity. Water connection from SUWSSA is also not far from the area
c) The site is easily accessible through the Mbozi-Tunduma Highway which connects with Vwawa Township road that leads to the project site and therefore it will be easy for transportation of construction materials to the site as well as easy accessibility during its operation.

6.9.2 Alternatives Storage Facilities

Whilst the choice of grain storage methods is wide, the most popular ones are steel silos, concrete silos, storage warehouses and bag silos among others. Among the four popular methods steel silos has more advantages than the other three as follows:

<u>Advantages of using steel silos for grain storage instead of storing the grain in warehouses</u>
Grain storage in silos is vertical, while the storage of grain in warehouses is horizontal. Using steel silos to store the grain instead of using warehouses provides many advantages:

- Steel Silo facility requires less ground space, which is important if space is not available or if its cost is high.
- With steel silo it is easy to keep the optimum storage conditions for the grain, by controlling the temperature, insects, mould, birds, which in long term storage facilities could result in an important economic loss.
- The third advantage consists of lower costs than that incurred from using warehouses, which entails the automation of the grain transport equipment. The loading as well as the unloading can be completely automated using a SCADA system and at a lower cost.
- Steel silo has lower assembling costs, since this element is designed specifically for this purpose and weighs less than a storage facility.
- Steel silo is less expensive overall, and this is probably the main advantage in comparison to grain warehouses.

<u>Advantages of a Steel Silo vs. a Concrete Silo for grain storage</u>

Production process

- All steel silo parts are manufactured in a factory, so the quality can be totally controlled, whereas cast in place concrete silos involve more variables such as concrete delivery and weather. The customer has to bear in mind that useful life of concrete before use is less than 2-3 hours. After this period, concrete start losing its optimal characteristics.

Design

- The slip frame concrete process is further complicated by the fact it is a dynamic or continuous process. Rebar placement, concrete quality, etc., all affect the final product. Also, field supervision plays a really serious role in concrete silos: more people working on site, longer period of commissioning (due to weather conditions) and, ultimately, higher costs.
- Concrete silos can be taller than steel silos but these ones have bigger diameters so the total capacity is highest. For this reason concrete silos are only more suitable when the space is really limited.
- It is easier to erect steel silos and also to install accessories like doors, ladders, samplers, etc.
- Steel structure is more flexible, so steel silos have better behavior in case of earthquake.
- Regarding airtight, both structures are normally airtight if the openings are properly sealed.

Price

- Steel silos generally give greater storage capacity per dollar. They tend to be more cost-effective because of the higher storage capacity.

Aeration

- It is easier and more effective to do aeration in steel silos. Aeration horsepower is a non-linear function of grain depth. It is often impossible or impractical to provide the same airflow in tall concrete silos that could be obtained in shorter and wider silos (the case of steel silos). A higher grain depth also leads to a higher heat of compression in the aeration system. This means it takes a lower outside temperature to achieve the same grain temperature, making early aeration more difficult.

Foundation

- Steel silos do not require the soil to be as firm in order to support the weight of the structure. Sometimes steel silos can be built on land that doesn't have the higher load-bearing capacity needed for concrete.

<u>Advantages of using a Steel Silo over a Bag Silo for Grain Storage</u>

Bag silos are a cheap solution for grain storage but its use has some limitations and disadvantages over the storage in steel silos. Here are some of the advantages of using a steel silo over a bag silo for grain storage:

a) *Steel silos keep the grains safe longer*
   Steel silos can be equipped with complete temperature control and ventilation system that guarantees the maintenance of the grain in good conditions. That is not possible when using bag silos, therefore they are not suitable for long term storage.

b) *Greater storage capacity in a much smaller area*
   Another disadvantage of the bag silo is its limited unitary capacity. A bag silo is not often bigger than 200 Tons, and since it is a horizontal type of storage, it requires a large land area, while steel silos, due to their vertical arrangement, allow greater storage capacities in a much smaller land area.

c) *Recommended to store high moisture grains*
   Bag silos are not recommended to store high moisture grains, due to the problem of fermentation. Fermentation produces grain overheating with the inevitable loss of quality. Besides, while the grains get into the bag silo, a big amount of oxygen is expelled and therefore the grain is stored in an environment full of carbon dioxide. This lack of oxygen

favors the grain fermentation and its damage. We shouldn't forget fermentation is an anaerobic process as it happens without oxygen.

d) *Steel silos avoid humidity problems in the case of rain*
Another disadvantage of bag silos over steel silos is the frequent breakage of the plastic film, whether it is by rodent attacks or any mechanical equipment working nearby, and therefore producing humidity problems, in case of rain.

e) *Easier to unload*
It is difficult to unload the grain from a bag silo, entailing grain damage or losses when falling on the ground. On the contrary, a steel silo can be equipped with different unloading conveying systems, according to the type of grain and the capacity required.

For the reasons above, the use of steel silo is justified more than the use of concrete silos, warehouses or bag silos.

6.9.3 No-Project Alternative

The "No-action" alternative or non development option is usually discussed as an option in the EIA process. However, this alternative is difficult to consider as a viable option due to the pre-existing investments which have been incurred by the proponent. One of the most costly investments that have been incurred prior to project approval is land ownership and the design costs.

The initial investments already incurred are the primary reason for the no action alternative not to be found economically feasible. This option would result in the loss of investment capital, and the loss of economic opportunities such as employment generation and supply of construction materials etc. However, the EIA as a planning tool is considered critical for the determination of potential negative impacts, mitigation measures and as an important part of the process of identification of best technology for the project.

If the proposed Grain Storage Facilities is not constructed, the opportunity to improve the storage capacity of NFRA which in turn will enhance market to famers and entrepreneurs will be foregone.

CHAPTER SEVEN: MITIGATION MEASURES

Chapter six above has identified the potential impacts and their significance. This section provides a summary of possible mitigation measures of those impacts, which are considered of moderate to high significance.

7.1 SITE SELECTION PHASE

7.1.1 Change of Landscape of the Area

To mitigate this impact the developer

- Shall engage experts in landscaping, also topsoil will be levelled; grass and trees and plants will planted to all unpaved areas and parking areas.
- Indigenous vegetation and trees in areas that will not be impacted by the project shall not be disturbed
- Rehabilitation by planting trees, grasses and ornamental plants to all areas that will not be occupied by buildings on the project site
- Avoid planting non-native and exotic species on the site

7.2 DESIGN PHASE

7.2.1 Risk of Flooding and Inundation

- Appropriate drainage system will be included in the facility design
- The site selected for the facilities will be sufficiently higher than the maximum water level during high tides and storm surges.
- Appropriate raising of the foundations will be carried out if the available sites are not currently at the appropriate level.

7.2.2 Health hazards to Workers and Users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management

The project shall:

<u>Water</u>

- Ensure adequate supply of water by drilling borehole onsite.
- Consider harvesting rain water
- Put in place water saving measures including an Education, Information, and Communication (EIC) package with " DO and DON'T"
- Continuously monitoring leakages of distribution pipelines and fixtures
- Pay annual fees for water use permit

<u>Energy</u>

- Institute standby generators and maintain it properly
- The design should consider use of low energy-consuming fluorescent
- Consider use of occupancy sensor light switches, which automatically turn on when people are present and turn off when they leave
- Enhance good day lighting and adequate ventilation in all buildings

Human and Financial Resource

- Recruit adequate number of staff for facilities operation
- Ensure availability of adequate resource particularly finance for running costs, maintenance, and other social services.

7.2.3 Health Impacts /Loss of Authentic of the area due to Haphazardly Management of Waste

Construction Waste

- To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials, for compaction and construction works.
- Instructions to contractor on handling of hazardous waste such as oils, lubricants and non combustible waste during construction process.

General Waste

- Introduction of waste disposal bins, warning notices, “DOs & DoNTs” etc posted at strategic points, through the Grain Storage Facilities area.
- No, on site burial or open burning of solid waste shall be permitted at the project premises.
- Developer shall make sure that they establish good and efficient solid waste and wastewater collection and disposal system within the premises by contracting to the licensed and experience waste management contractor.
- Appoint an environmental manager who will be responsible for day to day environmental management activities within the centre

Hazardous Waste

The disposal of hazardous waste and chemicals in Tanzania has to be done after obtaining disposal permit from National Environment Management Council (NEMC). There is a national Chemical Advisory Management Committee (CMAC) which was formed to advice the council on the appropriate ways of dealing with disposal of hazardous/chemical waste. The committee comprises of various members from different institutions.
The procedure for disposal permit is as follows:

- The waste generator or its consultant will have to lodging an official application to NEMC requesting the disposal permit
- After the application, the CMAC will visit the site to inspect the chemical/hazardous waste storage area and carry out analysis of the waste
- CMAC will convene meeting to discuss on the best option that can be used to disposal chemical/hazardous waste depending on its nature and provide recommendation on the disposal method
- During the disposal as per recommended methods, CMAC will supervise the process
- Finally upon proof that the waste was disposed as per recommendation, the waste generator will be issued with the certificate

Note: The waste generator will meet all the disposal costs including costs for the CMAC visit, meeting cost and disposal at the recommended facility.

Proponent is therefore advised to follow the procedure outlined above for disposal of its hazardous waste including empty ink containers.

7.3 MOBILIZATION/CONSTRUCTION PHASE

7.3.1 Depletion /Degradation at Points of Source of Construction Materials

Developer/Contractor shall procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.

7.3.2 Loss of Vegetation

To mitigate the impacts the project design shall ensure that:

- Indigenous vegetation and trees in areas that will not be impacted by the project shall not be disturbed
- Rehabilitation by planting trees, grasses and ornamental plants to all areas that will not be occupied by buildings on the project site
- Avoid planting non-native and exotic species on the site

7.3.3 Loss of Aesthetic Value of the Area

To mitigate the impacts the contractor

- Shall use the debris in the compaction and construction of the foundations for the structures
- Solid waste should be collected at different points (transfer station), which must be established inside the project compound before final disposal.
- Put in place as many waste bins as possible to discourage uncontrolled waste disposal.

7.3.4 Noise Pollution due to Construction Activities

- Working hours for construction activities within/near the communities will be limited to between 6am and 6pm.
- Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities
- Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution.
- Provided and sensitize use of ear plugs

7.3.5 Vibration Impact

- Silo facility foundation shall be designed to minimize vibration effect.
- Use of equipment designed with vibration control elements will be adopted where necessary.
- Construction work will be carried out in day hours only

7.3.6 Vehicular Traffic due to Transportation of Materials and Equipment

- Transportation and equipment and material will be astutely planned to avoid traffic congestion and other associated problems.
- Speed limits will be enforced for the Project vehicles.
- Safety signage should be placed at the work sites.

7.3.7 Air Pollution due to Dust and Smoke from Earth Moving Equipment

To mitigate this impact measure of control of exhaust emissions shall take place during project implementation which includes:

- Water shall be sprayed on unpaved surfaces used by such equipments to suppress dusts during construction
- Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke.
- Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use.
- Routine Inspection of equipments.
- Contractor to ensure compliance with the standard for ambient air quality.

7.3.8 Soil and Water Contamination

- The contractors will assign specific place for waste collection during construction
- 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, broken/used parts, etc.) will be sold to recycling contractors.
- Domestic solid waste from the construction site will be disposed through Vwawa Township Authority waste disposal system so as not to cause soil contamination.
- The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations.

7.3.9 Soil Erosion due to Inadequacies in Backfilling and Resurfacing

In order to mitigate soil erosion tendencies the following shall be done:

- After construction the site will be backfilled and resurfaced as per engineering design and procedure of which a minimum requirement of compaction strength is achieved during construction.
- Embankments and excavated slopes will not be left untreated /unattended for long durations. Appropriate slope stabilization measures will be taken per the design (eg, stone pitching).
- Light compaction to stabilize the soil.

7.3.10 Safety Hazards and Health Impacts of Construction Workers

In order to mitigate potential health and safety impact especially during construction, the contractor and developer management shall do the following:

- Register the site with Occupational, Safety and Health Authority (OSHA)
- The contractors will prepare site specific Health, Safety and Environment (HSE) Plan
- Use of water sprinklers to suppress excessive dust during construction
- Provide proper personal protective gear such as boots, masks, coats, and gloves for workers and enforce its use
- The construction sites will have protective fencing to avoid any unauthorized entry.
- Provide health and safety training to workers upon employment;
- Provide first aid services
- An 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.

- Availability of safe drinking water will be ensured for the construction staff.
- Notify OSHA on the actual day of commencing the project so that the statutory inspections; general workplace inspection, electrical safety inspection, and industrial hygiene survey to the workplace can be carried out.
- Formulate the Health and Safety Committee
- Occupational Health and Safety Risk Assessment
- Notify OSHA of closure or change of workplace project after completion of construction.

7.4 OPERATION PHASE

7.4.1 Health hazards to Workers and customers/ Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring

- Construction of underground and installation of overhead water storage tank to harvest rainwater should be considered.
- Whenever possible the standby generator will be instituted
- Recruitment of adequate number of staff
- Availability of adequate resource particularly finance for running costs, water and other social services.
- Institute standby generator adequately to serve the facility especially Silos during power outage.
- Consider harvesting rain water
- Put in place water saving measures including an Education, Information, and Communication (EIC) package with " DO and DON'T"
- Continuously monitoring leakages of distribution pipelines and fixtures
- Pay annual fees for water use permit
- Availability of adequate resource particularly finance for maintenance
- Regular maintenance schedule of the structures should be put in place
- Proper operational and monitoring procedures should be put in place

7.4.2 Health Hazards to Users and Workers/Soil and Water Pollution due to Inadequate Waste Disposal

- Appropriate treatment and disposal system, such as septic tanks and soaking pits, having adequate capacity will be constructed.
- Storm water will be handled by V-shaped concrete drain that will be constructed in the compound and direct to public channel along the road.
- Introduction of waste disposal bins, warning notices, "DOs &DoNTs" etc posted at strategic points, through the Grain Storage Facilities area.
- No, on site burial or open burning of solid waste shall be permitted at the project premises.
- 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, broken/used parts, etc.) will be sold to recycling contractors.
- Domestic solid waste from the construction site will be disposed through Vwawa Township Authority waste disposal system so as not to cause soil contamination.
- The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations.
- Appoint an environmental manager who will be responsible for day to day environmental management activities within the site

7.4.3 Safety Hazards and Health Impacts to Workers during Operation

- Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals.
- Provide staff with appropriate and adequate personal protective equipment including gloves, coveralls, safety goggles, respirators and helmets
- Install first aid facilities in all places
- Making sure that code of practices is observed
- Observe minimum working duration in hazardous areas
- Provide regular training to all staff on HSE matters especially new employees.
- Conduct medical monitoring for its workforce as per OSHA requirements.
- Formulate environmental, health and safety committee
- Prepare and execute an emergency preparedness and response plan to help manage fire incidences
- Warning signs e.g. “No smoking”, Switch off telephone, Switch of Engine, Car speed, fire extinguisher shall be posted all over the project area.
- Emergency Assembly Point shall be allocated
- Ensure proper light in working areas
- Using surfaces that can be easily decontaminated in the washrooms, kitchen and canteen
- Facilitating hand washing with the availability of sinks and alcohol hand rubs
- Controlling the effects of noise

7.4.4 Air Emission from Operation Activities and Equipment

- The steel silos to be constructed will have 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
- The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM
- Standard operating procedures will be formulated and followed to handle and use aluminium phosphide, and to prevent exposure to phosphine gas.
- Fumigate when the grain temperature is between 21 and 32°C.
- Level the grain below the vertical wall of the bins.
- Remove or break up any crust on the grain surface.
- Seal all cracks, making the bin as airtight as possible.
- Keep the bin closed and post warning signs until the gas concentration is below 0.3 ppm.
- DO NOT ENTER the bin during or after fumigation until gases have been reduced to safe concentrations (0.3 ppm).
- Provide respiratory masks to workers who fumigate the warehouse.
- Regular air quality for CO2, SPM, Sox and NOx shall be measure.
- Workers will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.

7.7.5 Noise Pollution and Vibration

- Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities
- Movement of all project vehicles and personnel will be restricted to within work areas, to
- Generator will be confined in a room to minimize noise and vibration impact
- Motors, conveyor belts, bag filters, dryers, generator will be properly maintained
- PPE (ear muffs or air plugs) will be provided to workers

7.4.6 Vehicular Traffic due to Delivery and Dispatch of Grains

- Proper plan for unloading and loading of grains during delivery and dispatch respectively will be developed and implemented
- Liaison will be maintained with the relevant authorities (such as traffic police) regarding the grain transportation particularly during emergencies.

7.4.7 Aesthetic Value due to Installation of Silos

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

7.4.8 Spread of HIV/AIDS and STIs due to Social Interaction

- Developer shall promote broad awareness and open discussion about HIV/AIDS in the community. Activities shall be undertaken to enable patients to learn about prevention and care.
- Respect for people affected by HIV/AIDS shall be promoted; gender stereotypes and discrimination/stigma against people with HIV/AIDS shall be actively opposed.
- Policies and practices regarding recruitment, health care, benefits, learning and others shall take into HIV/AIDS to the maximum extent possible.
- Developer shall designate an employee as a resource person on HIV/AIDS and support her to play her/his role effectively.
- Developer will work with relevant government institution e.g. TACAIDS and relevant NGO to promote awareness among community and staff on the threat of HIV/AIDS

7.4.9 Losses of Property/Lives or Injuries due to Fire Break out

- The architecture of the proposed building will ensure speedy evacuation in the eventuality of a fire. The hallways, corridors and exists from all the buildings will be of sufficient widths and dimensions to enable easy and speedy evacuation.
- Fire plan and evacuation plan will be in place
- The water reservoir specifically for fire fighting shall be installed.
- Fire extinguishers and reels will be placed at strategic locations in all buildings,
- Procedures to follow in emergency cases such as fire outbreak will be displayed along corridors and in public ways to ensure safe and speedy evacuation of personnel,
- Fire alarms will be installed at strategic places.
- All workers shall be educated about the fire hazards, fire fighting methods and precautionary measures against fire outbreak.
- Good housekeeping shall be maintained at all buildings to reduce the fire risk.
- “No smoking” signs shall be posted all over the building.

- Emergency assembly point shall be clearly marked.

7.5 DECOMMISSIONING PHASE

7.5.1 Loss of Aesthetic Value due to Abandonment of Structures

At decommissioning:

- Convert it to another use or sell the property and use the money for other activities
- Disassemble all equipments and demolish the structures in an environmentally sound manner to restore the environment into its original appearance.
- Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.

7.5.2 Loss of Aesthetics/Contamination and Impaired Environment due to Haphazard Disposal of Demolished Waste

- Metal parts will be sold or given free to smelters
- The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work.

7.5.3 Air pollution due to Dust Generation from Demolition Activities

- The site will be confined before demolition activities starts
- Developer shall provide and enforce the use of appropriate personal protective equipment (PPE)
- All active demolition areas will be watered at least twice a day to reduce dust.
- All trucks hauling demolition debris/wastes shall be covered.
- Exposed demolition debris of e.g. dust and sand, will be enclosed, covered, and watered daily before transported to disposal site.

7.5.4 Noise Pollution from Demolition Activities

- Use of equipment designed with noise/vibration control elements will be adopted where necessary.
- Trucks used during demolition exercise on site shall be routed away from noise sensitive areas in the neighborhood, where feasible.
- Idling time for pickup trucks and other small equipment will be minimized to limited time.
- Use of very noisy equipment will be limited to day time only.
- All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise.
- The demolition exercise will be limited at day time only

7.5.5 Loss of Employment to Workers

To mitigate this impact, the developer will ensure:

- Extensive training and preparations for workers for new /self employment.
- All employees are members of pension fund and the employer shall ensure that the fund contributions are made.

7.6 ENHANCEMENT OF POSITIVE SOCIO-ECONOMIC IMPACTS

7.6.1 Increased Employment Opportunities

Employment opportunities during construction and operation will increase the income, skills and knowledge to local labour force. Measures for enhancement of this positive impact shall be:

- Optimization of local employment (allocate jobs fairly among the locals through involvement of local leaders)
- Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers

7.6.2 Benefit to Local Producers and Suppliers of Construction Materials

Construction of Grain Storage facilities will consider the use of local contractors as well as local building materials available in Mbozi District. This will contribute to the boosting of income among local suppliers of materials, labourers and the economy of the country as a whole. Measures for enhancement of this positive impact shall be:

- Ensure procurement of construction materials from local source as much as possible
- Procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.

7.6.3 Enhanced Internal and External Grain Market Capacity for farmer and other Entrepreneurs

The project will improve internal grain market of farmers and other entrepreneurs. Measures for enhancement of this positive impact shall be:

- Increase buying centre to reach more farmers/AMCOS
- Farmers shall be offered with competitive prices as per season market

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 IMPACT MANAGEMENT PLAN

Plans for the implementation of mitigation measures for the proposed grain storage facilities project are provided below. The Plans indicate institutional responsibilities, time to take the action and estimated costs. The proposed costs are only indicative, should the proposed development proceed with the suggested changes, the developer will work out on actual costs and include them in the overall cost of the project. Based on the EMA, (2004), NEMC is required to ensure compliance of all the agreed conditions for authorization. The measures are given in Table 8.1. NFRA is committed to implement the Environmental and Social Impact management Plan (ESMP).

8.2 IMPLEMENTATION OF THE MANAGEMENT PLAN

The environmental and social mitigation measures incorporated in the detailed engineering design shall be handed over to the contractor during construction period. The Contractor shall take stock of the contents of the Environmental and Social Management Plan of the Project. The contractor shall implement the ESMP during the construction period under close supervision of NFRA. During the Operation Phase, NFRA will implement the ESMP. NFRA shall conduct inspection of the whole warehouses and silos everyday during operation phase.

8.3 ENVIRONMENTAL AND SOCIAL COST

The principal environmental and social cost includes the cost for implementing the mitigation measures proposed. These costs are indicated in Table 8.1. NFRA shall cover all the costs proposed in the ESMP.

Table 6.1: Environmental and Social Management Plan

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
SITE SELECTION	Change of Landscape of the Area	• Engage experts in landscaping, also topsoil will be levelled; grass and trees and plants will planted to all unpaved areas and parking areas. • Indigenous vegetation and trees in areas that will not be impacted by the project shall not be disturbed • Rehabilitation by planting trees, grasses and ornamental plants to all areas that will not be occupied by buildings on the project site • Avoid planting non-native and exotic species on the site	All affected area	Consultant Contractor NFRA	20,000,000
DESIGN PHASE	Risk of Flooding and Inundation	• Appropriate drainage system will be included in the facility design • The site selected for the facilities will be sufficiently higher than the maximum water level during high tides and storm surges. • Appropriate raising of the foundations will be carried out if the available sites are not currently at the appropriate level.	No flood	Consultant Contractor NFRA	50,000,000
	Health hazards to Workers and Users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management	<u>Water</u> • Ensure adequate supply of water by drilling borehole onsite. • Consider harvesting rain water • Put in place water saving measures including an Education, Information, and Communication (EIC) package with " DO and DON'T" • Continuously monitoring leakages of distribution pipelines and fixtures • Pay annual fees for water use permit	Adequate supply	Consultant Contractor NFRA	20,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
		Energy • Institute standby generators and maintain it properly • The design should consider use of low energy-consuming fluorescent • Consider use of occupancy sensor light switches, which automatically turn on when people are present and turn off when they leave • Enhance good day lighting and adequate ventilation in all buildings Human and Financial Resource • Recruit adequate number of staff for facilities operation • Ensure availability of adequate resource particularly finance for running costs, maintenance, and other social services.			
	Health Impacts /Loss of Authentic of the area due to Haphazardly Management of Waste	Construction Waste • To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials, for compaction and construction works. • Instructions to contractor on handling of hazardous waste such as oils, lubricants and non combustible waste during construction process.	Solid Waste Management regulations 2009 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009	Consultant Contractor NFRA	10,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
		General Waste • Introduction of waste disposal bins, warning notices, "DOs & DoNTs" etc posted at strategic points, through the Grain Storage Facilities area. • No, on site burial or open burning of solid waste shall be permitted at the project premises. • Developer shall make sure that they establish good and efficient solid waste and wastewater collection and disposal system within the premises by contracting to the licensed and experience waste management contractor. • Appoint an environmental manager who will be responsible for day to day environmental management activities within the centre Hazardous Waste Disposal of hazardous waste shall follow NEMC guidelines			
MOBILISATION/ CONSTRUCTION PHASE	Depletion /Degradation at Points of Source of Construction Materials	Developer shall procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.	Authorized source	Consultant Contractor NFRA	2,000,000
	Loss of Vegetation	• Indigenous vegetation and trees in areas that will not be impacted by the project shall not be disturbed • Rehabilitation by planting trees, grasses and ornamental plants to all areas that will not be occupied by buildings on the project site • Avoid planting non-native and exotic species on the site	All untouched areas are left intact All affected areas are replanted No exotic species	Consultant Contractor NFRA	30,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Loss of Aesthetic Value of the Area	• Shall use the debris in the compaction and construction of the foundations for the structures • Solid waste should be collected at different points (transfer station), which must be established inside the project compound before final disposal. • Put in place as many waste bins as possible to discourage uncontrolled waste disposal.	Solid Waste Management regulations 2009 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009	Consultant Contractor NFRA	5,000,000
	Noise Pollution due to Construction Activities	• Working hours for construction activities within/near the communities will be limited to between 6am and 6pm. • Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities • Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution. • Provided and sensitize use of ear plugs	Environmental management (standards for control of noise and vibration) regulations, 2015	Consultant Contractor NFRA	1,500,000
	Vibration Impact	• Silo facility foundation shall be designed to minimize vibration effect. • Use of equipment designed with vibration control elements will be adopted where necessary. • Construction work will be carried out in day hours only	Environmental management (standards for control of noise and vibration) regulations, 2015	Consultant Contractor NFRA	1,500,000
	Vehicular Traffic due to Transportation of Materials and Equipment	• Transportation and equipment and material will be astutely planned to avoid traffic congestion and other associated problems. • Adequately design the ingress and egress routes • Speed limits will be enforced for the Project vehicles. • Safety signage should be placed at the work sites.	As minimal traffic as possible	Consultant Contractor NFRA	5,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Air Pollution	• Water shall be sprayed on unpaved surfaces used by such equipments to suppress dusts during construction • Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke. • Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use. • Routine Inspection of equipments. • Contractor to ensure compliance with the standard for ambient air quality.	Environmental management Air quality standards regulation 2007	Consultant Contractor NFRA	6,000,000
	Soil and Water Contamination	• The contractors will assign specific place for waste collection during construction • 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, broken/used parts, etc.) will be sold to recycling contractors. • Domestic solid waste from the construction site will be disposed through Vwawa Township Authority waste disposal system so as not to cause soil contamination. • The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations.	Environmental Management (Soil Quality Standards) Regulations G.N.No. 239 of 2007	Consultant Contractor NFRA	10,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Soil Erosion due to inadequacies in Backfilling and Resurfacing	• After construction the site will be backfilled and resurfaced as per engineering design and procedure of which a minimum requirement of compaction strength is achieved during construction. • Embankments and excavated slopes will not be left untreated /unattended for long durations. Appropriate slope stabilization measures will be taken per the design (eg, stone pitching). • Light compaction to stabilize the soil.	No erosion	Consultant NFRA	30,000,000
	Safety Hazards and Health Impacts of Construction Workers	• Register the site with Occupational, Safety and Health Authority (OSHA) • The contractors will prepare site specific Health, Safety and Environment (HSE) Plan • Use of water sprinklers to suppress excessive dust during construction • Provide proper personal protective gear such as boots, masks, coats, and gloves for workers and enforce its use • The construction sites will have protective fencing to avoid any unauthorized entry. • Provide health and safety training to workers upon employment; • Provide first aid services	OHS Act No. 5 of 2003	Consultant Contractor NFRA	5,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
		• An 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. • Availability of safe drinking water will be ensured for the construction staff. • Notify OSHA on the actual day of commencing the project so that the statutory inspections; general workplace inspection, electrical safety inspection, and industrial hygiene survey to the workplace can be carried out. • Formulate the Health and Safety Committee • Occupational Health and Safety Risk Assessment • Notify OSHA of closure or change of workplace project after completion of construction.			
	Employment Opportunities	• Optimization of local employment (allocate jobs fairly among the locals through involvement of local leaders) • Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers	Labour standards	Contractor NFRA	3,000,000
	Benefit to Local Producers and Suppliers of Construction Materials	• Ensure procurement of construction materials from local source as much as possible • Procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.	As maximum as possible	NFRA Contractor	5,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
OPERATION	Health hazards to Workers and Users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring	• Construction of underground and installation of overhead water storage tank to harvest rainwater should be considered. • Whenever possible the standby generator will be instituted • Recruitment of adequate number of staff • Availability of adequate resource particularly finance for running costs, water and other social services. • Institute standby generator adequately to serve the facility especially Silos during power outage. • Consider harvesting rain water • Put in place water saving measures including an Education, Information, and Communication (EIC) package with " DO and DON'T" • Continuously monitoring leakages of distribution pipelines and fixtures • Pay annual fees for water use permit • Availability of adequate resource particularly finance for maintenance • Regular maintenance schedule of the structures should be put in place • Proper operational and monitoring procedures should be put in place	As efficient as possible	NFRA	40,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Health Hazards to Users and Workers/Soil and Water Pollution due to Inadequate Waste Disposal	• Appropriate treatment and disposal system, such as septic tanks and soaking pits, having adequate capacity will be constructed. • Introduction of waste disposal bins, warning notices, "DOs &DoNTs" etc posted at strategic points, through the Grain Storage Facilities area. • No, on site burial or open burning of solid waste shall be permitted at the project premises. • 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, broken/used parts, etc.) will be sold to recycling contractors. • Domestic solid waste from the construction site will be disposed through Vwawa Township Authority waste disposal system so as not to cause soil contamination. • The hazardous waste will be kept separate and handled according to NEMC Guidelines/Hazardous waste regulations. • Appoint an environmental manager who will be responsible for day to day environmental management activities within the site	Solid Waste Management regulations 2009 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009 Environmental Management (Soil Quality Standards) Regulations G.N.No. 239 of 2007	NFRA	5,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Safety Hazards and Health Impacts to Workers during Operation	• Material safety data sheet (MSDS) will be followed to handle Aluminium sulphide and other hazardous chemicals. • Provide staff with appropriate and adequate personal protective equipment including gloves, coveralls, safety goggles, respirators and helmets • Install first aid facilities in all places • Making sure that code of practices is observed • Observe minimum working duration in hazardous areas • Provide regular training to all staff on HSE matters especially new employees. • Conduct medical monitoring for its workforce as per OSHA requirements. • Formulate environmental, health and safety committee • Prepare and execute an emergency preparedness and response plan to help manage fire incidences • Warning signs e.g. “No smoking”, Switch off telephone, Switch of Engine, Car speed, fire extinguisher shall be posted all over the project area. • Emergency Assembly Point shall be allocated • Ensure proper light in working areas • Using surfaces that can be easily decontaminated in the washrooms, kitchen and canteen • Facilitating hand washing with the availability of sinks and alcohol hand rubs • Controlling the effects of noise	OHS Act No. 5 of 2003	NFRA	50,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Air Emission from Operation Activities and Equipment	• The steel silos to be constructed will have 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. • The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM • Standard operating procedures will be formulated and followed to handle and use aluminium phosphide, and to prevent exposure to phosphine gas. • Fumigate when the grain temperature is between 21 and 32°C. • Level the grain below the vertical wall of the bins. • Remove or break up any crust on the grain surface. • Seal all cracks, making the bin as airtight as possible. • Keep the bin closed and post warning signs until the gas concentration is below 0.3 ppm. • DO NOT ENTER the bin during or after fumigation until gases have been reduced to safe concentrations (0.3 ppm). • Provide respiratory masks to workers who fumigate the warehouse. • Regular air quality for CO2, SPM, Sox and NOx shall be measure. • Workers will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.	Environmental management Air quality standards regulation 2007	Consultant Contractor NFRA	20,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Noise Pollution and Vibration	• Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities • Movement of all project vehicles and personnel will be restricted to within work areas, to • Generator will be confined in a room to minimize noise and vibration impact • Motors, conveyor belts, bag filters, dryers, generator will be properly maintained • PPE (ear muffs or air plugs) will be provided to workers	Environmental management (standards for control of noise and vibration) regulations, 2015	Consultant Contractor NFRA	30,000,000
	Vehicular Traffic due to Delivery and Dispatch of Grains	• Adequately design the ingress and egress routes • Proper plan for unloading and loading of grains during delivery and dispatch respectively will be developed and implemented • Liaison will be maintained with the relevant authorities (such as traffic police) regarding the grain transportation particularly during emergencies.	As minimum traffic as possible	NFRA Contractor Police	2,000,000
	Aesthetic Value due to Installation of Silos	• Landscaping and tree plantation will be carried out at around silos. • Proper housekeeping will be regularly maintained at the facilities	Pleasant visual	NFRA	4,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Spread of HIV/AIDS and STIs due to Social Interaction	• Developer shall promote broad awareness and open discussion about HIV/AIDS in the community. Activities shall be undertaken to enable patients to learn about prevention and care • Respect for people affected by HIV/AIDS shall be promoted; gender stereotypes and discrimination/stigma against people with HIV/AIDS shall be actively opposed. • Policies and practices regarding recruitment, health care, benefits, learning and others shall take into HIV/AIDS to the maximum extent possible. • Developer shall designate an employee as a resource person on HIV/AIDS and support her to play her/his role effectively. • Developer will work with relevant government institution e.g. TACAIDS and relevant NGO to promote awareness among community and staff on the threat of HIV/AIDS	Number of HIV/AIDS cases	NFRA	7,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Losses of Property/Lives or Injuries due to Fire Break out	• The architecture of the proposed building will ensure speedy evacuation in the eventuality of a fire. The hallways, corridors and exists from all the buildings will be of sufficient widths and dimensions to enable easy and speedy evacuation. • Fire plan and evacuation plan will be in place • The water reservoir specifically for fire fighting shall be installed. • Fire extinguishers and reels will be placed at strategic locations in all buildings, • Procedures to follow in emergency cases such as fire outbreak will be displayed along corridors and in public ways to ensure safe and speedy evacuation of personnel, • Fire alarms will be installed at strategic places. • All workers shall be educated about the fire hazards, fire fighting methods and precautionary measures against fire outbreak. • Good housekeeping shall be maintained at all buildings to reduce the fire risk. • "No smoking" signs shall be posted all over the building. • Emergency assembly point shall be clearly marked.	As per OSHA requirements	NFRA, FIRE AND RESCUE FORCE	3,000,000
	Increased Employment Opportunity	• Optimization of local employment (allocate jobs fairly among the locals through involvement of local leaders) • Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers	Labour standards	NFRA	3,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Enhanced Internal and External Grain Market Capacity for farmer and other Entrepreneurs	• Increase buying centre to reach more farmers/AMCOS • Farmers shall be offered with competitive prices as per season market	As maximum as possible	NFRA	5,000,000
DECOMMISSIONING	Loss of Aesthetic Value due to Abandonment of Structures	• Convert it to another use or sell the property and use the money for other activities • Disassemble all equipments and demolish the structures in an environmentally sound manner to restore the environment into its original appearance. • Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.	To original state	NFRA	25,000,000
	Loss of Aesthetics/Contamination and Impaired Environment due to Haphazard Disposal of Demolished Waste	• Metal parts will be sold or given free to smelters • The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work.	Solid Waste Management regulations 2009 Environmental management Soil quality standards regulation 2007	NFRA	5,000,000

Phase	Impact	Management Measure	Target level/ Standard	Responsibility	Costs T.shs.
	Air pollution from Dust Generation from Demolition Activities	• The site will be confined before demolition activities starts • Developer shall provide and enforce the use of appropriate personal protective equipment (PPE) • All active demolition areas will be watered at least twice a day to reduce dust. • All trucks hauling demolition debris/wastes shall be covered. • Exposed demolition debris of e.g. dust and sand, will be enclosed, covered, and watered daily before transported to disposal site.	Environmental management Air quality standards regulation 2007	NFRA	1,000,000
	Noise Pollution from Demolition Activities	• Use of equipment designed with noise/vibration control elements will be adopted where necessary. • Trucks used during demolition exercise on site shall be routed away from noise sensitive areas in the neighborhood, where feasible. • Idling time for pickup trucks and other small equipment will be minimized to limited time. • Use of very noisy equipment will be limited to day time only. • All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise. • The demolition exercise will be limited at day time only	Environmental management (standards for control of noise and vibration) regulations, 2015	NFRA	1,000,000
	Loss of employment	• Extensive training and preparations for workers for new /self employment. • All employees are members of pension fund and the employer shall ensure that the fund contributions are made.	Labour standards	NFRA	Pension Funds contribution

CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MONITOING PLAN

9.1 INTRODUCTION

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. There are four types of monitoring that are also relevant to this EIA.

- **Baseline monitoring** – the measurement of environmental parameters during a pre-project period and operation period to determine the nature and ranges of natural variations and where possible establish the process of change.

- **Impact/effect monitoring***:* involves the measurement of parameters (performance indicators) during establishment, operation and decommissioning phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project. This monitoring provides experience for future projects and lessons that can be used to improve methods and techniques.

- **Compliance monitoring**: takes the form of periodic sampling and continuous measurement of levels of compliance with standards and thresholds – e.g. for waste discharge, air pollution.

- **Enhancement /Mitigation monitoring** aims to determine the suitability and effectiveness of mitigation programmes, designed to diminish or compensate for adverse effects of the project.

To ensure that mitigation measures are properly done, monitoring is essential. Table 9.1 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer shall be included in the project cost.

Environmental and social monitoring plan (Table 9.1) provides the application of ESMP as well as dealing with ad hoc or unforeseen issues which need to be mitigated. Detailed on parameter to be monitored have been considered along with costs estimates and responsible institution(s).

Table 7.1: Environmental and Social Monitoring Plan

Phase	Impact	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level/ Standard	Responsibility	Annual Cost Tsh
SITE SELECTION	Change in natural setting and landscape of the area	Landscape	Once before commissioning	Project area	NA	NA	NFRA Consultant	3,000,000
DESIGN PHASE	Health hazards to Workers and users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Management	Performance of the facilities	One every day	Project area	NA	Good performance record	NFRA	5,000,000
	Risk of Flooding and Inundation	Capacity of storm water drainage	Before Construction	Project Area		No flood	NFRA Consultant	3,000,000
	Health Impacts due to Haphazardly Management of Waste	• Quantity of waste generated • Waste management practices • Health of workers and users	Once every day	Company/ Tenants personnel file	Number Type of disease	Solid Waste Management regulations 2009 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009	NFRA Consultant	5,000,000
MOBILISATION/ CONSTRUCTION PHASE	Depletion /Degradation at Points of Source of Construction Materials	• Quantity of materials used • Source of construction materials • Level of degradation	Once every month	Quarry sites	Number and Visual	Authorized source	Consultant Contractor	5,000,000

Phase	Impact	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level/ Standard	Responsibility	Annual Cost Tsh
	Loss of Vegetation	Impacted area	During construction	Project area	m^2	As minimum as possible	Consultant, Contractor	5,000,000
	Loss of Aesthetic Value of the Area	• Waste management practices • Aesthetics	Once every day	Project area	Number and Visual	Solid Waste Management regulations 2009 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009	Consultant Contractor	5,000,000
	Noise Pollution	Noise level	Once every day	Project area	dB	Environmental management (standards for control of noise and vibration) regulations, 2015	NFRA Contractor	3,000,000
	Vibration Impact	Vibration	Once per week	Project area	Hz/, mm/s	Environmental management (standards for control of noise and vibration) regulations, 2015	NFRA Contractor	3,000,000
	Vehicular Traffic due to Transportation of Materials and Equipment	Traffic volume	Once per month	Part of access road adjacent to the project area	Number	As minimum traffic as possible	NFRA Contractor Police	2,000,000

Phase	Impact	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level/ Standard	Responsibility	Annual Cost Tsh
	Air pollution due to smoke and dust emission	Dust, NO_X, SO_X, PM, CO, CO_2	Once every week	Project area	ppm, mg/m^3, dB	Environmental management Air quality standards regulation 2007	NFRA	5,000,000
	Soil and Water Contamination	Soil and water quality, Oil and grease	Once every six months	Project area	ppm	Environmental management Soil quality standards regulation 2007	NFRA Contractor	5,000,000
	Soil Erosion due to inadequacies in Backfilling and Resurfacing	Soil erosion tendencies	Once every year	Project area	None	No erosion	Consultant Contractor	10,000,000
	Safety Hazards and Health Impacts of Construction Workers	• OSHA Registration • HSE Plan in place • Trainings provided • First aid in place • Accident reports • Availability of protective gears	Once every day	Construction site	NA	OHS Act No. 5 of 2003	Consultant, Contractor	5,000,000
	Employment Opportunity	Percentage of local construction labourers	During construction	Project area	Number	As maximum as possible	NFRA Contractor	1,000,000
	Benefit to Local Producers and Suppliers of Construction Materials	Number of suppliers and quantity of materials supplied	During construction period	Project area	Number/m^3 /L/ tons	None	NFRA Contractor	5,000,000
OPERATION	Health hazards to Workers and users / Poor Operation of the Facilities due to Inadequate Supply of Resources and Monitoring	Performance of the facilities	One every day	Project area	Good performance record	As efficient as possible	NFRA	3,000,000

Phase	Impact	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level/ Standard	Responsibility	Annual Cost Tsh
	Health Hazards to Users and Workers/Soil and Water Pollution due to Inadequate Waste Disposal	• Amount of waste • Diseased reported • Types and number of waste bins • Collection and disposal frequency • Soil and water quality • Oil and grease	Once every day	Project records	Number, ppm	Solid Waste Management regulations 2009 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2009 Environmental management Soil quality standards regulation 2007	NFRA	5,000,000
	Safety Hazards and Health Impacts to Workers during Operation	• OSHA Registration • HSE Plan in place • Trainings provided • First aid in place • Accident reports • Availability of protective gears	Once every day	Construction site	NA	OHS Act No. 5 of 2003	NFRA	5,000,000
	Air Emission from Operation Activities and Equipment	Dust, NO_X, SO_X, PM, CO, CO_2	Once every week	Project area	ppm, mg/m^3, dB	Environmental management Air quality standards regulation 2007	NFRA	5,000,000

Phase	Impact	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level/ Standard	Responsibility	Annual Cost Tsh
	Noise Pollution and Vibration	Noise and Vibration levels	Once every day	Project area	dB, Hz/, mm/s	Environmental management (standards for control of noise and vibration) regulations, 2015	NFRA Contractor	3,000,000
	Vehicular Traffic due to Delivery and Dispatch of Grains	Traffic volume	During delivery and dispatch of grains to and from the depot	Part of access road adjacent to the project area	Number	As minimum traffic as possible	NFRA Contractor Police	2,000,000
	Aesthetic Value due to Installation of Silos	Aesthetics of the area	During operation period	Project area	Visual	Pleasant visual	NFRA	4,000,000
	Spreading of HIV/AIDS and other STIs	Health status of workers	Once every three months	Health centre or hospitals surrounding neighbours	Number of HIV/AIDS cases	No or minimum HIV/AIDS victims	NFRA	25,000,000
	Losses of Property/Lives or Injuries due to Fire Break out	• Adherence to safety regulations • Availability of fire extinguishers • Position of fire extinguishers • Expiry of fire extinguishers	Once every month	Project records	number	As per OSHA requirements	NFRA, FIRE AND RESCUE FORCE	30,000,000
	Increased Employment Opportunity	Number of employments	During operation	Project area	Number	As maximum as possible	NFRA	3,000,000
	Enhanced Internal and External Grain Market Capacity for farmer and other Entrepreneurs	• Number of beneficiary • Amount of grain purchased	Once every six month	Project area	Number	As maximum as possible	NFRA	5,000,000

Phase	Impact	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Unit	Target Level/ Standard	Responsibility	Annual Cost Tsh
DECOMMISSIONING	Loss of Aesthetic Value due to Abandonment of Structures	Aesthetics of the area	Six months after decommissioning	Project area	Visual		NFRA	4,000,000
	Loss of Aesthetics/Contamination and Impaired Environment due to Haphazard Disposal of Demolished Waste	○ Level of contamination ○ Aesthetics of the area	Once after decommissioning	Project area	ppm, mg/kg; Visual	Solid Waste Management regulations 2009 Environmental management Soil quality standards regulation 2007	NFRA	15,000,000
	Air pollution from Demolition Activities	Dust level	During Decommissioning	Project area	ppm, mg/m^3	Environmental management Air quality standards regulation 2007	NFRA	5,000,000
	Noise Pollution from Demolition Activities	Noise Level	During Decommissioning	Project area	dBA	Environmental management (standards for control of noise and vibration) regulations, 2015	NFRA	3,000,000
	Loss of employment	Pension Funds remittance	Once every year	Company Records	Number of employees registered with Pension Funds	Labour standards	NFRA	2,000,000

CHAPTER TEN: COST BENEFIT ANALYSIS

10.1 INTRODUCTION

This section addresses financial analysis, economic analysis of the project and an extended cost-benefit analysis for the proposed project. The cost benefit analysis provided here uses approximate values as the project is still in the procurement process therefore real values cannot be used at this venture.

10.2 QUANTIFIABLE AND NON-QUANTIFIABLE BENEFITS TO COMMUNITIES

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

a) The project will employ a total of 70 people during construction. During operation 13 workers will be recruited during normal operation period and about casual 300 labourers during peak season. The majority of the non-skilled labour will be recruited from the communities around the project. Other skilled staff will be recruited from within Tanzania.
b) The project will enhance internal and external market for farmers and entrepreneurs of maize.
c) Communities around the project e.g. food vendors will be able to sell their foods to workers during construction and thus get their livelihood.
d) This will create opportunity to different suppliers of construction materials during the construction phase and maintenance of the project structures.

10.3 POSSIBLE COSTS TO COMMUNITIES AND GOVERNMENT

It is a fact that the proposed project entails social and environmental impacts. The developer is committed to mitigate the negative social and environmental impacts.

The government through Ministry of Agriculture TFDA, NEMC, OSHA, Fire Department, Songwe Region Administrative Office, Mbozi District Council, Vwawa Township Authority etc. has the responsibility to regulate the proposed project during its implementation. This implies that there will be close monitoring of operations of the proposed project so as to ensure adherence to the regulations in place. This involves deployment of government employed inspectors to the site once in a while for monitoring purposes.

10.4 COSTS TO THE PROJECT

The following project items will be termed as “COST”:

- The capital investment costs
- The environmental costs spent as part of the Environmental Management Plan (EMP) and Environmental Monitoring Costs
- The Cost of Decommissioning the project

A total capital of USD 5,353,257.20is required for starting and funding acquisition of capital goods for the construction of the project.

10.5 ENVIRONMENTAL COST AND BENEFIT ANALYSIS

Environmental cost benefit analysis is assessed in terms of the negative versus positive analysis. Furthermore, the analysis is considering whether the impacts can be mitigated and the costs of mitigating the impacts are reasonable. As it has been demonstrated in Chapter 6, the benefits of the project, in terms of financial and social benefit are substantial, the environmental impacts can be mitigated (chapter 7) and the financial resources needed to mitigate the impacts presented in Environmental Management Plan (EMP) amount to at least TZS 328,000,000/- and Environmental Monitoring Plan (EoMP) amount to TZS 186,000,000 are relatively reasonable compared with the actual capital investment.

10.6 SOCIO-ECONOMIC BENEFIT ANALYSIS

Increasing the storage capacity of Mbozi Depot from 17,000MT to 37,000MT and 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. The project will help ensure food and nutritional security to the communities in the Nation, particularly in the disaster prone areas.

The project will serve to safeguard livelihood, human capital and welfare of the poor and vulnerable populations. The women and children will be more benefited as any shock on food stock directly affects the women and the children suffers from delayed and skewed food supply during disasters and the aftermath.

Also since NFRA procures grains mainly maize from various individual and AMCOS, therefore the increase in storage capacity will result into increase in potential market to farmers.

10.7 BENEFIT – COST COMPARISON

Based on the facts described under Section 10.2 to 10.6, when all the benefits accrued from the project are compared to costs, it is obvious that the project will have more positive impacts to the surrounding environment as compared to the costs. The profits to be realized have also incorporated costs of the closure of the project.

CHAPTER ELEVEN: DECOMMISSIONING PLAN

11.1 INTRODUCTION

The project assessment covers the entire project life time. It is assumed that during that period mechanical equipment and the electro-mechanical will be replaced several times. No specific information is available about decommissioning. The anticipated regular maintenance and replacement of equipment would obviously ensure a long life span of this project.

In the unlikely event of the total closing down of the project a new assessment is needed to decide on the feasibility and benefits of removal of the structures. It is important to ensure that when the construction works leave the site that they do not result in significant impacts, such as contamination, waste or damage. Such considerations should be included within the site procedures handbook.

11.2 PROJECT REMOVAL METHODOLOGY AND SCHEDULE

The owner of the structures at the time of decommissioning will implement all aspects of Project decommissioning, including but not limited to, all engineering, environmental assessment, permitting, and mitigation activities associated with the removal of the structures, in accordance with this Plan and the Settlement Agreement, and mitigation of Project removal impacts on site. The owner shall monitor environmental impacts during and after Project removal to respond to defined events during the monitoring phase.

The owner of the immovable assets shall remove the structures safely and in a manner that:

- Minimizes environmental impacts;
- Restores the site to original condition; and
- Pays all dues (workers, government, suppliers etc.).

Immovable assets removal will begin six months after closure and continue for another six months. Within the six months from closure the owner will prepare an inventory of all components that need to be removed and/or disposed. This inventory will include building structures to be demolished, equipment to be disposed of, debtors and creditors to be settled. Also mode of disposal will have to be finalized. This information will assist in the preparation of the final decommissioning plan, for approval by NEMC.

After the approval of the decommissioning plan, the metal parts will be removed first within the first month (this is important to ensure that they are not vandalized). The second month of the decommissioning will be used to remove concrete structures. Debris will be used as road fills.

Any hazardous material (for example used batteries, acids etc) discovered during decommissioning will be cleaned up and disposed of in accordance with the prevailing regulations. All disturbed areas will be landscaped and re-vegetated using indigenous trees.

Project decommissioning has five phases: (1) pre-removal monitoring; (2) permitting; (3) interim protective measures; (4) project removal and associated protective actions; and (5) post-removal activities, including monitoring of environment and socio economic activities.

The first three phases will occur prior to removal of the structures (i.e. within the first six months). The fourth phase-project removal and associated protective actions will take place six

months after closure. The fifth phase will begin after total removal and continue for at least six months

The description that follows outlines the activities that will occur in each phase and provides references to detailed descriptions of each activity elsewhere in this Plan.

(1) Pre-removal monitoring: Pre-removal monitoring includes environmental and socio economic status of the project, and the surrounding. This monitoring is essential to identify if there is any environmental or social liability which need to be settled before the permit for closure is given. This period will also be used for inventory of all assets and facilities that need to be disposed of and to prepare a final decommissioning plan for approval by NEMC.

(2) Permitting: The owner shall obtain all permits required to undertake removal of the Project. This basically will include NEMC.

(3) Interim Protective Actions: This will take care of any interim protective measure that needs to be implemented to protect human health and environment.

(4) Project Removal: As noted above, the removal of the project will be completed within six months.

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

11.3 PRELIMINARY DECOMMISSIONING PLAN

Decommissioning is the final phase in the life cycle of the facility after sitting, design, construction, commissioning and operation. Most often, it is a process involving activities such as dismantling and demolition of unwanted structures, and management of resulting materials and people going out of job. All these activities take into account of the environmental, health and safety requirements for the operating personnel, the general public and any implications to the environment.

This section entails a proposed preliminary decommissioning plan. This plan establishes feasible decommissioning schemes that can be accomplished without undue risk to the health and safety of the public, decommissioning personnel and the environment. The decommissioning procedures should always be undertaken within established guidelines and limits of the appropriate regulatory agencies. Although it is not detailed, this preliminary plan will serve the purpose of ensuring that the decommissioning procedures and ultimate disposition mechanisms of a facility are considered during the initial stages of design and construction. The preliminary plan will remain a “living document,” and revisions will be made throughout the operating life of the project. It must be reviewed periodically and revised to reflect any changes in facility construction or operation that might affect decommissioning. Prior to the initiation of actual decommissioning activities for the facility, a detailed final disposition plan will be prepared.

On completion of the project life on the site, everything should be left in order to achieve this, the following should be accomplished.

h) Landscaping of open areas should be done. Such areas should be sealed from pits and other depressions and vegetation introduced.
i) All waste materials should be cleared and removed from the site. There should be no such materials as wood, glass, stones, scrap metals etc. However, these should be disposed appropriately.

j) General rehabilitation of any excavated areas; quality vegetation should be introduced to add aesthetic value to the site. This should be regularly watered.
k) The structures should be cleared and rubbed of any dust particles
l) Workers should be pre-warned just before decommissioning and suitably compensated and recommended and if possible, assist in seeking opportunities elsewhere.

11.4 DECOMMISSIONING COSTS

Information pertaining to the decommissioning of the project at the end of its life cycle and associated impacts, proposed measure to return the site as far as possible to its former state elaborately provided in Table 11.1. The total cost for decommissioning plan is estimated at TZS 390,000,000 that is likely to change depending on currency value and other economic factors of that time.

11.4.1 Site and Facility Preparation

In preparation for decommissioning planning and execution, surveys will be performed at the centre prior to commencing any decommissioning work. Also, systems such as electrical systems, fire protection system, if not required for decommissioning work, will be de-energized. Utilities that are not required to support decommissioning work will be removed. These activities will be completed prior to facility decommissioning.

11.4.2 Labour

Decommissioning labour costs have been included for project/program management, execution of field work (construction/demolition crews), and for providing technical support in the areas of safety assessment, regulatory affairs, and community engagement throughout the decommissioning.

11.4.3 Material and Equipment

In addition to the labour costs, material costs for specific activities are also included. Both head frames and all surface infrastructures will be demolished and removed to appropriate waste facilities outside the project site. The cost of demolition is based on labour and equipment requirements multiplied by estimated duration of demolition. Also Personal protective Equipment will be required for all workers.

11.4.4 Waste Management

Waste generated will be disposed at appropriate site. Metal parts will be sold or given free to smelters. The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work.

11.4.5 Site Restoration

General restoration of the site will be completed once the structures have been removed and septic tanks and soak away pits sealed and the surface infrastructure has been removed. Also, the site will be capped with 150 mm of soil and vegetated.

11.4.6 Contingency

A contingency of 30% has been included in this cost estimate due to the uncertainty associated with these preliminary cost estimates. Most of the uncertainty is associated with the shaft sealing work. The potential salvage value associated with structures, systems, components, and equipment has not been considered in the cost estimate. While reasonable assumptions have been made about the design of the shaft sealing system and its construction, the methods to be used cannot be fully defined until laboratory and field investigations are performed near the end of repository operations.

Table 11.1: Decommission Costs Estimates

SN	ITEM	ESTIMATED COSTS [TZS]
1.	Site and Facility Preparation	50,000,000
2.	Labour	30,000,000
3.	Material and Equipment	70,000,000
4.	Waste Management	50,000,000
5.	Site Restoration	100,000,000
6.	Contingency	90,000,000
	Grand Total	**390,000,000**

CHAPTER TWELVE: SUMMARY AND CONCLUSIONS

12.1 SUMMARY

The EIS has identified a number of impacts both positive and negative and other residual cumulative issues pertaining to the Proposed Construction of grain storage facilities on Plot No. 92 Block J, Ipanga Mtaa, IChenjezya ward, Mbozi District, Songwe Region. Major issue of concern during project implementation are as follows:

- Water supply during peak season when the site attracts about 300 people
- Vehicular traffic during peak season of the road leading to project site
- Accessibility difficulties especially during rainy season due to poor road condition leading to the site
- Occupational health and safety of workers and surrounding neighbours from fumigation activities when maintaining grains quality
- Management of pesticides empty containers.

These major issues together with other impacts have been described and assessed in detail to gain adequate understanding of possible environmental effects of the proposed project from site selection to decommissioning, in order to formulate mitigation measures in response to negative aspects which have emerged. The Environmental Management Plan (EMP) provides way forward for implementation of the identified mitigation measures.

The estimated costs for implementing the mitigation measures are just indicative. The consultant has used informed judgment to come up with these figures.

The study concludes that although the project can have significant and wide-ranging impacts on the environment, the project is environmentally suitable and socially acceptable subject to the implementation of the Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) as proposed in chapter 8 and 9.

12.2 CONCLUSIONS

It is the opinion of the study team that social economic and environmental impacts resulting from operations at NFRA Mbozi depot can effectively be managed and reduced to acceptable levels as long as proposed mitigation measures are applied. Consequently, the benefits arising from operations of grain storage facilities as a developmental project outweigh the environmental costs.

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39. Environmental Management (Soil Quality Standards) Regulations G.N.No. 239 of 2007
40. Environmental Management (Control of Ozone Depleting substances) Regulations G.N.No. 240 of 2007

APPENDIX 1: APPROVED TERMS OF REFERENCES FOR EIA STUDY

TERMS OF REFERENCE FOR ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED CONSTRUCTION OF GRAIN STORAGE FACILITIES AT MBOZI DEPOT, PLOT NO. 92 BLOCK J, ICHENJEZA WARD, VWAWA TOWNSHIP AUTHORITY, MBOZI DISTRICT, SONGWE REGION

1.0 INTRODUCTION

National Food Reserve Agency (NFRA) is a Public Institution established by the Executive Agencies Act No. 30 of 1997 and came into effect on the 1st day of July, 2008 as an Executive Agency under the Ministry of Agriculture Livestock and Fisheries.

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. Thus the Agency has been established to carry out three main functions. These are; -

- Procuring, reserving and releasing food stocks to address disasters
- Recycling and releasing food stocks in the market in order to stabilize food supply, and
- Marketing food commodities and generating revenue.

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). National Food Reserve Agency (NFRA) is therefore intending to expand its storage capacity of Mbozi Depot.

Currently the site has the warehouses with storage capacity of 17,000 MT. The proposed expansion will include construction of six (6) Silos with total capacity of 20,000 MT. It is expected that, at the end of the project, the Mbozi Site will have the storage capacity of 37,000MT. Also the project will involve rehabilitation of existing warehouses and construction of other supporting facilities such as administration blocks, drainage system, installing weighbridge and other equipment etc.

The Mbozi Depot has a total area of 53,691 m^2, whereas area earmarked for silos construction is 6,000 m^2. The total investment cost for the Mbozi Storage site is estimated to be USD 5,353,257.20.

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

2.0 OBJECTIVE OF ESTABLISHING THE PROJECT

The overall purpose of the proposed project is to meet food emergency in the country for post disaster needs and improve the efficiency of grain storage management.

Specific Objectives

1. Construct six (6) Silos with total capacity of 46,000 MT at Mbozi Site.
2. Modernization of existing storage facilities at Mbozi Site
3. Provision of technical assistance, training and strategic studies

3.0 OBJECTIVES OF THE EIA STUDY

Development of proposed project is included in the mandatory list of projects that are required to develop EIA by the Environmental Management Act (2004). Part IV of the EIA and Audit Regulations (2005) provides the general objectives for carrying out EIA, among others a list include the following:

a) To ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process
b) To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal
c) To protect the productivity and capacity of natural systems and ecological processes which maintain their functions
d) To promote development that is sustainable and optimizes resources use and management opportunities.

Consequently, the proponent would like to undertake Environmental Assessment so as to translate the principles of sustainable development and environmental protection into strategies and actions that can be practically applied to her intended project.

The specific objectives of the EIA are to:

- Establish baseline information on both natural and built environment including socio-economic conditions of the proposed project area;
- Identify, predict and evaluate foreseeable impacts, both beneficial and adverse, of the proposed investment;
- Develop mitigation measures that aim at eliminating or minimizing the potential negative impacts and promote positive ones; and
- Develop management plan and monitoring plan for ease of reference during project implementation.

4.0 TERMS OF REFERENCE FOR AN EIA

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

5.0 SCOPE OF WORK.

The EIA shall be conducted in accordance with the guidelines laid down by the Environment Management Act (EMA, 2004). The main steps to be followed by the Consultant in the environmental impact assessment will involve:

- ✓ Identifying, collecting and analyzing information which include:
  - project characteristics and activities;
  - baseline data of the environmental and socio-economic setup;
  - predicting impacts;
  - evaluating impacts' significance;
  - identifying and proposing mitigation measures;
  - preparing the Management and Monitoring Plan and Follow up; and
- ✓ Presenting the information which involves writing an environmental Impact Statement (EIS).

The approval process shall also be according to the procedure laid down by the National Environment Management Council (NEMC) whereby these Terms of Reference will be approved by NEMC before the EIA field exercise commences. Following the EIA study the Environmental Impact Assessment Report will be submitted to NEMC for review and approval.

6.0 TASK TO BE CARRIED DURING THE EIA

The Consultant shall carry out the following tasks:

Task 1: Stakeholders Consultations

Consultations with stakeholders have been undertaken in this scoping stage of the EIA. The Consultants shall carry this further during the impact study.

Stakeholders consultations should be done adequately (more stakeholders should be consulted at Mbozi District Council and Vwawa Township Authority) and records of meetings, communication and comments raised be appended and addressed in the EIS. Names and signature of all the consulted stakeholders should be appended as well. Also include stakeholders' issues response table – showing how and where significant issues raised by stakeholders have been addressed in the EIS.

Task 2: Description of Project

In order to cover assessment of all key issues related to the project, the study area shall be much wider than that covered by the project site where most of the project operations and facilities and services will be located. This is because some of the impacts might have local, regional or national implication. The core area has been determined to be the whole area that is covered by the project site.

The Consultant shall: further determine and set the project boundaries particularly spatial boundaries (i.e. impact area coverage and area of influence).

The Consultant shall give details of:

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

In addition to the above the tasks the consultant shall give details of the following:

- Activities to be carried out in each phase of the project i.e. pre-construction, construction, operation and decommissioning phase
- The project shall be well described indicating all project components and the activities in each component of the project development
- The project shall clearly specify the carrying capacity of the storage facility
- The purpose and objectives of the proposed development shall be clearly stipulated.
- The EIS should be attached with architectural drawings which have been done by licensed architect.
- The EIS should be attached with site layout plan showing the state of the plot in relation to the component of the project.
- The redevelopment scheme of the specific area should be abide to.
- The land use of the area should be compatible with the proposed development and its verification should be done in consultation with Mbozi District Council, Vwawa Township Authority and Ministry of Lands, Housing and Human Settlements development

- The Environmental Impact Assessment should take into account development conditions of the area making sure that the parking facility has sufficient capacity to serve all users of the facilities and the anticipated visitors without causing any problems
- Types and quantities of material and inputs needed during pre-construction, construction and operational phases
- The types and quantities of wastes, energy and residual materials and the rate at which these will be produced
- The description of methods used to make estimations of waste generated, and the proposed methods of waste treatment and disposal.
- The project capital cost and source of funds

Task 3: Description of the Environment

The Consultant shall provide description of:

- The location and area of land affected by the development. This shall also be shown on maps and the current land uses of the area shall be clearly demarcated.
- Definition of affected site shall be broad enough to include any potential effects occurring away from the construction site (e.g. dispersal of pollutants, traffic, changes in channel capacity of water sources as a result of increased surface run off etc.)
- Baseline condition of the current biophysical, ecological, socio-economic and cultural environment and, prediction of the future condition if the project did not take place
- The method used to gather the baseline information.

Baseline data shall be gathered in such a way that the importance of the particular area to be affected can be planned into the context of the region or surrounding area and that the effect of the proposed change be predicted and monitored

Task 4: Legislative and Regulatory Considerations

The Consultant shall:

Describe pertinent local, national and international regulations and standards governing environmental quality, health and safety, protection of sensitive areas and underground water resources, land use control etc.

The EIS shall show how the company will comply with the cited policies and Legislation

Task 5: Prediction, Identification and Analysis of Impacts

Under this activity the consultant shall:

i. identify issues and concerns in order to find suitable remedies;
ii. identify linkages among project components and the issues;
iii. identify where project activities or elements interact with social and biophysical environment (direct impacts):
iv. identify indirect impacts of the project on the environment;
v. identify cumulative impacts that may be anticipated;
vi. identify residual impacts if any;
vii. predict probability, magnitude, distribution and timing of expected impacts:
viii. carry out assessment of alternative sites and alternative technologies 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 technologies) are chosen (a no-project option will also be considered)

The consultant shall also outline:

- The methodology used to identify and analyze likely impacts
- The logic used to identify the key impacts on human beings, flora and fauna, soil, water, air, climate, landscape, cultural heritage, or their interaction, should be explained
- The data used to estimate the magnitude

Furthermore, the consultant shall: assess:

- The significance of impacts using the appropriate national and international quality standards where available.
- Remaining impacts after mitigation using the appropriate national and international quality standards where available. Where no such standards exist, the assumptions and value systems used to assess significance should be justified.

Task 6: 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 to 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 7: Analysis of alternatives to the project

The consultant shall:

- Discuss alternative sites, undertakings, processes, technologies and design
- Discuss the main environmental advantages and disadvantages and the reasons for the final choice given.
- Make a comparison of the alternatives in terms of potential environmental impacts as well as capital and operating costs i.e. cost benefit analysis of each alternative/option

Task 8: Development of Environmental and Social Management Plan (ESMP)

In preparation of the ESMP the following activities shall be performed:

- Specific mitigation measures and enhancement measures shall be identified on all significant impacts.
- Effectiveness of mitigation methods shall be ascertained. Where the effectiveness is uncertain justification of the acceptance of the suggested interventions/assumptions shall be provided.
- Effective environmental and social management plan shall be prepared. The Environmental and Social Management Plan shall identified among other thing: Phase of the project, identified impacts, mitigation measures, responsibility, time frame for implementing the mitigation measures and budget estimates.

Task 9: Development of Environmental Monitoring Plan

In preparation of the Monitoring plan the consultant shall ensure that the plan is consisted of the following:

i. phases of the project,
ii. Identified impacts.
iii. mitigation measures

iv. parameter to be monitored
v. sampling area/points
vi. frequency of monitoring
vii. Standard/target level
viii. responsible institutions
ix. budget estimates

The consultant shall also:

- determine and assess methods to monitor impacts for predicting accuracy remedial measures for effectiveness
- describe follow up scheme and post project action plan
- assess the level of financial commitment by the proponent for management and monitoring plan and follow activities

The consultant shall be guided by the cost-effectiveness principles in proposing mitigation 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 10: Reporting requirement and Report Presentation

The final draft of the EIS document shall be concise and in line with EIS format stipulated in the Regulations 18 and 19 respectively of the Environmental Impact Assessment and Audit Regulations (2005) G.N. No. 349 0f 2005. The *contents* and the *structure* of the main text (EIS) shall be presented according to *Regulations 18(1) and (2) of the Environmental Impact Assessment and Audit Regulation, 2005.*

The Executive summary shall not be in separate document rather, shall be part of the EIS. The *contents* and *structure* of the Executive Summary shall be as per *Regulation 18 (3).* There shall be a *standalone/separate document* of Non Technical Executive Summary to be both in *Kiswahili* and *English* languages stating the *key findings*, *conclusions* and *recommendations* as per the requirement *of Regulation 19(2) of the EIA and Audit Regulations of 2005.*

Submission of the EIS, Non-Technical summary and prescribed fees shall observe the requirements of Regulations 19 to 21 of the *EIA and Audit Regulations of 2005.*

7.0 TIMEFRAME FOR CARRYING EIA STUDY

It is expected that the study would be completed within a period of Three Months (i.e. 90 days) from project brief to submission of final EIS.

8.0 STUDY TEAM

The consultants shall deploy consultants/experts with the demonstrable practical experience in conducing EIA studies, with specific experience in agriculture, environmental engineering, civil engineering, ecology and sociology.

APPENDIX2: SIGNATURES OF CONSULTED STAKEHOLDERS

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF GRAIN STORAGE FACILITIES AT MBOZI DEPOT, PLOT NO 92 BLOCK J, ICHENJEZA VWAWA TOWN, MBOZI DISTRICT, SONGWE REGION

STAKEHOLDERS CONSULTATIONS

DATE 11/01/2017

SN	NAME/JINA	INSTITUTION/TAASISI	ADDRESS/PHONE	SIGNATURES/SAHIHI
1.	JOEL G. KAMINYOGE	VTA	0752522253/ 0629 267231	
2.	FREDRICK F. MASAWE	VTA.	0755527659	
3.	BLAYA MSONGOLE	WEO ~~KATA~~ ICHENJEZA	0755415956	
4.	JULIANI MALAHALENDE	WEO ILOLO	0756024649	
5.	KASSIM MYOMBE	WEO VWAWA	0759946702	
6	Paul Sondo	TFDA-SHZ	0252504425	

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF GRAIN STORAGE FACILITIES AT MBOZI DEPOT, PLOT NO 92 BLOCK J, ICHENJEZA VWAWA TOWN, MBOZI DISTRICT, SONGWE REGION

STAKEHOLDERS CONSULTATIONS

DATE 10.01.2017

SN	NAME/JINA	INSTITUTION/TAASISI	ADDRESS/PHONE	SIGNATURES/SAHIHI
	Bright E. Mollel	NFRA – MWB	0787/0655 692471	
	Eng. NZOBONARIBA, F.J	NFRA – HQ	0713789365	
	Elias Nicholas	NFRA. MBOZI	0754 805483	
	ALFRED MONGI	NFRA – MBOZI	0763 439856	
	HAMIS P. NZUNDA	DEMO – MBOZI DC	0759-511772	
	RENATUS A. QALQAL	OSHA SHZ, P.O.BOX 889 MBY	0767214124	

ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED DEVELOPMENT OF GRAIN STORAGE FACILITIES AT MBOZI DEPOT, PLOT NO. 92 BLOCK J, IPANGA MTAA, ICHENJEZYA WARD, MBOZI DISTRICT, SONGWE REGION

STAKEHOLDERS CONSULTATIONS

Date. 12/10/2017

SN	NAME/JINA	INSTITUTION/TAASISI	ADDRESS/PHONE	SIGNATURE/SAHIHI
1	SAMWEL MMARI	TPRI - Asm.	Box 1585 Asm	

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF GRAIN STORAGE FACILITIES AT MBOZI DEPOT, PLOT NO 92 BLOCK J, ICHENJEZA VWAWA TOWN, MBOZI DISTRICT, SONGWE REGION

STAKEHOLDERS CONSULTATIONS

PROJECT NAME:................ DATE OF CONSULTATION 25/05/2017

S/N	Name/Jina	Title/Position/Cheo	Location/Institution/Taasisi	Tel/Email/Simu	Signature/Sahihi
1.	ELIMPAA KIRANGA	KAIMU KATIBU MKUU	MALF - DODOMA	0754446233	
2.	Vumilia Zikankuba	Ag. CEO	NFRA	0744463044	
3.	JOSEPH P. OLOMOLA	Dg DED	NFRA HQ	0717507792	
4	Oswald Ruboha	AD- M&E	MALF - Dodoma	0757882005	
5	Paulo Tarimo	DLNP	MALF	2860450	
6	Sospeter W. Mtei	AD - Lm	MALF	0762-879011	
7	Richard Y. Kasuga	HGCU	MALF	0769-239946	
8	Beatus Malema	ADCIS	MALF	0784608806	
9.	B. A. Shaban	DPMU	MALF	0713227288	
10.	Seushi J. Mburi	DAHRM	— " —	0754745305	
11.	George Mandara		— " —	0754375056	

PROJECT NAME:................

S/N	Name/Jina	Title/Posi
1.	ELIMPAA KIRANGA	KAIMU MKU
2.	Vumilia Zikankuba	Ag. CE
3.	JOSEPH P. OLOMOLA	Dg DE
4	Oswald Ruboha	AD- M&
5	Paulo Tarimo	DL
6	Sospeter W. Mtei	AD
7	Richard Y. Kasuga	H
8	Beatus Malema	AD
9.	B. A. Shaban	D
10.	Seushi J. Mburi	DA
11.	George Mandara	

APPENDIX 3: NEMC LETTER APPROVING TERMS OF REFERENCE AND TAC COMMENTS

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/01/0684/Vol.1/4**

Date: **10/02/2017**

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 AT MBOZI DEPOT ON PLOT NO. 92 BLOCK "J" IN ICHENJEZA VWAWA WARD, MBOZI DISTRICT, SONGWE REGION

Kindly refer the heading above.

We acknowledge receipt your letter with **Ref. No. BA.52/112/01/37** of **1st February, 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;

All correspondence should be addressed to the Director General

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 EIA 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. 11,969,883.10** which excludes transport costs as elaborated on the attached sheet (**NEMC Invoice NO. 3892 of 09/02/2017**).

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: EnviroPlanners Limited, P.O. Box 33153, **Dar es Salaam**.

All correspondence should be addressed to the Director General

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

Telephone: +255 22 2774889,
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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

Ref: **NEMC/HQ/EIA/01/0684/Vol.1/6** **19/09/2017**

Chief executive Officer,
National Food Reserve Agency,
P.O. Box 5384,
Dar es Salaam

RE: COMMENTS OF THE TECHNICAL ADVISORY COMMITTEE (TAC) ON THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED EXPANSION OF GRAIN STORAGE FACILITIES ON PLOT NO. 92 BLOCK J AT IPANGA MTAA, ICHENJEZYA WARD IN MBOZI DISTRICT, SONGWE 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 Technical Advisory Committee (TAC) in the review meeting held on 11th September, 2017.

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 to NEMC for further action.

You are also required to provide comments response table indicating where comments have been addressed section and page numbers. Also, indicate where the comments have not been addressed and the reasons thereof.

Attached please find the TAC Comments for your action.

Yours Sincerely;

R.Said
For: Director General

Ce: EnviroPlanners Limited; P.O Box 33151, Dar es Salaam.

All correspondence should be addressed to the Director General

COMMENTS OF THE TECHNICAL ADVISORY COMMITTEE (TAC) ON THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED EXPANSION OF GRAIN STORAGE FACILITIES ON PLOT NO. 92 BLOCK J AT IPANGA MTAA, ICHENJEZYA WARD IN MBOZI DISTRICT, SONGWE REGION

GENERAL COMMENT(S)

i. The format of the EIA and EA Regulation of 2005 should be adhered in writing the EIS;

ii. The project title should read "proposed expansion of grain storage facilities on Plot No. 92 Block J at Ipanga Mtaa, Ichenjezya Ward in Mbozi District, Songwe region"

SPECIFIC COMMENTS

REVIEW AREA 1: Description of the Development, Legal Framework, Local Environment and the Baseline Conditions

1. On page 6; narrow the locational map to at least district level;
2. On page 9 section 2.4.1; provide detailed description (including their capacity) of all existing facilities within the same site; Also state if they will be demolished/rehabilitated or not
3. State the life span of the grain that will be stored in the silos and or warehouses;
4. State typo of chemicals that will be used in fumigation;
5. On page 10 section 2.4.3; provide information on handling of agrochemicals;
6. On page 11 section 2.4.7; state the capacity of the parking space;
7. On page 13 sect 2.5.2.2; state types, sources and estimated quantities of construction materials;
8. Discuss health and safety issues in each project phase i.e from pre-construction, construction, operations and decommissioning phases;
9. On page 18 (container disposal);
   i. state how liquid wastes be handled after dressing of the agrochemical containers
   ii. state the name and the location of the approved dumpsite;
   iii. describe mode of cleaning the containers;
   iv. disposal mechanism of the containers;
10. State the total project site; the area that has already been occupied by existing structure. Also state the area that will be occupied by the proposed project;

11. State types, sources and estimated quantities of waste generation rates. Also describe the methodology used to make those estimations; Note that: information provided on page 22 sect 2.7.1 is for construction phase only;
12. Provide sources to all cited information presented in the EIS e.g. all tables, baseline information, all figures etc;
13. Review and include texts from Plans and programs such as;-
    i. Tanzania Agriculture and Food Security Investments Plan (TAFSIP) 2011/12 to 2020/21.
    ii. ASDP II especially Component 3. **Improved and expanded rural marketing and value addition promoted by a thriving competitive private sector and effective farmer organization** (indicate the link between the component and the storage facility).
    iii. Add CSA programme CSA (link Component 3: Improved Food Storage and Distribution with the proposed grain storage facility.
14. Discussion of legislations/laws; review the following laws and regulation; and state their relevance to the proposed project;
    i. National Agriculture Policy 2013 and not 2012;
    ii. Grazing Land and Animal Feed Resources Act 2010;
    iii. The Local Government (Urban and Authorities) Act, No. 8 of 1982 section 55(2)
    iv. The Urban Planning Act, No. 8 of 2007 section 29, 31, 32 and 33;
    v. The Land act, No. 4 of 1999 section 4 and 19
    vi. The plant Protection Act, 1997.
    vii. The environmental (Solid Waste Management) Regulations, 2009.
    viii. The Industrials and Consumers Chemicals Management and Control Act, 2003.

REVIEW AREA 2: Identification and Evaluation of key Impacts

1. Discuss methodologies used in identification, analysis and evaluation of impacts;
2. Discuss impacts during mobilisation and construction phase separately;

REVIEW AREA 3: Alternatives, Mitigations, EMP and Commitment

1. Discuss management of storm water;
2. Ensure impacts discussed in chapter 7, 8 and 9 are the same;
3. Redo the CBA chapter as it is too descriptive;

REVIEW AREA 4: Stakeholders Participation and Communication of Results

1. Append the following:
    i. complete Certificate of Title;
    ii. site layout plan
    iii. designs of the silos
2. Consult TPRI and incorporate their concerns in the EIS;

APPENDIX 4: TFDA WAREHOUSE CHECKLIST

TFDA	CHECKLIST FOR INSPECTION OF FOOD WAREHOUSE	TFDA/DFS/FI&E/F/001 Rev #:0

INTRODUCTION

Name of premises .....
Type of food stored.....
Name of owner.....
Region .....District.....
Address.....Tel No.....Fax.....
Plot No.....Block No.....Street.....
Registration certificate No.....of (date).....
Business permit No.....of (date).....
Purpose of inspection (Tick) routine / registration / licensing/ complaints/ follow up, other (specify).....
Date.....Time.....

NO.	ITEM	POINT	
		ALLOCATED	SCORED
1.0	**LOCATION /SITING**		
1.1	* Free from source of contamination	4	
1.2	*Not water logged for any period of the year	4	
1.3	Sound surface water drainage in place	2	
1.4	Accessible by all weather road or rail	2	
1.5	Does not cause nuisance to nearby property or residences during operations	2	
2.0	**BUILDING (S)**		
2.1	Of permanent material and in good state of repair	2	
2.2	*Proper adequate natural and artificial lighting and air ventilation provided	5	
2.3	Walls internally smooth, hard, cleanable and kept clean	2	
2.4	Ceiling has no leakages dampness and not broken or gapped	2	
2.5	Operable window space 1/8 or more of floor area	2	
2.6	*Floor drainage, no stagnant water, channels dry and smooth to invert	4	
2.7	Provides adequate area to accommodate activities carried on	2	
2.8	Floor finish hard, smooth, non absorbent, and no accumulations of grime oils or dirt	2	
2.9	*Roof in good state of repair: clean, not broken or gapped or worn out	4	
3.0	**WATER SUPPLY**		
3.1	Source is (Municipal or private) available all the time	2	
3.2	Water is potable and is distributed in pipes	2	
3.5	Reservoir with capacity to supply adequate water for more	2	

Page 1 of 3

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NO.	ITEM	POINT	
		ALLOCATED	SCORED
	than 14 days without replenishment		
4.0	**WAREHOUSE MANAGEMENT**		
4.1	Environment without rodents.	3	
4.2	Storage area free from birds , insects and bats	3	
4.3	*Equilibrium relative humidity below 70 %	4	
4.4	Food stored in racks, trestles or pallets	3	
4.5	Pallets/racks/trestles placed at least 15 cm above floor, 60 cm away from walls and 15 cm between pallets/racks/trestles.	3	
4.6	Incoming material checked	3	
4.7	Provision of an area for putting expired/unfit product.	3	
4.8	Proper stock rotation implemented	3	
4.9	Absence of spillages	3	
5.0	**PEST CONTROL**		
5.1	Measures to prevent pest and other vermin from food premises in place	2	
5.2	*Pesticides and other chemicals are kept safely in a separate room	4	
5.3	Pesticides recommended for use	2	
5.4	Pesticides handled by trained personnel	2	
6.0	**SANITATION AND STAFF HYGIENE**		
6.1	Sufficient toilet and cloak room facilities provided	3	
6.2	Employees provided with protective gears	2	
6.3	Cleaning schedules documented and followed	2	
6.4	Employees medically examined on first appointment and every after six months	2	
6.5	Lid type containers for garbage and refuse collection provided in sufficient quantity	2	
7.0	**RECORDS**		
7.1	Cleaning and disinfections/ disinfestations records	2	
7.2	Medical examination records	2	
7.3	Distribution records	2	
GRAND TOTAL SCORE		100	

These are critical defects

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IMPLEMENTATION

1. Premises scoring 80 to 100 points will be registered and licensed provided that score of each individual critical defect(s) is more than 50%.
2. Premises scoring between 65 and 79 points shall be deemed to qualify for registration and license provided that score of each individual critical defect(s) is more than 50%. However, the owner shall be saved a notice of a maximum of three months to improve the condition of his/her facility.
3. Premises scoring between 55 and 64 points shall neither be registered nor licensed however the owner shall be saved be saved a notice of a maximum of three months to rectify defects.
4. Premises scoring 54 points and below shall neither be registered nor licensed. Similarly, it shall be served with closure notice according to Food Act.

INSPECTOR'S CERTIFICATION

A), I .....(Name) Authorized officer having inspected the above premises do/do not recommend the premises be registered and or licensed because points scored are .....and or critical defect(s) noted is/are .....

.....

.....

.....

Signature .....**Date**.....
(Authorized officer)

B). I.....(Name) Authorized officer having inspected the above premises do recommend the premises be served with a notice to rectify defects* or closure* because points scored are.....and critical defects noted is/are.....

.....

Signature.....**Date**.....
(Authorized officer)

OWNER'S CERTIFICATION

I certify that the above named authorized officer has inspected my premises and that the markings and decisions made above are true.

Name of Owner/Manager.....**Signature and stamp**.....
Date: .....

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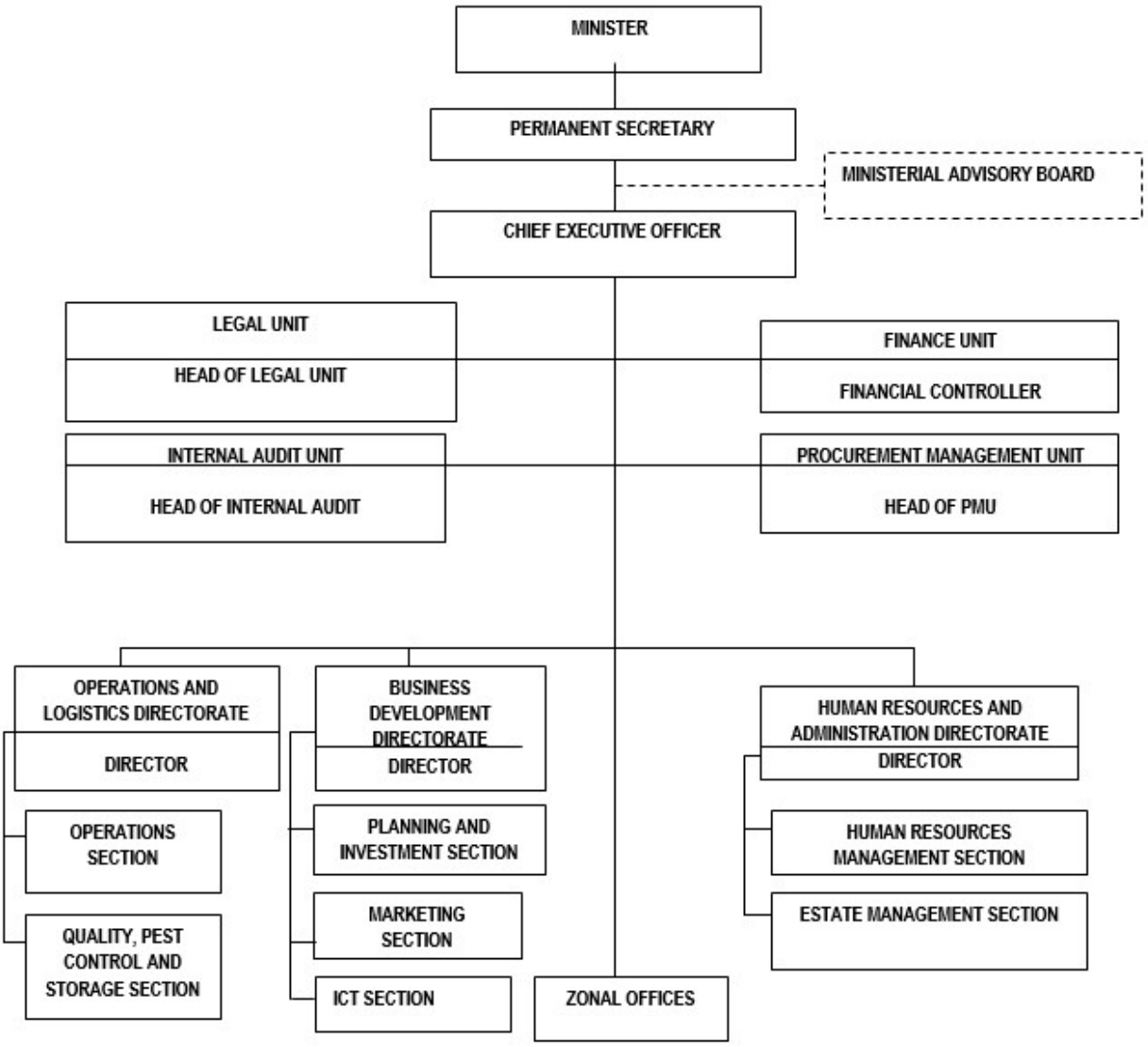
APPENDIX 5: NFRA ORGANIZATION CHART



APPENDIX 6: LAND OCCUPANCY CERTIFICATE – LETTER FROM NFRA REGARDING LAND OWNERSHP AND TRANSFER STATUS

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA KILIMO MIFUGO NA UVUVI
WAKALA WA TAIFA WA HIFADHI YA CHAKULA
Kizota Viwandani Area | S.L.P 1050 Dodoma | Simu: +255(0)26 2340012 | Fax:+255(0)26 2340014
Barua pepe: info@nfra.go.tz | Tovuti: www.nfra.go.tz
NFRA

Kumb. Na. CAB. 26/165/112/01/52 **27 Oktoba 2017**

Mkurugenzi Mkuu
National Environmental Management Council (NEMC)
35 Regent Street
S.L.P. 63154,
11404 DAR ES SALAAM

YAH: HATI MILIKI ZA MAENEO UTAKAPOTEKELEZWA MRADI

Tafadhali husika na kichwa cha habari hapo juu.

Ifuatayo ni hali halisi ya upatikanaji wa Hati Miliki za eneo utakapotekelezwa Mradi wa Kuongeza uwezo wa Hifadhi ya Akiba ya Chakula (Storage Capacity Expansion Project):

NA.	KANDA/ENEO	NAMBA YA KIWANJA	MAELEZO
1.	Sumbawanga	Plot No. 20 & 21, Block "EE", Mtaa wa NMC, Kata ya Mazwi, Manispaa ya Sumbawanga, Mkoa wa Rukwa	Manispaa wamekamilisha kuandaa *Deed Plan* pamoja na Hati Miliki. Tarehe 01 Novemba 2017 itawasilishwa kwa Kamishina Msaidizi wa Ardhi kanda ya Mbeya kwa ajili ya kusainiwa.
2.	Mpanda	Plot No. 16 & 17, Block "C" Mtaa wa Mpanda Hotel, Manispaa ya Mpanda, Mkoa wa	Manispaa wamekamilisha kuandaa *Deed Plan* pamoja na Hati Miliki. Tarehe 01 Novemba 2017 itawasilishwa kwa Kamishina Msaidizi wa

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		Katavi	Ardhi kanda ya Mbeya kwa ajili ya kusainiwa.
3.	Mbozi	Plot No. 92, Block "J" Mtaa wa Ipanga, Kata ya Ichenjezya, Wilaya ya Mbozi, Mkoa wa Songwe	Hati Miliki Na. 41660-MBYLR; LO No. 537669 ipo kwa jina la NFRA.
4.	Songea	Plot No. 101, 102 & 106; Block "B" Mtaa wa Ruhuiko Shuleni, Kata ya Ruhuiko, Manispaa ya Songea, Mkoa wa Ruvuma.	Hati Miliki Na. 27169-MBYLR; LO No. 176125 na Hati Na. 23840-MBYLR; LO No. 176126 zipo kwa jina la NFRA. Plot Na. 106 mchakato wake bado upo ngazi ya Ardhi Manispaa ya Songea kwa ajili ya kuandaliwa Deed Plan.
5.	Shinyanga	Plot No. 176 & Plot No. 178 Mtaa wa Ibadakuli, Manispaa ya Shinyanga.	Manispaa wamekamilisha kuandaa *Valuation for Transfer,* Wakala umelipa gharama za kuhamisha umiliki na mchakato wa kuandaa Hati Miliki ili ipatikane kabla ya mwisho wa mwezi Novemba 2017.
6.	Babati	Plot No. 794 – 803 Block "YY" Maisara area, Wilaya ya Babati, Mkoa wa Manyara.	Hati Miliki Na. 52892; LO No. 618201 ipo kwa jina la NFRA.

F.M. Masele

KNY: KAIMU AFISA MTENDAJI MKUU

APPENDIX 7: SILO DESIGN DETAILS

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 m³
- Storage capacity 3,031 Metric tons
- Compacted capacity 3,350 Metric tons
- Product: Maize
- Product Density 0.71Ton /m³
- 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/m²
- 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 8: SITE LAYOUT, SILO DESIGN AND SILO SECTION PLAN