

SILVERLANDS TANZANIA LIMITED

PROPOSED INTERGRATED POULTRY PRODUCTION AT MAKOTA FARM (309.6 HA) AT IHEMI VILLAGE, MGAMA WARD IN IRINGA DISTRICT, IRINGA REGION



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY

FINAL REPORT

Submitted to:

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05 FEBRUARY 2014

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ESIA STUDY EXPERTS

The following experts undertook and prepared this ESIA report

	Name of Expert	Position/ Area of Expertise	Signature
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2.	Mr. Ronald Ndesanjo	Natural Resource Assessment and Management, Resilience Ecology	
3.	Mr. Elikana Kalumanga	Wildlife Ecologist	
4.	Eng. Fredrick Mashingia	Hydrologist	
5.	Mr. Shabani Yahya Shabani	Archaeologist	
6.	Dr. Jason John	Ornithologist (Bird Ecologist)	
7.	Geoffrey Kazaula	Geometrician/GIS Specialist	

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The Consultant and his team of experts bid sincere gratitude to Silverlands Tanzania Limited (STL) for procuring their services to carry out this Environmental and Social Impact Assessment (ESIA) study of the proposed *Integrated Poultry Production Project at Makota Farm* in Iringa region. We appreciate the support we received in and out of the field from STL management and staff notably Steve Steenkamp (Project Manager). We also appreciate all the people whose immense support enabled us to produce this report. We categorically recognize the people we consulted by their names and positions in their respective institutions they represent as presented in the appendices. They are the key stakeholders of STL project operations whose views have enabled us to objectively present our findings and suggest practical recommendations that we believe, if are well implemented by STL, will significantly make the project much more environmentally sustainable, socially acceptable, and economically viable.

EXECUTIVE SUMMARY

THE PROJECT TITLE AND LOCATION

The Proposed Integrated Poultry Production in Makota Farm is located on the Southern highlands of Iringa Region in Mgama Ward of Iringa District. The farm is about 30 km from Iringa Town/ Municipality and is about 1.5 km from Iringa – Mbeya highway.

PROJECT PROPONENT

Silverlands Tanzania Limited (STL) is a recently incorporated company in Tanzania (see **Appendix 6:** Certificate of incorporation No. 93945 of 19th September 2012) that intend to use the Makota Farm to create the leading integrated poultry business in Tanzania. STL is a subsidiary company of SilverStreet Capital LLP, 33 St. James's Square Street, London, UK SW1Y 4JS.

THE ESIA STUDY TEAM

This ESIA report has been prepared by a team of seven experts led by Mr. Juma Kayonko, a registered environmental impact assessment expert NEMC/EIA 0162). The names and expertise of other experts is given in page viii of this report.

RATIONALE AND JUSTIFICATION OF THE PROPOSED PROJECT

The main objective of the proposed integrated poultry project is to build an annual production over a ten year period to 120,000 tons of high quality poultry feed, 15.6 million Day Old Chicks (DOCs), and 48.2 million table eggs. This project is very much relevant to Tanzania's poultry industry as the long-term objective of the Ministry of Livestock and Fisheries Development (MLFD) has been to increase quantity and improve quality of poultry and its products to meet domestic demand and export surplus to external markets (Njombe and Msanga, 2007). The domestic market for chicken meat and eggs is growing, especially in urban areas where there is a high dependence on imports (PASS Trust, 2013).

Recent surveys reveals that the main challenges or constraints facing Tanzania's poultry industry includes availability and price of quality poultry feeds, reliable supply of quality feed resources, increase demand for hatcheries and production of quality DOCs, increasing poultry production infrastructures, and provision of technical support devices and extension services (PASS Trust, 2013; Kisungwe et al., 2012; Kisungwe et al., 2009; Njombe and Msanga, 2007).

In view of this brief background of the poultry industry in Tanzania, if well implemented, the proposed project will have significant contribution in improving the sector. Tanzania's poultry sector grows at an average rate of about 3% per annum. The livestock industry, which includes the poultry subsector, contributes 30% of agricultural Gross Domestic Product (GDP) (PASS Trust, 2013).

BRIEF DESCRIPTION OF THE PROJECT ENVIRONMENT

The Makota Farm is located on the Southern highlands of Iringa Region in Mgama Ward of Iringa District. The farm is about 30 km from Iringa Town and is about 1.5 km from Iringa – Mbeya highway. Iringa District is predominantly rural such that, in the vicinity of the Makota Farm, the main adjacent land uses are smallholder farming of maize, cassava, potatoes, pulses such as beans, and woodlots planted with exotic tree species. The main cash crop is sunflower. Livestock including cattle and goats are the main animal husbandry activities. There are also village forest reserves.

The topography of the proposed project area i.e. Makota Farm is located between 1890-1925 m.a.s.l and lies within a 250-300 hectare catchment area. The southern third of the site is steeply sloped (1:20)

but tapers down to a gentler slope for the northern sections. There are old contours still visible on the site, but offer very little support in their current state. Soils in the area are typically well-drained and vary from deep yellowish or reddish sandy clays, to sandy-loams. The topsoil is most often sandy. Rainfall is extremely seasonal, highly localised and spatially varied, with a single rainy season from November to April and strongly correlated with altitude, with the higher areas receiving up to about 1600 mm of rain. Only Iringa meteorological station had long term temperature records. The mean annual air temperature varies from about 18°C at higher altitudes to about 28°C.

PROJECT STAKEHOLDERS AND THEIR INVOLVEMENT IN THE EIA PROCESS

List of stakeholders consulted

The table below presents project stakeholders who were consulted during the EIA process. Consultations were done in series from July 2013 to January 2014.

	Category of stakeholder	Institutions consulted
1.	Government Ministries, departments and agencies (MDAs)	Ministry of Livestock and Fisheries Development (MLFD); Ministry of Agriculture, Food Security and Cooperative (MAFC); Ministry of Industry and Trade (MIT); Veterinary Investigation Centre(VIC) – Iringa Zonal Office; Tanzania Food and Drugs Authority (TFDA); Occupational Health and Safety Authority (OSHA); and Rufiji Basin Water Basin Office (RBWO)
2.	Iringa Region	Regional Agricultural adviser
3.	Iringa District Council	District Executive Director (DED), Engineers, agricultural, livestock, planning, community development, HIV/AIDS, environmental and forest officers.
4.	Local communities surrounding Makota farm project	Ward executive officials; Village executive officials; Village chairpersons; Sub-village chairpersons; and Villagers
5.	Individuals and farmers groups association in the following villages	Ihemi, Makota, Kaning'ombe and Tanangozi
6.	Community Based Organizations	CBOs dealing with Agricultural (livestock keeping and farming) in the district
7.	STL's Workers (inherited from former investor on Makota)	Administrators, technicians, and non-technicians/ general workers

Results of public consultations

A number of issues and concerns emanated from the stakeholders consulted. Key issues raised were in relation to the potential impacts of the proposed project on the environment, and surrounding communities as well as the nation at large. These include potential employment opportunities the project would generate to the immediate neighbouring communities and other socio-economic benefits. A summary of issues and concerns are as follows:

- **Job opportunities:** Both local communities as well as district and local authorities expect the proposed project to provide a number of employment opportunities during construction, operation and maintenance phases. Likewise, a few employees who are already employed with the project expressed their wish to have their contract finalised as long as they have the necessary qualification. They also recommended that whenever there are job openings during the projects life cycle, people coming from neighbouring villages be given priority.
- **Waste Management:** Given the nature of project, it is expected that waste (solid, liquid and gaseous) will be produced. In that regard, stakeholders particularly district authorities raised their concern that the proponent should have in place appropriate waste management and disposal mechanisms to avoid any potential negative impacts to both the environment and surrounding communities.

- **Contamination of Water source:** One (*Ididiga* spring) of water sources for neighbouring villages lies right within the project site. Stakeholders had a concern that project execution should not lead to destruction and/or pollution of this water source. Related to that is excessive water drawing that might leave the villages and other downstream users water scarce. The concern was related to a misunderstanding between former Flower project and the villages following construction of a dam that, according to locals, threatened sustainable water availability for the villages neighbouring the project. It was therefore recommended that the developer help in digging boreholes in the villages to compensate any shortage should the envisaged water shortage becomes a reality in the future.
- **Wastewater Treatment:** In connection to the above aspect, stakeholders were of the opinion that project proponent ensures all waste water generated from poultry farming and processing is treated before being disposed.
- **Safety and Health Issues:** The stakeholder's consulted particularly employees who are currently hired by the project expressed their concern about safety and health risks that might associate with the project activities. It was recommended that the developer take into consideration all occupational health and safety standards to ensure employees safety and that of the general public neighbouring the project.
- **Farmers' training and capacity building:** Stakeholders were appreciative of the fact that the developer will train local farmers on better farming methods to ensure quality crops are produced to supply the feed mill with adequate raw materials. It was recommended that the developer also include training on poultry farming to the immediate local communities so as to increase productivity among local poultry farmers.
- **HIV/AIDS and other STIs:** A concern was also raised that the proposed project may lead to increased transmission of HIV/AIDS and other STIs due to the influx of new comers searching for casual and permanent jobs. It was recommended that the developer effect long-term awareness creation program for employees and other project stakeholders.

DESCRIPTION OF THE MAJOR SIGNIFICANT IMPACTS

Potential Positive Impacts

Potential positive environmental and socioeconomic impacts expected during different phases of the proposed project include the following:

- (i). Local employment opportunities. It is expected that about 50 people will be employed during construction phase and 30 to 40 during operation phase. Employment will be in the form of managers, skilled labourers as well as unskilled labourers;
- (ii). The project will provide a reliable local market to small-scale maize and soya farmers in Iringa, Mbeya and Ruvuma Regions;
- (iii). Extension services to small-scale farmers who will be connected to the project as supplier of maize and soya required for feed production;

- (iv). Promotion of poultry sector through supply of poultry feed and chicks in the surrounding communities and target markets (Iringa, Mbeya, Songea, Dodoma and Dar es Salaam);
- (v). The project is likely to encourage the development of small scale broiler farms for the day old chicks to fully grown broilers;
- (vi). Contribution to local socioeconomic development in the project area through money circulation and the multiplier effect;
- (vii). Contribution to government revenue through corporate tax; and annual NSSF contributions; and annual PAYE income tax of over 30 full-time employees;
- (viii). Health benefits from the supply of safe white meat and table eggs;
- (ix). The project will directly and indirectly contribute to the socioeconomic development of the surrounding communities. Direct contributions could be done as part of corporate social responsibility (CSR) by supporting community development initiatives in areas such as education, health, water, feeder roads etc.

Potential Negative Impacts

Potential negative environmental and socioeconomic impacts expected during different phases of the proposed project include the following:

- (i). *Loss of or disturbance to local biodiversity:* Site clearance and removal of vegetation cover during construction might have some negative impacts on the flora and fauna (large animals, small mammals, amphibians, reptiles, and birds) of the area.
- (ii). *Potential for environmental contamination:* Improper disposal of poultry carcasses can contribute to water-quality problems especially in areas prone to flooding or where there is a shallow water table. Depending on disposal method (burial, incineration, composting or rendering), large volumes of carcasses can generate excessive amounts of leachate and other pollutants, increasing the potential for environmental contamination.
- (iii). *Potential for contamination of surface water and groundwater resources:* Poultry manure contains considerable amounts of nutrients such as nitrogen, phosphorus, and other excreted substances such as, antibiotics if introduced through the feed and pathogens might occur from the gastro-intestinal tracts of the birds. Leaching and runoff of these substances has the potential to result in contamination of surface water and groundwater resources.
- (iv). *Concerns regarding greenhouse gas emissions and climate change:* This could result from on-farm energy consumption (e.g. energy input for poultry housing systems and feed processing) and greenhouse gases emissions from feed production.
- (v). *Increased chances for transmission of HIV/AIDS and other STDs:* Implementation of the project will increase mobility, migration and interaction of people, and communities. Extra earnings by project workers could be the sources of increase transmission of communicable diseases such as HIV/AIDS and other STIs if they engage themselves in extra-marital affairs.

- (vi). *Local disturbances:* Poultry facilities are a source of odour and attract flies, rodents and other pests that create local nuisances and carry disease. Odour emissions from poultry farms adversely affect the life of people living in the vicinity. Odour associated with poultry operations comes from fresh and decomposing waste products such as manure, carcasses, feathers and bedding/litter.
- (vii). *Health and safety issues to project workers:* In absence of effective management, project workers might be exposed to occupational health and safety hazards. Occupational health and safety hazards related to the daily operations of the poultry sector can be grouped into five categories

PROJECT ALTERNATIVES CONSIDERED

Five alternatives were considered for the proposed project.

1. The No Project or Zero Alternative

The no project or zero alternative entails maintaining existing use to which the proposed project site has previously been put to. This alternative would eventually evade any short term potential negative impacts from project execution. To this end, any potential positive impacts envisaged during midterm and long term project implementation will be missed. As noted earlier on in this report, the site has been used as a commercial flower farm thus it was left in conditions that necessitate putting it back to production. Adopting zero alternative would mean abandoning all the potential that the site offers to investor(s), contribution to government revenue and even local community livelihoods improvement.

2. Shifted Location Alternative

The current proposed project site was inherited from a previously horticultural project that has already been abandoned. In that respect, retaining the proposed project site is more viable compared to moving it to alternative location.

3. Modified Project Units Arrangement Alternative

STL intends to drill two boreholes within the property. However, information such as exact location, depth, yield, radius of influence and quality were not yet available. These data will help to determine the groundwater potential to support the proposed activity and the risks associated with infrastructure stability. For an example, the construction of a new well can lead to increased drawdown in existing sources. This in turn can lead to greater pumping (energy) costs in both the existing well and the new well, reduced yields, changes in groundwater quality and potential conflict between users. It is, therefore, expected that hydrogeological investigation will be undertaken and water use licence be applied as required by the local authorities.

4. Modified Project Designs Alternative

Current proposal and future expansion of the farm facilities must minimise the potential adverse impacts on natural environment. This is achieved by avoiding removal of significant vegetation and by ensuring appropriate separation distances to surface water. Recommended minimum distances between different farm facilities will be observed. The poultry sheds should also be designed and constructed in accordance with industry best practice guidelines.

5. Modified Construction Technology Alternative

The proposed development will be constructed using modern, locally and internationally accepted technology and materials to achieve public health, safety, security and environmental aesthetic

requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Tanzania Bureau of Standards (TBS) requirements.

Selected Alternative

From the findings of this ESIA study, the existing designs provide the optimum alternative for implementing and operating the proposed project subject to the effective implementation of the proposed ESMP and EMP.

ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

A number of mitigation and enhancement measures have been proposed to address the identified potential negative and positive impacts. These have been used to develop an Environmental and Social Management Plan (ESMP) for construction and operation phase. Programs for both internal and periodic external environmental monitoring have been proposed with an overall objective of ensuring that mitigation measures are implemented effectively. Environmental monitoring will be carried out to ensure that all construction and operation activities comply and adhere to environmental provisions and standard specifications. The activities and indicators that have been recommended for monitoring are presented in Environmental Monitoring Plan (EMP). The ESMP and EMP are presented in Section 9.

The total budget for implementing ESMP and EMP is estimated at TZS 162,000.00 and 43,500.00 respectively amounting to TZS 205,500/=. This will be covered by the developer.

DECOMMISSIONING

The project is tentatively scheduled to start in early 2014 and will extend over a period up to 10 years at which stage the developments on the project will be completed. The project is then expected to continue for longer than 25 years. Unless some unexpected factors triggers an immature closure of the business, decommissioning of poultry production facilities for the proposed project is not anticipated to be in the near future. However, it is important that the developer throughout the life span of the project establishes a monitoring program for the environmental and social aspects and the findings be included in audit reports that would feed into a decommissioning plan if deemed necessary. A preliminary decommissioning plan has been prepared and presented in Section 11 of this report.

LIST OF ABBREVIATIONS AND ACRONYMS

B	BOD	Biochemical Oxygen Demand
C	CBA	Cost Benefit Analysis
	CBOs	Community Based Organizations
	CFC	Chlorofluorocarbon
	COD	Chemical Oxygen Demand
	CSR	Corporate Social Responsibility
D	DED	District Executive Director
	DEM	Digital Elevation Model
	DOCs	Day Old Chicks
	DVS	Director of Veterinary Services
E	EMA	Environmental Management Act
	EIA	Environmental Impact Assessment
	EIAAR	Environmental Impact Assessment and Audit Regulations
	EIS	Environmental Impact Statement
	ESIA	Environmental and Social Impact Assessment
	ESMP	Environmental and Social Management Plan
F	FY	Financial Year
G	GPS	Global Positioning System
H	HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
I	IFC	International Finance Corporation
	IUCN	International Union for Conservation of Nature
K	kVA	kilovolt Amps
L	LGAs	Local Government Authorities
	LC	Least Concern
M	MDAs	Ministries, Departments and Agencies
	MLFD	Ministry of Livestock and Fisheries Development
	MSDS	Material Safety Data Sheet
N	NEMC	National Environment Management Council
	NEP	National Environmental Policy
	NGO	Non-Government Organization
	NSGPR	National Strategy for Growth and Poverty Reduction
	NSSF	National Social Security Fund
O	OSHA	Occupational Safety and Health Authority
P	PPE	Personal Protective Equipment
R	RBWO	Rufiji Basin Water Office
S	STL	Silverlands Tanzania Limited
	STI	Sexually Transmitted Disease
T	TAC	Technical Advisory Committee
	TBS	Tanzania Bureau of Standards
	ToR	Terms of Reference
	TPRI	Tanzania Pesticide Research Institute
	TRA	Tanzania Revenue Authority
	TRRL	Transport and Road Research Laboratory
	TSC	Timed Species Count
	TSS	Total Suspended Solids
U	USD	United States Dollars
W	WHO	World Health Organization

1. INTRODUCTION

1.1 Project Overview

Silverlands Tanzania Limited (STL) has bought a titled 309.6 hectare Makota Farm in Iringa Tanzania. STL has bought the farm from Shira Flowers Limited who set up the farm to grow flowers for the Dutch market in 2007. The flower project had received a grant from the Netherlands Ministry of Development Cooperation through FBME Bank Limited of Dar es Salaam. For a number of reasons the project was not successful and the company defaulted on its loans and the lending bank has exercised its rights to recover its loans from the sale of the farm assets.

STL plans to use the Makota Farm to create the leading integrated poultry business in Tanzania. Tentatively, the project time period is scheduled to start in early 2014 and will extend over a period up to 10 years at which stage the developments on the project will be completed. The project is then expected to continue for longer than 25 years.

1.2 Rationale and Justification for the Proposed Project

STL's strategy is to move production of feed, DOCs, table eggs close to the source of the maize and to grow (and encourage others to grow) soya to replace fish meal as the protein source; the business will purchase 90% of the raw materials for feed production from local and regional sources. Iringa has been identified as an ideal base for this poultry business, due to its proximity to the major maize producing areas in the country and its central location to the target markets of Dar es Salaam, Dodoma, Iringa, Mbeya and Songea. The business strategy involves operations on a secondary site in Dar es Salaam that will house a commercial layer farm, hatchery, and depot.

The objective of the proposed integrated poultry project is to build an annual production over a ten year period to 120,000 tons of high quality poultry feed, 15.6 million Day Old Chicks (DOCs), and 48.2 million table eggs. This project is very much relevant to Tanzania's poultry industry as the long-term objective of the Ministry of Livestock and Fisheries Development (MLFD) has been to increase quantity and improve quality of poultry and its products to meet domestic demand and export surplus to external markets (Njombe and Msanga, 2007). The domestic market for chicken meat and eggs is growing, especially in urban areas where there is a high dependence on imports (PASS Trust, 2013).

A total of 28.7 million DOCs were produced in 2006/07 compared to 26.8 million produced in 2005/2006. As production of DOCs does not satisfy demand importation becomes inevitable. In this regard about 782,550 chicks were imported in 2006/07 compared to 2.1 million which were imported the previous year. Moreover, 3.1 million eggs for hatching were imported in 2006/2007 compared to 8.4 million of 2005/2006. The decline in number of imported chicks and eggs is attributed to the imposition of an import ban as a result of the Bird flu threat in recent years (Njombe and Msanga, 2007).

Recent surveys reveals that the main challenges or constraints facing Tanzania's poultry industry includes availability and price of quality poultry feeds, reliable supply of quality feed resources, increase demand for hatcheries and production of quality DOCs, increasing poultry production infrastructures, and provision of technical support devices and extension services (PASS Trust, 2013; Kisungwe et al., 2012; Kisungwe et al., 2009; Njombe and Msanga, 2007).

In view of this brief background of the poultry industry in Tanzania, if well implemented, the proposed project will have significant contribution in improving the sector. Tanzania's poultry sector grows at an average rate of about 3% per annum. The livestock industry, which includes the poultry subsector, contributes 30% of agricultural Gross Domestic Product (GDP) (PASS Trust, 2013).

1.3 The Need for ESIA Study

The Environmental Management Act (EMA) No. 20 of 2004 requires such large projects as the proposed one to undergo full environmental impact assessment (EIA) prior to their implementation. STL is legally committed to implementing the International Finance Cooperation (IFC) Performance Standards on environmental and social aspects. Standard 6 on biodiversity conservation and sustainable natural resource management recognizes that protecting and conserving biodiversity is fundamental to sustainable development.

An EIA process foresees the consequences of proposed projects in relation to social, physical, economic and cultural environment with which the proposed project interacts. EIA focuses on socioeconomic and environmental concerns and natural resource constraints that could affect the sustainability of the proposed project. It also examines how the project might cause harm to other resource users, their property or people's livelihoods in nearby communities and developments. After predicting potential impacts, EIA identifies measures to mitigate or minimise the negative impacts and enhance positive ones and outlines ways to improve the project's sustainability.

1.4 Objective of the ESIA Study

As provided in the Terms of Reference (ToR) (**Appendix 1**) approved by the National Environment Management Council (NEMC) (**Appendix 2**), the main objectives of this ESIA study was to:

- (i). establish a detailed documentation prevailing baseline conditions before project construction commences;
- (ii). identify the anticipated environmental impacts of the project and the scale of the impacts;
- (iii). propose mitigation measures to be taken during and after the implementation of the project;
- (iv). document the consultation process undertaken to inform potential project stakeholders as well as the attitude of the stakeholders towards the project;
- (v). consider stakeholders' views and suggestions on project's design;
- (vi). consider different alternatives to the project to meet the intended objectives and discuss alternative methods for developing the project to ensure that the project is justified from a broader environmental and social perspective, and
- (vii). develop an environmental management plan with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures.

1.5 Scope of the ESIA Study

The study takes into account environmental, social, cultural, economic, and legal considerations, and covers the following:

- (i) provide a comprehensive description of the project units, activities, processes and operations;
- (ii) identify anticipated environmental and social impacts of the project;
- (iii) identify and analyse alternatives to the proposed project;
- (iv) propose mitigation measures to be taken during and after project implementation; and
- (v) develop an environmental and social management plan (ESMP) with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures.

2. ESIA STUDY METHODOLOGY

2.1 Introduction

This ESIA study was divided into three phases; deskwork studies and analyses, fieldworks (for scoping and full ESIA study) and stakeholders' consultations. The methodology used in this ESIA followed these steps during the inception phase (debriefing), scoping phase and full ESIA (or impacts assessment) phase. The ESIA process specifically involved the methods presented below.

2.2 Scoping Study

As required by EIA and Audit Regulations of 2005, a scoping study was conducted with an aim of identifying key environmental and socioeconomic issues before undertaking full ESIA study. This ensures that the ESIA study is more focused and addresses all pertinent issues related to the proposed project. In this regard, the scoping study underscored the following aspects:

- (i) Identification of key environmental and social issues for full ESIA study;
- (ii) Identification of key stakeholders to be consulted;
- (iii) Identification of project alternatives;
- (iv) Identification of full ESIA study boundaries;
- (v) Identification of information requirements; and
- (vi) Identification of appropriate methods for full ESIA study; and defining and developing detailed ToR for the full ESIA study.

The methods that were employed during the scoping study are explained below.

2.2.1 Desk Review

The scoping study involved undertaking a thorough desk review of key documents that are relevant to the envisaged EIA study. The aim was to ensure that necessary technical as well as legislative and regulatory aspects relevant to the proposed project are taken into consideration.

2.2.2 Reconnaissance Fauna Assessment

As noted in the Iringa District Council Profile (2009), the district is relatively rich in wildlife. Therefore, assessing environmental impact of proposed project on wildlife is crucial. The scoping study employed a number preliminary trapping and tracking techniques to establish wildlife profile in the proposed study site. This was aimed at establishing guidelines for a detailed fauna assessment.

2.2.3 Reconnaissance Flora Assessment

The scoping study also undertook preliminary flora assessment to establish species richness and associated impacts from the proposed project. The study employed remotely sensed techniques to determine vegetation cover. The information provided will guide a detailed assessment of flora found on the proposed study site.

2.2.4 Reconnaissance Hydrological Assessment

Iringa district is one of the catchment areas for the Great Ruaha River which forms part of the Rufiji basin (Maganga et al, 2004). Hydrological assessment therefore is necessary to ensure that any proposed project is executed with possible minimum negative impacts on water resources in the area. Preliminary assessment of the area's hydrology entailed taking basic geographical information i.e. satellite based coordinates which will enable the determination of the nature of drainage pattern assessment to be undertaken during a full ESIA study.

2.2.5 Reconnaissance Cultural Heritage Impact Assessment

Given Iringa's such heritage potential as Rockshelters, Chief Mkwawa's rebellion to German colonial power and the famous Stone Age site of Ismila (located about 5 km from the proposed project site) (Biitmer and Willoughby, 2012; Willoughby, 2012), the scoping study found that a detailed Cultural and Heritage Impact Assessment is imperative before project execution. This become apparent due to site location and documented scientific findings reviewed during scoping study.

2.2.6 Mapping of Existing Land Cover/ Land Use

Land cover/use of the proposed project site is constituted with farm houses and other facilities of the former flower project as well as small maize plots. The remaining part of the farm is predominantly covered by natural vegetation. To this end, the scoping study established that full ESIA has to also include a detailed land use/cover analyses.

2.3 Socioeconomic Survey Methods

2.3.1 Literature Review

Literature review involved going through project documents, related to integrated poultry production study reports, Iringa District Council Profile, legal, policy and other relevant documents. Likewise, reference materials on physical, biological, and socio-economic attributes of the project site were also reviewed. From the exercise, a number of aspects emanated including:

- project area, location and pertinent features;
- project options under consideration;
- project components, activities and phases involved;
- scope and area to be covered during full assessment study;
- specific and general impacts that may be associated with the project;
- identifying legal, policy and institutional frameworks that may be associated with the proposed project and requirements for undertaking the EIA study.

2.3.2 Stakeholders Consultations

Different methods were employed by the ESIA team during the stakeholder's consultation process. These include consultative and public participatory meetings; personnel interviews and focus group discussion. The consultations were done mainly with technical personnel in Iringa regional and District Council officials; Community Based Organizations (CBOs), Government ministries, departments and agencies (MDAs). A simple questionnaire (**Appendix 3**) was used to consult key stakeholders especially at national level. Also, public consultative meetings in the villages were conducted to probe for the environmental, social, cultural and economic implications of the proposed project. Stakeholder

consultations during full impact study were guided by preliminary consultations conducted during scoping exercise where stakeholders were categorized and into seven main groups.

Table 2-1: Categories of stakeholders consulted

	Category of stakeholder	Institutions consulted
1.	Government Ministries, departments and agencies (MDAs)	Ministry of Livestock and Fisheries Development (MLFD); Ministry of Agriculture, Food Security and Cooperative (MAFC); Ministry of Industry and Trade (MIT); Veterinary Investigation Centre(VIC) – Iringa Zonal Office; Tanzania Food and Drugs Authority (TFDA); Occupational Health and Safety Authority (OSHA); and Rufiji Basin Water Basin Office (RBWO)
2.	Iringa Region	Regional Agricultural adviser
3.	Iringa District Council	District Executive Director (DED), Engineers, agricultural, livestock, planning, community development, HIV/AIDS, environmental and forest officers.
4.	Local communities surrounding Makota farm project	Ward executive officials; Village executive officials; Village chairpersons; Sub-village chairpersons; and Villagers
5.	Individuals and farmers groups association in the following villages	Ihemi, Makota, Kaning'ombe and Tanangozi
6.	Community Based Organizations	CBOs dealing with Agricultural (livestock keeping and farming) in the district
7.	STL's Workers (inherited from former investor on Makota)	Administrators, technicians, and non-technicians/ general workers

Detailed and intensive consultations, during ESIA study, were done with the above mentioned stakeholders. The main objectives of stakeholder consultations were to:

- (i) introduce project to the stakeholders and potential affected and benefited people;
- (ii) understand stakeholders concerns regarding various aspects of the project proposals;
- (iii) provide clear and accurate information about the project to communities living in or surrounding the project area especially neighbouring villages of *Tanangozi, Ihemi, Kaning'ombe and Makota* villages in order to obtain their concerns and views regarding direct and indirect environmental, social, cultural and economic impacts caused by the proposed project as well as preferred mitigation measures;
- (iv) allow stakeholder to air out their opinions about and expectations from the proposed project, and
- (v) promote understanding through active participation of individuals, local farmer's groups, organizations as stakeholders who have a stake in the project and its outcomes.



Figure 2-1: Stakeholder Consultative Meeting at Kaning'ombe Village

Source: Field photo, July 2013

2.3.3 Cultural Heritage Impact Assessment

Detailed intensive survey of the affected landscape was conducted. The survey aimed at identifying archaeological and historical or other physical heritage resources such as monuments, rock shelter, graves etc that may be affected by the proposed project. Four Test pit (TP) were done through excavation at a diameter of the 45cm, 50cm, 55cm, and 60cm. The waypoint of the TP were recorded as follows Test pit one located at (7°58.979'S, 35°29.937'E), Test pit two located (7°58.747'S, 35°29.620'E), Test pit three located at (7°59.053'S, 35°29.178'E) and (7°59.279'S, 35°30.478'E).

Key informants interview involved unstructured questions to local cultural experts was done to understand project sites potentialities of archaeological, historical heritage resources remains such as human burials, ethnographic objects etc.

2.3.4 Field Observations

Field observations were done to evaluate key biophysical and socio-economic components that might be affected by the proposed project, both, positively and negatively. These included physical assessment of the terrain that informed drainage pattern of the site during a hydrological impact assessment. Habitat observation was performed to guide floral and faunal impact studies. Sight layout as presented in the project brief was also verified so as to provide consultants with site overview in relation to location of different project facilities and how that may lead to positive and/or negative environmental and social impacts.

2.4 Flora Survey Methods

Habitat characterization was done during the site visits in order to establish major habitats within the entire proposed project area. Four major habitats were identified; woodland, riverine vegetation, grassland (fallow land) and farm (figure 2.1 below). Habitat characterization helped in alignment of transects for vegetation sampling and identifying sites for fauna study. The aim was to capture the biodiversity among different habitats. Thus, surveying various habitats ensured the recording of different biodiversity found within the Makota farm.

2.4.1 Literature Review

The task involved reviewing information on methods for undertaking flora surveys. Specifically, the review focused on analyses for ecological communities, vegetation structure and composition, as well as plant communities and tree species (see Munishi et al., 2011; Banda et al., 2006; McCune and Grace, 2002).

2.4.2 Vegetation Sampling

Vegetation sampling was done within 10 circular plots established and at the interval of 100 m in each transects (1 Kilometre long). Plot sizes differed according to the vegetation types; 15 m radius in woodlands and riverine vegetation (Munishi et al., 2001; Banda et al., 2006) and 30 m radius in grassland (Munishi et al., 2011). Circular plots are expeditious in allowing accurate area sampling with minimal effort for plot layout (a single central marker for permanent location) and they reduce the number of edge decisions because they minimize perimeter to area ratio (McCune and Grace, 2002).

2.4.3 Vegetation Identification

During the vegetation survey, climbers, fern, grasses, sedges, herbs, shrubs and trees were sampled. These were later identified in herbarium at the University of Dar es Salaam.

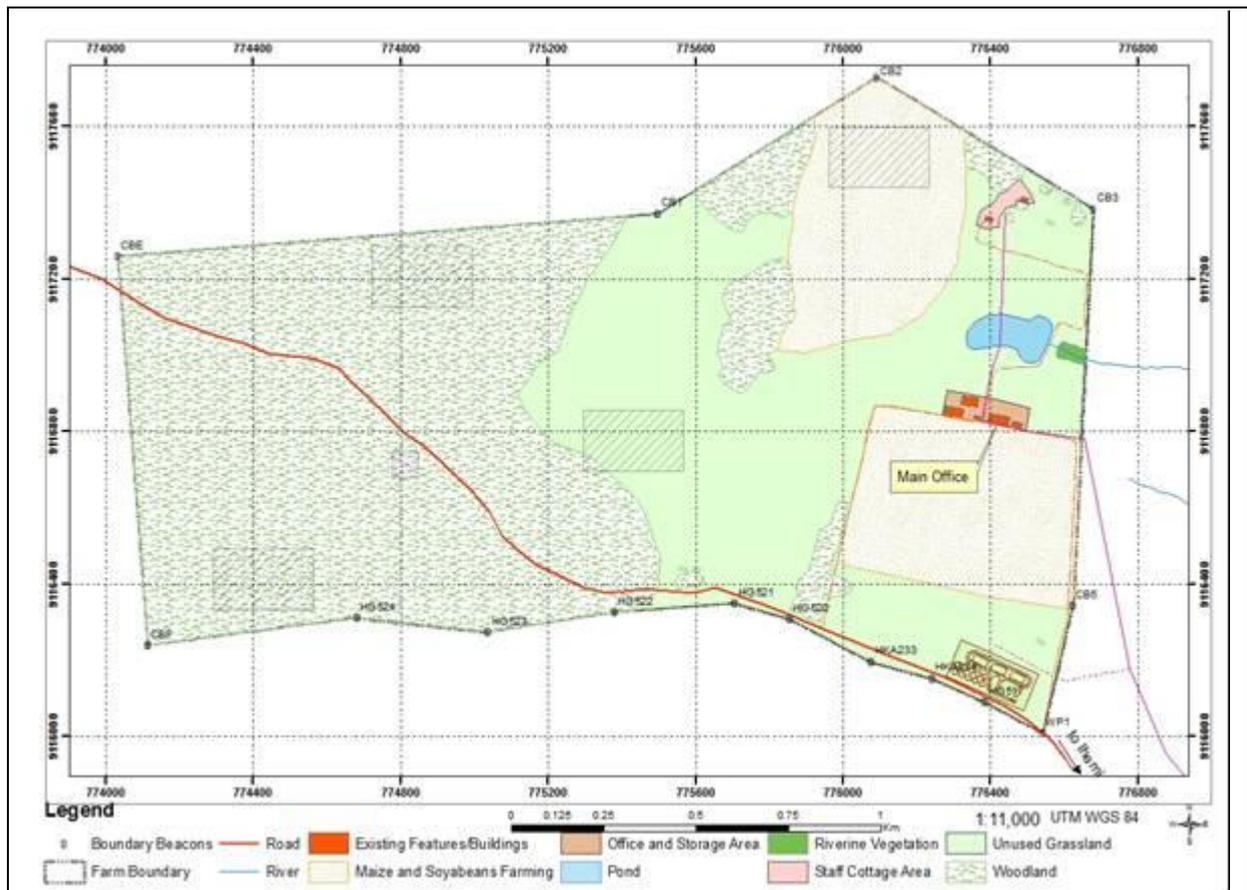


Figure 2-2: Proposed Project Area and its Major Habitat Types
Source: Field Study, July 2013

2.5 Fauna Survey Methods

Sites for fauna study and vegetation survey were identified and located in major habitat types such as woodlands, riverine vegetation, grassland (fallow) and in the farm (see Figure 2.2 below).

2.5.1 Literature Review

Like in flora survey, fauna survey exercise was preceded by a review of literature on relevant methods/techniques. These included but were not restricted to trapping, tracking, tracing, opportunistic observation, etc.

2.5.2 Large Mammals Survey

To understand whether the large mammals are present or absent in Makota farm and even in areas adjacent to the farm the following combination of methods were used:

2.5.2.1 Sighting (Casual Encounters)

The presence and/or absence of large mammals in Makota farm were recorded along transects aligned for vegetation survey.

2.5.2.2 Report from local residents

A total of 20 people were randomly selected and interviewed to give information about the presence or absence of large mammals at Makota farm and adjacent areas.

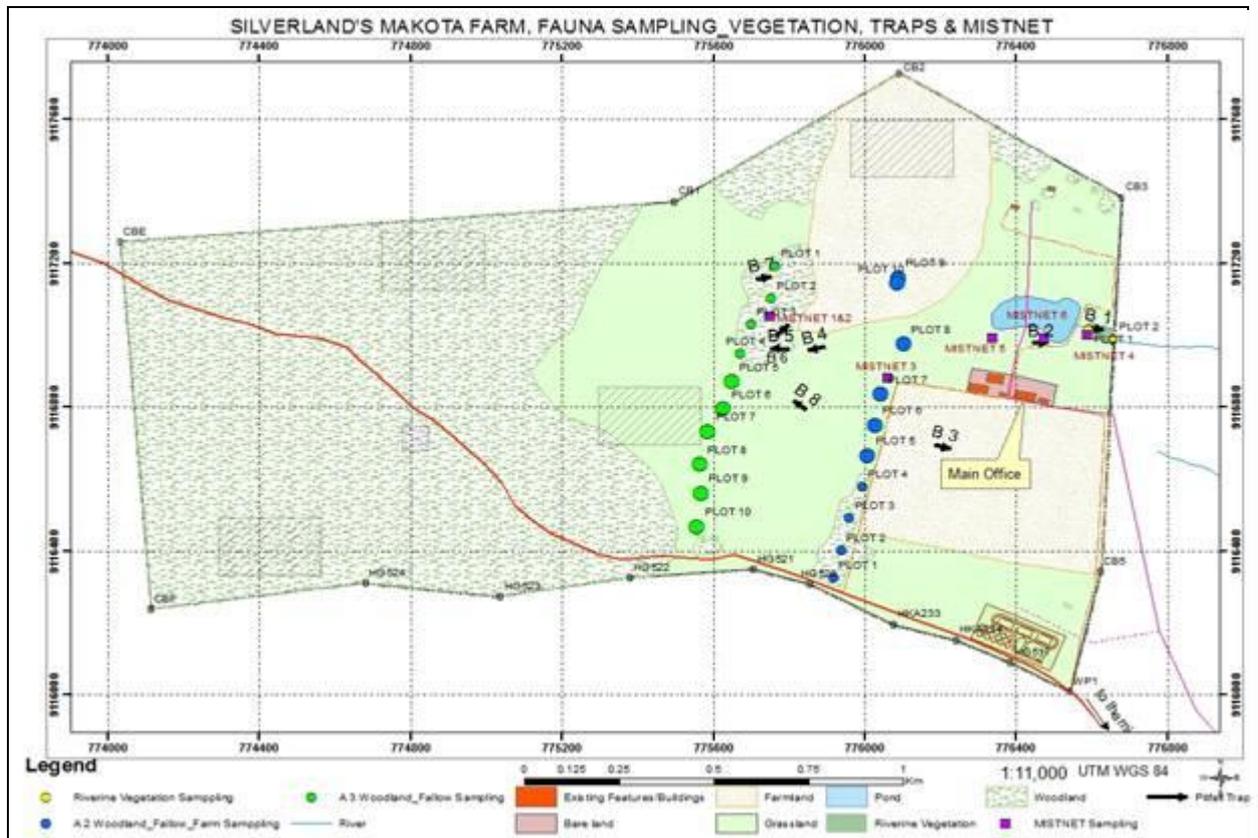


Figure 2-3: Fauna Trapping and Sampling Sites at Makota Farm

Source: Field Study, July 2013

2.5.2.3 Animal traces (signs/indices)

Different signs/indices indicating the presence of large mammals at Makota farm were traced along transects aligned for vegetation sampling and randomly while walking within the Makota farm.

2.5.2.4 Vocalisation

For five consecutive days, the team listened carefully for any animal vocalization. The method was mostly intended to capture information about the presence of nocturnal mammals (e.g. *Galagos*).

2.5.3 Small Mammals Survey

Small mammals are a group of flying and non-flying species grouped together because of their relatively small size, despite obvious anatomical and ecological differences (Davies and Howell, 2002; Corominas, 1999). Different from other fauna group, small mammal include species with individuals that do not exceed 5 kg (Hayward and Phillipson, 1979; Fleming, 1979). In Africa, small mammals are found in the orders *Rodentia*, *Insectivora*, *Carnivora*, *Lagomorpha*, *Chiroptera*, *Primates* and *Pholidota*.

A combined array of commonly used methods was used to sample small mammals in Makota farm (Stanley et al., 1996; 1998; 2005, Njau, 1999, Magige and Senzota, 2006) as below.

2.5.3.1 Shearman traps

Rodents and insectivores were sampled using 100 Sherman traps (standard size) baited with toasted groundnuts and peanut butter and sardines. At main trap sites (see Figures 2.1 & 2.2), traps were placed around three bucket pitfall lines, approximately 5m apart. Traps were baited each evening (1600hr or later and checked early the following morning (0800hr or earlier) for five consecutive days.

2.5.3.2 Bucket pitfall traps

Small mammals, amphibians and reptiles were sampled using 88 bucket pitfall traps. 50 m linear transects were created at each zoological trap site location whereby eleven 10 litre plastic buckets were positioned 5 m apart from each other (Figures 2.2-2.2). Buckets were sunk into the ground with their rims flush to ground level. Buckets had small holes in their base to allow water to drain from them. A vertical polythene sheet (approximately 0.5m high) was run along the bucket line crossing the centre of each bucket to form a 'drift fence'. A 10-15 cm lip of plastic sheeting was left flat on the ground onto which soil and leaf litter was placed to prevent any gap in the drift fence at ground level. Animals moving into the area from either side would be channelled along the plastic sheet towards the bucket traps. Each bucket pitfall line was placed at the distance of more than 150m apart so as to encompass a range of micro-habitats. Brief habitat notes were taken for each bucket position. Traps were checked daily early in the morning and evenings for trap site period (5 days in each area) and data about the capture and recaptured animal were recorded on standardised data sheets.

2.5.3.3 Bat mist-netting

Bats were trapped using six mist-nets (6 and 12 m long) within the trapping sites. Nets were placed across assumed 'flight corridors' such as Makota farm pond and in the riverine vegetation (Figures 2.1-2.2). Nets were left at the trapping sites for 5 days and checked daily approximately 0700 hour.

2.5.4 Amphibians and Reptiles Survey

Different groups of amphibians and four main groups of living reptiles; snakes, lizards, chameleons, and chelonians (tortoise and terrapins) were surveyed using the following techniques:

2.5.4.1 Timed Man-hour Searches

Timed searches (opportunistic surveys) for herpetofauna were conducted in Makota farm during both day and the night with the search time ranging from 1 to 6 man hours. Visual searching included the examination of hiding sites such as under logs and in crevices.

2.5.4.2 Audio-strip Survey

Anuras (frogs and toads) are the most active at night and most noticeable where males are vocalizing. Visual searching for vocalizing individuals is the most productive method of locating and capturing male anuras. Vocals/calls were intended to help in the identification of anura species because of vocal variations among species (Ngalason, 2005).

2.5.4.3 Bucket Pitfalls

The use of drift fences with bucket pitfall is the commonest technique for studies of individual species or hypertofaunal communities and has been used with success in trapping of amphibians and reptiles (Mitchell et al., 1993; Heyer et al., 1994; Handley and Varn, 1994; Kok et al., 1997; Msuya, 2001). The assumption behind the use of pitfall traps is that leaf-dwelling as well those which may be moving to or

from aquatic breeding sites can be effectively sampled using Bucket Pitfall Traps (Figures 2.1 & 2.2). However, tree frogs (family Hyperoliidae) and foam nest frogs (family Rhacophoridae) are not adequately sampled using this technique. Such herpetofauna species are mostly recorded opportunistically. In addition, Bucket Pitfall traps are not suitable for sampling large reptiles such as large monitor lizards, snakes, or highly arboreal forms. To capture a wide range of herps therefore, a combination of methods is used.

Data on reptiles and amphibians were recorded on standard recording forms which included habitat and altitude of each search, as well as the identification of any captures. If not taken as specimens, captures were released marked using scissors

2.5.5 Avifauna Survey

Avifauna refers to birds in a geographic region, a habitat region, a political boundary region or even a time period. Ornithologists and conservationists study a region's avifauna for both short and long term changes that may indicate population shifts, evolutionary adaptations or the rise or fall of threatened species. A number of methods were employed for this survey as describes in the following sections.

2.5.5.1 Timed Species Count (TSC)

Timed species count (TSCs) was employed by wandering around using existing road networks, including firebreaks and farm boundaries. In TSCs, birds were given scores of 6 to 0 depending on the sighting period of one hour long survey. Six scores were given for all birds recorded within the first 10 min of each TSC, 5 scores for the next 10 minutes and so on. This method is recommended for woodland and bush habitats (Pomeroy and Tengecho, 1986), in addition to producing a checklist; it also provides a reasonable measure of relative abundance (Bibby et al. 2000). Most of the TSCs were carried out in the morning and evening, though some were done in the mid of the day. During this survey we depended much on visual and very little for aural.

2.5.5.2 Bird mist netting

Six mist nets of 66m long (five of 12m and one of 6m) in total were laid down for three consecutive days. Two mist nets were put in the Miombo woodland (Net 1&2), one along the marshland (Net 4, at the lower end of the reservoir), two adjacent the water reservoir (Net 5&6, within 20m from the reservoir), and one within the grassland (Net 3) (see figures 2.1 & 2.2). The mist nets near the reservoir were laid down targeting birds that use marshlands, and those which use grassland near the reservoir. Nets were opened from 0730 to 1930 hrs, and checked every 30 to 45 minutes.

2.5.5.3 Opportunistic observation

Also carried out were opportunistic observations targeting species that are very hard to observe with TSCs and do not come down to mist nets.

2.5.5.4 Indices (calls/songs, nests and feathers)

Calls/songs, nests and dropped feathers helped in the identification of some birds indirectly.

2.6 Hydrology Study Methods

2.6.1 Introduction

The Makota farm is located within the Great Ruaha River basin as illustrated in figure 2.3 below. With its headwaters in Kipengere Mountains, the Great Ruaha River flows through the Usangu wetlands and the Ruaha National Park, serving as the main source of water for the Park, before flowing into the Mtera and Kidatu hydropower reservoirs. Hydroelectric plants (HEP) at these two dams generate about 50 per cent of power generated in the country.

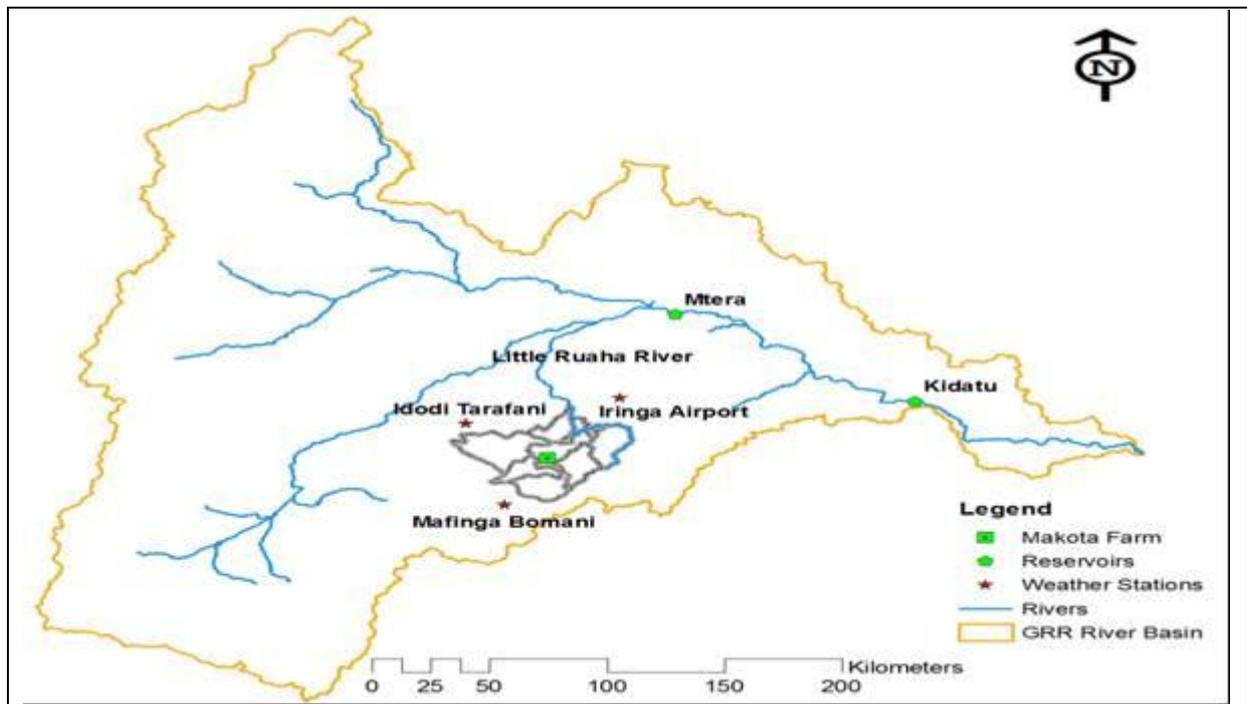


Figure 2-4: Location of Makota Farm in the Great Ruaha River Basin

Source: Field study, July 2013

2.6.2 Surface and Ground Water Assessment

A dam with 65,000m³ is located within the farm area previously used by the flower project. There is currently no plan to use the dam water in the proposed poultry production activities as it would require significant investment on treatment facility. The project instead proposes to use borehole water and it is estimated that about 25,000 m³ per annum of clean water will be required.

Hydro-census carried out during the field visit shows that shallow wells exist in surrounding wards. Also, due to serious water scarcity observed in the nearby villages, it is likely that in future, boreholes will be their reliable alternative. It is expected therefore, a water use licence will be applied for as required by the local authorities before drilling and construction of borehole.

2.6.3 Mapping of Drainage Patterns

Two catchments B1 (239.96 sq.km) and A1 (310.89 sq.km) draining the Makota farm to little Ruaha river were identified. The streams' lengths from the farm boundary are 39.50 km and 25.65 km for B1 and A1 respectively. An existing dam (65,000m³) is located on the property.

The dam is within a sub-catchment A2 with a seasonal stream recharging to Iddidiga spring which is the main source of water for over six nearby villages. On the other side of the farm, a seasonal stream drains sub-catchment B2. No channelling of rainwater runoff into any specific areas was observed.

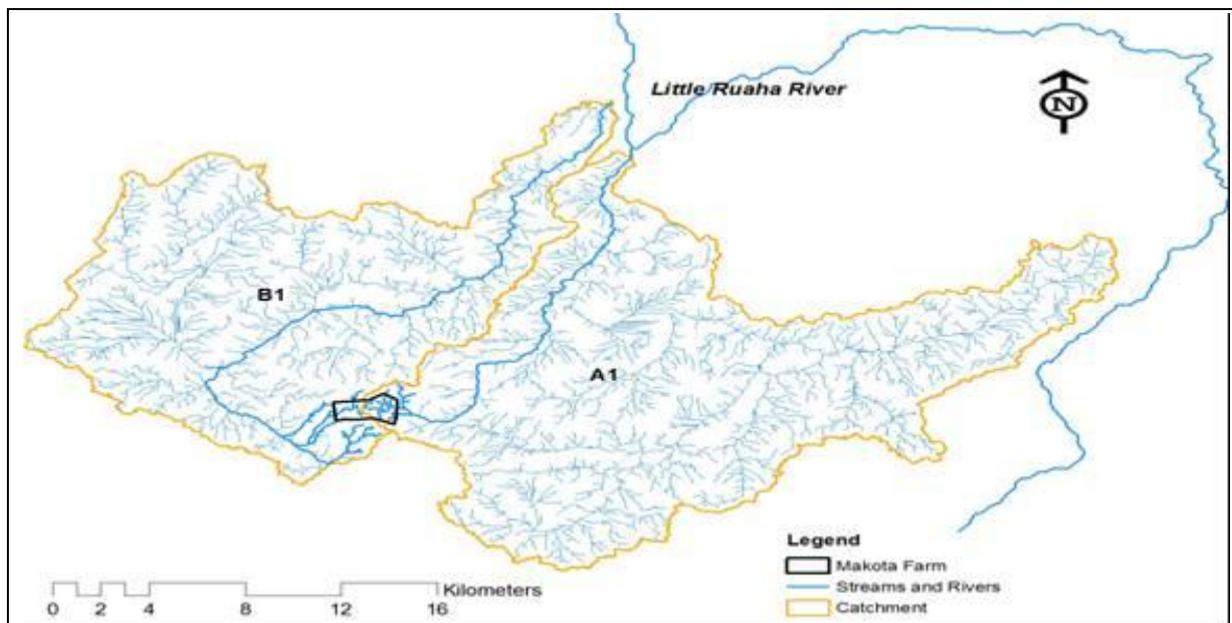


Figure 2-5: Catchments draining the Makota Farm

Source: Field study, July 2013

2.6.4 Delineation of Project Waste Streams

The watersheds for the study area were delineated from the Aster Global 30m DEM (Digital Elevation Model). The projected (Datum Arc 1960, UTM Zone 37S) DEM grid DEM was loaded to the ArcSWAT ArcGIS 9.3 interface which allowed delineating watershed based on the eight - pour point algorithm with steepest descent which helped to derive the watershed extent and also for the calculation of several geomorphologic parameters of the watersheds and the constituent segments. The watershed characteristics include catchment area, slope, stream length and stream slope (table 2.1).

Table 2-2: Summary for watershed characteristics

Catchment	Area (km ²)	Channel Length (km)	Channel Slope (%)	Land Slope (%)
A1	310.89	25.65	2.13	10.20
A2	1.98	2.52	2.20	10.63
B1	239.96	39.50	1.82	13.15
B2	1.62	2.75	1.73	10.66

Source: Field data, July 2013

2.6.5 Laboratory Water Analysis

Flooding can cause pollutants and waste to easily enter ground water and surface water. It is therefore important to understand the flooding conditions before setting up the waste management plans. In this assignment, the TRRL East African Flood model has been used to generate flood estimates for the different return periods (**Appendix 4: Flood Estimation using TRRL Flood Model**). The information has been collected and analysed in respect of all relevant aspects including soil characteristics, land-use pattern, soil cover and drainage characteristics of the stream catchments.

This method was developed by the “Transport and Road Research Laboratory (TRRL)”, of the UK, to estimate flood especially in un-gauged catchments. Once again it is very useful in areas where there are no or just a few rainfall stations in the area. This method can be applied to such un-gauged catchments using very little measurements of catchment characteristic e.g. area, slope and soil type.

This method is based on the fact that storm rainfall in a given duration can be related to the daily totals as measured by the standard rain gauge. It assumes that, if antecedent catchment conditions are envisaged over the region, T-year flood results from a T-year storm.

The essentials of the method consist of:

- Estimation of the physical parameters such as land and channel slopes, vegetation cover, land-use pattern and soil types;
- Design flood for return period of more than 10 years are worked out using the relationships as under:

$$\frac{Q_N}{Q_{10}} = \frac{P_N}{P_{10}}$$

Where,

- N Return Period in years
 QN N-year Design Flood
 Q10 10-year Design Flood
 PN N- year daily point rainfall
 P10 10- year daily point rainfall

The relationship given above is based on the assumption that the slope of the flood frequency curve is the same as that for the annual maximum daily rainfall. The design values for return period of 2, 5, 10, 25, 50 and 100 years were estimated using this model relationship. The discharge computations for the different rivers/streams are included in the appendix, while summary results of discharges and their corresponding catchment characteristics are given in table 2.1.

The essentials of the TRRL East African Model are as follows:

1. Calculate catchment area, land and channel slopes. The catchment land-slope is estimated by averaging the sub-basin slopes. The channel slope is the average slope from the drainage structure to the uppermost part of the stream.
2. Based on the site inspection report, establish catchment type in Table 7 (user manual) and hence the lag time K;
3. Based on the site inspection report or using Soil zones in Fig. 15 (user manual), establish soil type and with land slope estimate the standard contributing area coefficient (Cs) from Table 4 (user manual);
4. Using Fig. 14 (user manual), determine the antecedent rainfall zone. Refer to Table 3 (user manual) to determine if the zone is wet, dry or semi-arid;
5. Estimate catchment wetness factor (Cw) from Table 5 (user manual);
6. Compute the Contributing area coefficient (CA) using: $CA = Cs.Cw .CL$ where, CS = standard value of contributing area coefficient for a grassed catchment at field capacity, CW = catchment wetness factor and CL = land-use factor;
7. If antecedent rainfall zone so calculated as in above is semi-arid, initial retention Y is 5mm. For all other zones, Y is taken as zero;
8. Using Fig. 16 and Table 8 (both from the user manual), estimate rainfall time (TP);

9. Work out the design storm rainfall to be allowed for during time interval TB hours i.e. P (mm);
10. Compute the volume of runoff RO (m3) using: $RO = CA (P - Y).A.103$
11. Compute the average flow, , using: $=0.93RO/3600TB$
12. Compute base time TB using $TB=TP + 2.3K$ where, $TA = 0.028L/Q-1/4S1/2$
13. Repeat steps (9) to (12) until average flow is within 5% of the previous estimate;
14. Compute the Design Peak flow, Q (m3/s) using: $Q = F \cdot$, where peak flow factor F is 2.8 for $K < 0.5$ hours and is 2.3 if $K > 1$ hour.

It is noted that this method give reasonable estimates for catchments with areas of below 200km². The summary of hydrological calculations for the two catchments within Makota farm are summarised in table 2.2 and detailed in the appendices.

Table 2-3: Summary for hydrological calculations

Catchment	Contributing Area Coefficient (CS)	Catchment Wetness Factor (CW)	Land use Factor (CL)	Lag Time (hrs)	Rainfall Time (Tp)	Peak Discharge(m3/s)			
						10	25	50	100
A2	0.11	1.00	1.00	1.5	0.75	2.530	2.928	3.223	3.517
B2	0.11	1.00	1.00	1.5	0.75	2.020	2.339	2.574	2.809

Source: Field data, July 2013

2.7 Mapping of the Farm Area

2.7.1 Mapping Methods

Boundaries mapping of Makota farm was based on the beacons coordinate list from the farm's survey plan, and beacons locations were verified by using a hand held Garmin GPS. The data processing and map compilation was carried out in Arc GIS 10.1 software, existing features locations has been mapped based on high resolution satellite imagery and optimal sites of the proposed features mapped based on STL's desired choice locations, land cover/vegetation and current land use was also based on a satellite image followed by ground truthing using a Garmin GPS.

2.7.2 Features Mapped

The mapping exercise entailed a number of features as detailed in the text and appendices. These include (i) 4km proximity land use map; (ii) Project location maps; (iii) Current land use map; (iv) Fauna mist-net sampling map; (v) Fauna pitfall trap sampling map; and (vi) Site plan map.

2.8 Report Writing

2.8.1 Report Writing Activities

This report contains objective and accurate ESIA study observations, findings and recommendations. The main activities that were undertaken as part of draft and final report writing are:

Data analysis: All data and information collected were analysed in terms of impacts, both positive and negative. The analysis and review of qualitative information was through content analysis and expert judgement. Other forms of data such as flora, fauna and spatial/temporal were analysed using specific methods as detailed in previous sections above.

Development of mitigation and enhancement measures: This involved examination of the expected environmental and social impacts of proposed project activities, and other potential impacts, which are bound to arise if certain activities are undertaken. The impacts were examined with regard to their magnitude and significance in relation to both the environment and people, with consideration to their longevity and whether they are cumulative. Positive impacts were also analysed with a view to proposing enhancement measures.

Drawing conclusions and recommendations: This involved synthesising the impacts assessment and providing recommendations for possible remedial measures for effective and efficient environmental and social management systems.

2.8.2 Report Structure

In accordance with Regulation 18(1) (2) (a) of the Environmental Impact Assessment and Audit Regulations, 2005 this report has been compiled and structured in twelve chapters outlined as follows:

Chapter 1:	Introduction
Chapter 2:	ESIA Study Methodology
Chapter 3:	Project Description
Chapter 4:	Policy, Legal and Institutional Framework
Chapter 5:	Baseline Conditions of the Project Area
Chapter 6:	Stakeholders Consultations
Chapter 7:	Impacts Assessment
Chapter 8:	Mitigation and Enhancement Measures
Chapter 9:	Environmental and Social Management Plan
Chapter 10:	Project Alternatives and Cost-Best Analysis
Chapter 11:	Preliminary Decommissioning Plan
Chapter 12:	Summary and Conclusion

2.8.3 Submission of Report to NEMC

According to Regulation 21 of the EIA and Audit Regulations, 2005 on submission of environmental impact statement, this report to NEMC for review and approval.

3. PROJECT DESCRIPTION

3.1 Introduction

This chapter presents all aspects of the proposed project. It details the nature of the proposed project, its location, designs of the farms and site layout/plan. It presents the activities that will be involved during all stages of project; how wastes/by-products that will be generated from all project phases shall be handled as well as details on supportive resources i.e. man power and utility requirements.

3.2 Project Location Description

3.2.1 Location of the Makota Farm

The Makota Farm is located on the Southern highlands of Iringa Region in Mgama Ward of Iringa Rural District. The farm is about 30 km from Iringa Municipality and is about 1.5 km from Iringa – Mbeya highway. As indicated in the table below, the nearest residential houses are located on the northern part of the farm, 200 meters from the farm boundary.

Table 3-1: Distance between Makota farm and surrounding villages

	Name of village(s) bordering the farm	Location	Distance to the farm
1.	Tanangozi	Eastern	4 km
2.	Kaning'ombe and Makota	Western	2 km
3.	Ihemi	Southern	0.5 km
4.	Kaning'ombe and Tanangozi	Northern	200 meters

Source: Field data, July 2013

3.2.2 Land Ownership

STL is the owner of a titled Makota Farm (Farm No. 960) located at Ihemi village in Iringa Tanzania. STL has bought the farm from Shira Flowers Limited who set up the farm to grow flowers for the Dutch market in 2007. The flower project had received a grant from the Netherlands Ministry of Development Cooperation through FBME Bank Limited of Dar es Salaam. For a number of reasons the project was not successful and the company defaulted on its loans and the lending bank has exercised its rights to recover its loans from the sale of the farm assets. **Appendix 5** reveals the transfer of the farm Title Deed from Shira Flowers Limited to STL as executed by FBME Bank Limited in May 2013.

3.2.3 Project Site Description

A large part of the Makota farm is covered by woodland which occupies 49% of the total farm area followed by grassland 32.3%. The overall current land use or site description of the Makota farm is given in the table below.

Table 3-2: Site description/ current land use of the Makota farm

S/N	Land use	Area (Ha)	Percentage
1.	Maize and soya beans farming	53.4	17.2 %
2.	Office and storage area	1.5	0.5 %
3.	Staff cottage area	0.8	0.3 %
4.	Earth dam	2	0.6 %
5.	Unused grassland	100	32.3 %
6.	Riverine vegetation	0.3	0.1 %
7.	Woodland	151.6	49.0 %
	Total Area	309.6	100 %

Source: Field data, July 2013

Vegetation mapping revealed that mainly the land cover in the farm is farm land (short grass), grassland, bare land, riverine vegetation, earth dam and a large portion covered by Miombo woodland. The table below gives percentage coverage of each of these vegetation types.

Table 3-3: Makota farm's vegetation cover

Land Cover / Vegetation			
S/N	Land Cover	Area (Ha)	Percentage
1.	Farmland	53.4	17.2 %
2.	Grassland	100.8	32.6 %
3.	Bare land	1.5	0.5 %
4.	Riverine vegetation	0.3	0.1 %
5.	Pond	2	0.6 %
6.	Woodland	151.6	49.0 %
	Total Area	309.6	100 %

Source: Field data, July 2013

3.2.4 Existing Structures

The existing farm infrastructures are Shed 900m² (offices, stores, workshop, cold-room); an Earth Dam (65,000m³) constructed in 2007/2008 for the flower project; Power (33KV line, 220 kVA transformer, 110 kVA Perkins Genset); Farm House (3 bedroom), and hothouse.



Figure 3-1: Some existing infrastructure on Makota Farm

Source: Field photo, July 2013

3.2.5 Adjacent Land Uses

The main adjacent land use is smallholder farming of maize, cassava, potatoes, pulses such as beans, and woodlots planted with exotic tree species. The main cash crop is sunflower. Livestock including cattle and goats are the main animal husbandry activities. There are also village forest reserves.

3.3 Project Overview

3.3.1 Project Developer

Silverlands Tanzania Limited (STL) is a recently incorporated company in Tanzania (see **Appendix 6:** Certificate of incorporation No. 93945 of 19th September 2012) that intend to use the Makota Farm to create the leading integrated poultry business in Tanzania. STL's Trade License, Taxi Identification Number (TIN) Certificate is attached as **Appendix 7**. STL is a subsidiary company of SilverStreet Capital LLP, 33 St. James's Square Street, London, UK SW1Y 4JS.

3.3.2 Project Objective

The main objective of the proposed project is to build an annual production over a ten year period to 120,000 tons of high quality poultry feed, 15.6 million Day Old Chicks (DOCs), and 48.2 million table eggs. This will require a \$ 20.98 million investment into a 20 ton per hour feed mill, storage silos, rearing and laying houses, hatchery equipment, and related infrastructure over this period. The plan is to build storage silos and a feed mill to produce top quality poultry feed. Also, Chicken houses for producing layers and DOCs will be built (Figure 3.3).

Maize will be bought at harvest from predominantly small-scale farmers and soya will be produced both on STL's own farms and by local producers. Extension services will be provided to train farmers in the use of appropriate production techniques. 5,000 hectares of soya production will be required to fully supply the mill's requirements in the long term.

3.3.3 Business Strategy

STL's strategy is to move production of feed, DOCs, table eggs close to the source of the maize and to grow (and encourage others to grow) soya to replace fish meal as the protein source; the business will purchase 90% of the raw materials for feed production from local and regional sources. Iringa has been identified as an ideal base for this poultry business, due to its proximity to the major maize producing areas in the country and its central location to the target markets of Dar es Salaam, Dodoma, Iringa, Mbeya and Songea. The business strategy involves operations on a secondary site in Dar es Salaam that will house a commercial layer farm, hatchery, and depot.

3.3.4 Capital Investment

The developer/ investor will invest approximately USD 11.24 m over the life of its project with a further USD 9-10m being invested from cash flows. The project tentative time period is scheduled to start in 2013 and will extend over a period up to 10 years.

3.4 Project Components

3.4.1 Feed Mill Complex

A feed mill complex is one of the 9 facilities to be constructed during the initial construction phase. The largest part of poultry feeds will be mixed and delivered from this feed mill. The design of the mill is Modular Pre-Grind Feed Mill with the capacity of 20 ton/hour feed processing. The technology to be used will entail grinding, mixing, conditioning, pelleting, crumbling. The feed mill will be connected to 10 MySilo Grain Storage Silos 1618I-ZO with maximum capacity per silo (720m³/kg) = 2,124kg Layout of the mill with other facilities is as shown in figure 3.3 below.

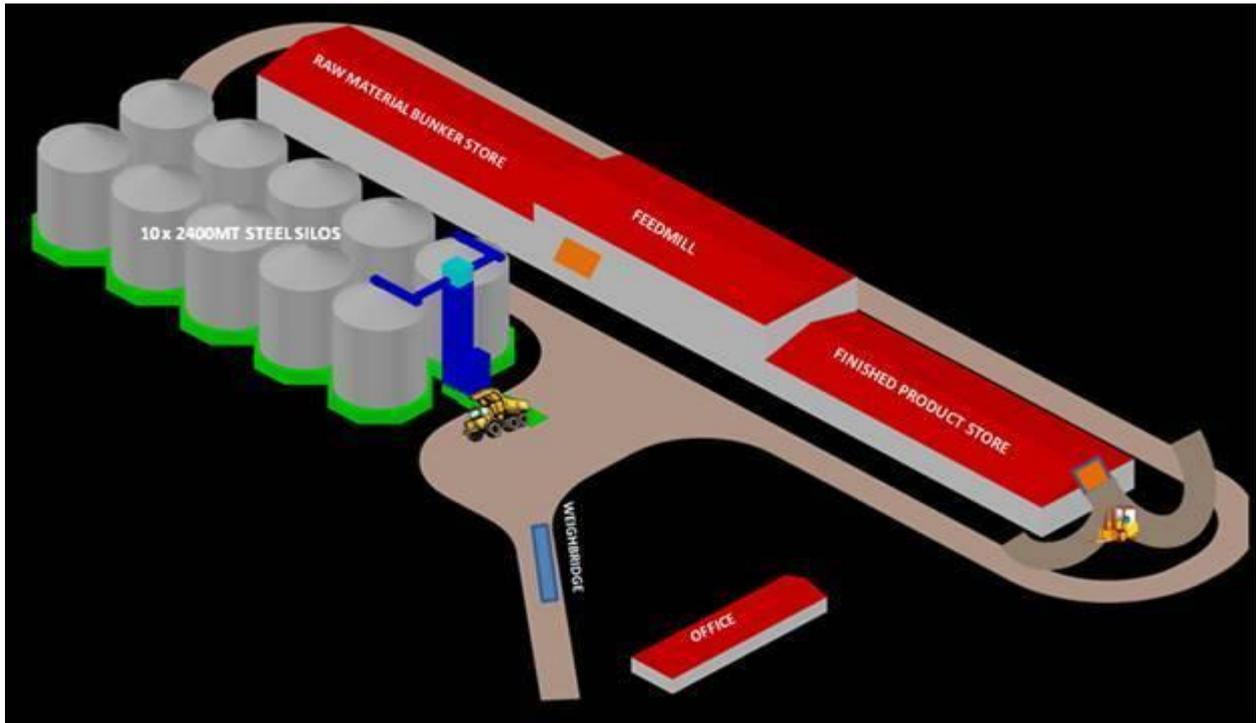


Figure 3-2: A typical feed mill to be constructed at Makota Farm.

Source: STL, 2013

3.4.2 Small Mill and Soya Plant

A small feed mill and soya plant will be located in the already existing building as shown in figure 3.4 that is going to be renovated during construction phase. This mill is aimed at manufacturing food for feeding chicken (particularly layers) that will be raised at the proposed site.

3.4.3 Rearing Sites

A total of four rearing houses will be constructed on site. These will be used to house parent chicks that will be imported. As for table eggs production, imported chicks will be nurtured in the rearing site for 18 weeks before being moved to laying site while for broilers it will take up to 22 weeks (figure 3.5).

3.4.4 Layer and Broiler Sites

After spending 18 weeks in rearing site, parent chicks for layers will be moved to laying sites where they will spend another 52 weeks laying eggs that will be hatched to produce layers to be raised in a commercial layers farm on site (Farm 3). Broiler parent birds will be housed for about 41-48 weeks laying eggs that will be hatched to produce broilers. There will be a total of 3 layer breeder sites including 9 x C-lines houses where each house is 105m x 12m. As for broilers, 4 broiler breeder sites will be constructed including 12 x C-lines houses each with the same dimension of 105m x 12m

3.4.5 Hatchery Sites

The proposed project will have one hatchery house designed by ChickMaster which will occupy a building area of 1,010m² (to be built in the second construction phase). The hatchery will be used for hatching both, layers and broiler chicks. The projected weekly setting capacity is 186,624 eggs. The technology to be used in the hatchery will include C576-54 Multi-Stage Setters and CVH96 hatchers. An initial stage will involve importing chicks which will be raised at the farm (figure 3.5).

3.4.6 Staff Housing

By financial year (FY) 2014 the proposed project is expected to have 7 housing facilities 4 as staff cottages and the rest for senior staff (see figure 3.4 below).

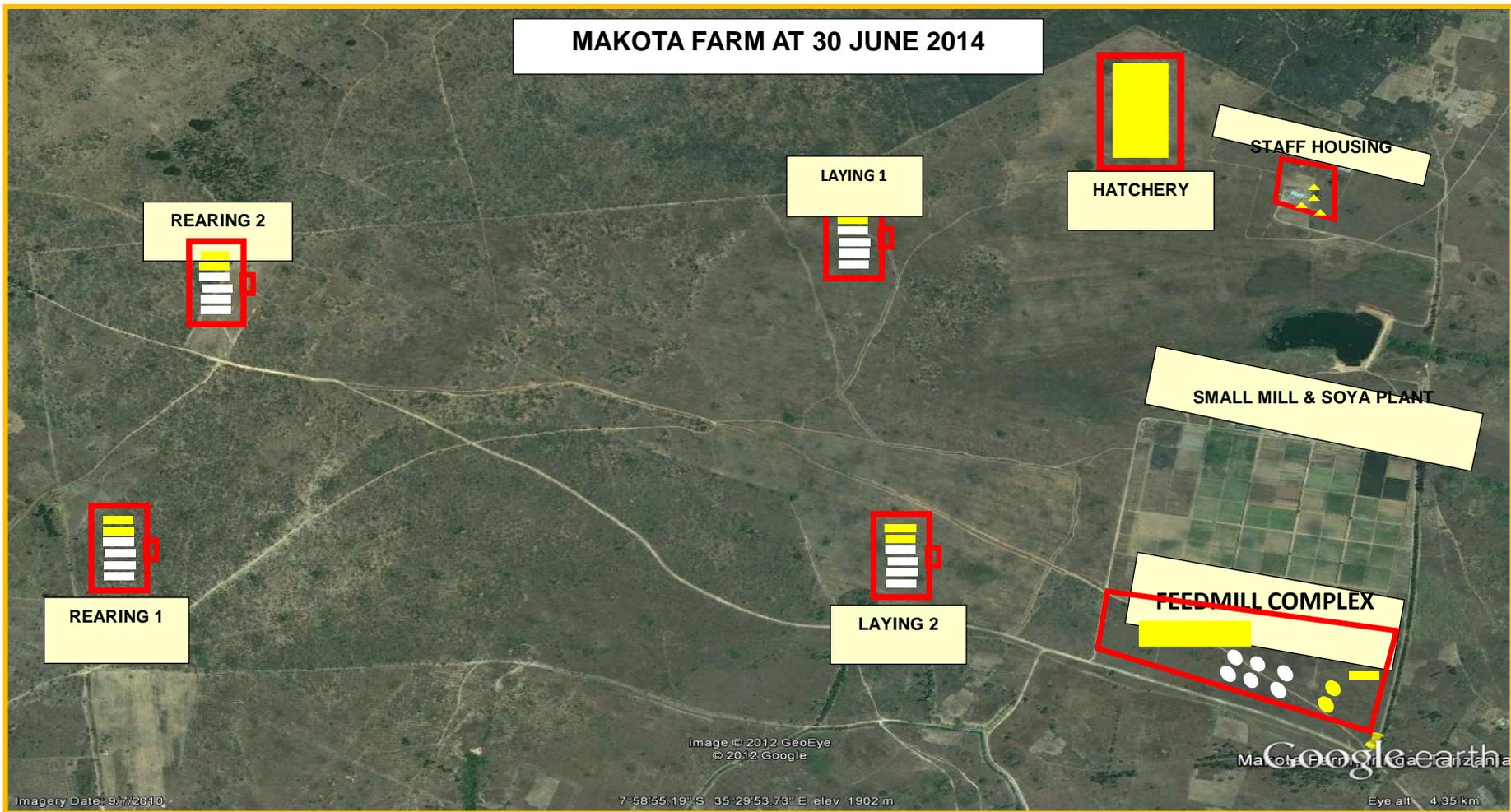


Figure 3-3: Site layout showing location of different facilities
Source: STL, 2013

Tanzania

Silverlands Poultry Project - Makota Farm Map Proposal (to approx scale)

BB =	Broiler Breeders
CB =	Commercial Breeders

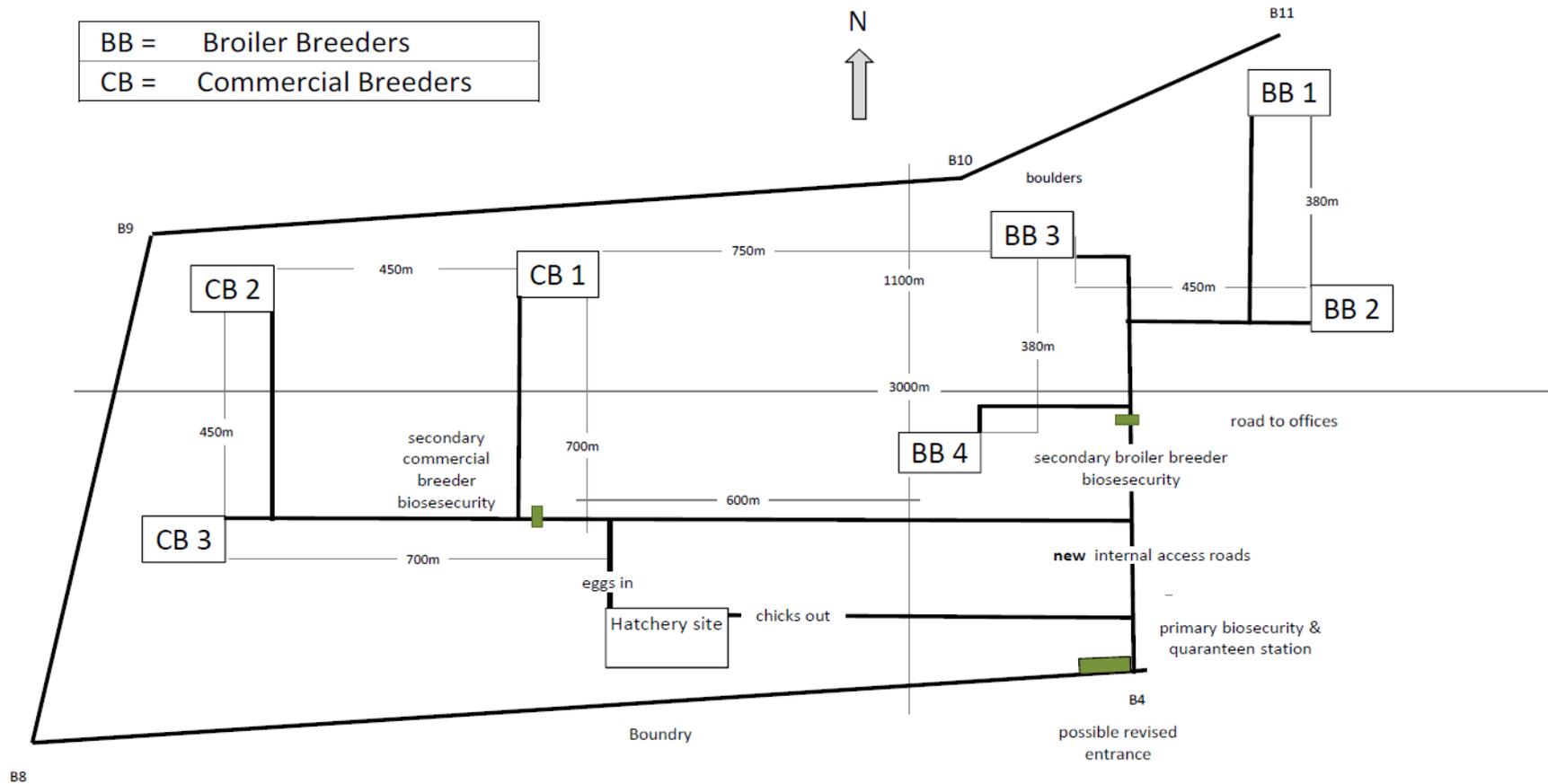


Figure 3-4: Project components layout plan
Source: STL, 2013

3.4.7 Dar es Salaam Operation Centre

The proposed project will have mixing and distribution operation in Dar es Salaam. This is due to the fact that Dar es Salaam offers potential for quite a big number of customers being the business capital and most populous city in the country. The facility will also help in logistical cost reduction.

3.5 Project Production Processes

The Makota integrated poultry project will involve building annual production over a ten year period to 120,000 tons of high quality poultry feed, 15.6 million DOCs, and 48.2 million table eggs. The plan is to build storage silos and a feed mill to produce top quality poultry feed. Also, chicken houses for producing layers and DOCs will be built. Specific production process for each of the three components is as follows:

3.5.1 Poultry Feed Production Process

The project is proposing use of maize and soya as key ingredients for poultry feed. Use of soya is a slightly new approach from conventional poultry feed production in Tanzania that are dependent on fish as source of protein. In the Financial Year (FY) 2014 the project is expected to produce about 7,540 tonnes. Feed mill production will increase to the tune of 10,000 tonnes per annum by FY2022. This production will be attained based on 20 tonne/hour feed mill.

Poultry feed production will involve three key processes: grinding, mixing and pelleting. Grinding or particle-size reduction is a major function of feed manufacturing. Many feed mills pass all incoming ingredients through a grinder for several reasons: (a) reduction of clumps and large fragments (b) moisture removal by aeration, and (c) blending of the feed with additives such as antioxidants. The grinding of ingredients generally improves feed digestibility, acceptability, mixing properties, pelletability, and increases the bulk density of some ingredients. It is accomplished by many types of manual and mechanical operations involving impact, attrition, and cutting.

Feed mixing will include a number of combinations of solids as the aim is to produce solid/dry feed. Number of combinations will be determined by the nutritional requirements of the animals to be fed.. This is one of the reasons for project collaboration with farmers to ensure they produce high quality ingredients i.e. maize and soya. The objective of feed mixing is to start with a certain assortment of ingredients called a "formula", totalling some definite weight. This will be processed so that each small unit of the whole, either a mouthful or a day's feeding, is the same proportion as the original formula.

After mixing, the feed will be conditioned to ensure a number of aspects including: raising the mash moisture and temperature cook; activating natural adhesives found in ingredients; softening the feed particles for increased surface binding during compression; increasing pellet die lubrication, and destroying micro-organisms as well as deactivating some anti-nutritional factors

Pelleting and crumbling entails transformation of a soft, often dusty feed into a hard pellet by compression, extrusion, and adhesion. The general process involves passing a feed mixture through a conditioning chamber where 4 to 6 per cent water (usually as steam) may be added. Moisture provides lubrication for compression and extrusion and in the presence of heat causes some gelatinization of raw starch present on the surface of vegetative ingredients, resulting in adhesion. Within 20 seconds of entering the pellet mill, feed goes from an air-dry (about 10-12 per cent moisture) condition at ambient temperature, to 15-16 per cent moisture at 80-90°C. During subsequent compression and extrusion through holes in a ring' die, friction further increases feed temperature to nearly 92°C. Pellets discharged onto a screen belt of a horizontal tunnel drier or into a vertical screened hopper are air-

cooled within 10 minutes to slightly above ambient temperatures and dried to below 13 per cent moisture. The process ends with crushing the feed to consistent crumbs so as to make the feeding process more convenient and efficient by guaranteeing optimum digestibility.

3.5.2 Table Eggs Production Process

Poultry enterprises may vary from basic backyard poultry keeping to mechanized and automated production farms. The Proposed Integrated Poultry Production on Makota Farm is commercial poultry DOC production that will involve full-time labour and geared towards producing on a sufficient scale. Parent Birds usually start to lay eggs at around five months (20-21 weeks) of age and continue to lay eggs for 12 months (52 weeks) on average, laying fewer eggs as they near the moulting period. It is projected that the production during FY2015 will be 40,000 Hatching eggs/ week and expected to reach 120,000 hatching eggs/ week during FY2022.

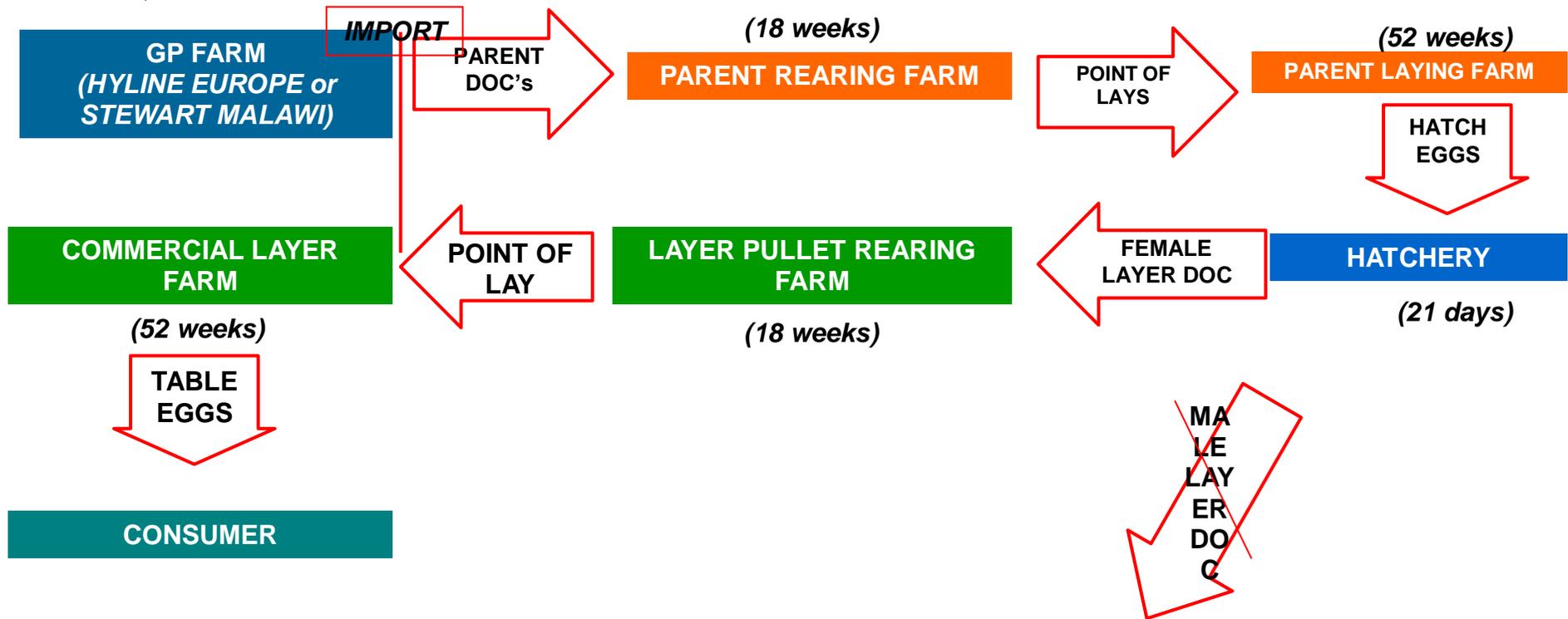
The typical production cycle lasts about 17 months (72 weeks) and involves three distinct phases, as follows:

Phase 1: *Brooding DOC to be imported from Europe and/or Malawi at commencement of the project.* This phase lasts from 0 to 2 months (0-8 weeks) during which time small chicks are kept in facilities (rearing farm).

Phase 2: *Rearing.* This phase lasts about 3 months, from the ninth to the twentieth week of age. Growers will still be housed in the rearing farms. Appropriate care will be provided to the growers particularly between their seventeenth and twentieth week of age as their reproductive organs develop during this period.

Phase 3: *Layers.* This stage will involve transferring point of lay pullets from the rearing house to the layer house when they are 18 weeks old to prepare for the laying cycle. Birds typically lay eggs for a twelve-month period starting when they are about 21 weeks old and lasting until they are about 72 weeks old.

Figure 3.6: Table Eggs Production Process
 Source: STL, 2013



3.5.3 Broilers Production Process

Broilers are chickens bred and raised specifically for meat production. Typical broilers have white feathers and yellowish skin. Most commercial broilers bred for meat reach slaughter weight at between 5 to 7 weeks of age, although slower growing strains reach slaughter weight at approximately 14 weeks of age. When the proposed project is up and running production of DOCs in the FY2014 will be around 1.9 million DOCS'. As for FY2022 production will mount to overall 300,000 DOC's/week with Makota Hatchery alone producing 100,000 DOC's/week.

Broiler breeder production process will begin with the DOCs (parent flocks) to be imported from Europe and/or Malawi. The breeder flocks will then be raised to maturity for 22 weeks. Upon egg laying period the parent flocks will be moved to laying houses, where they will spend 41-48 weeks from which fertile eggs will come and then sent to hatcheries which will take 21 for hatching to take place. Shortly after the eggs hatch, the chicks are then sold to broiler farmers who will grow them out over 6 to 8 weeks.

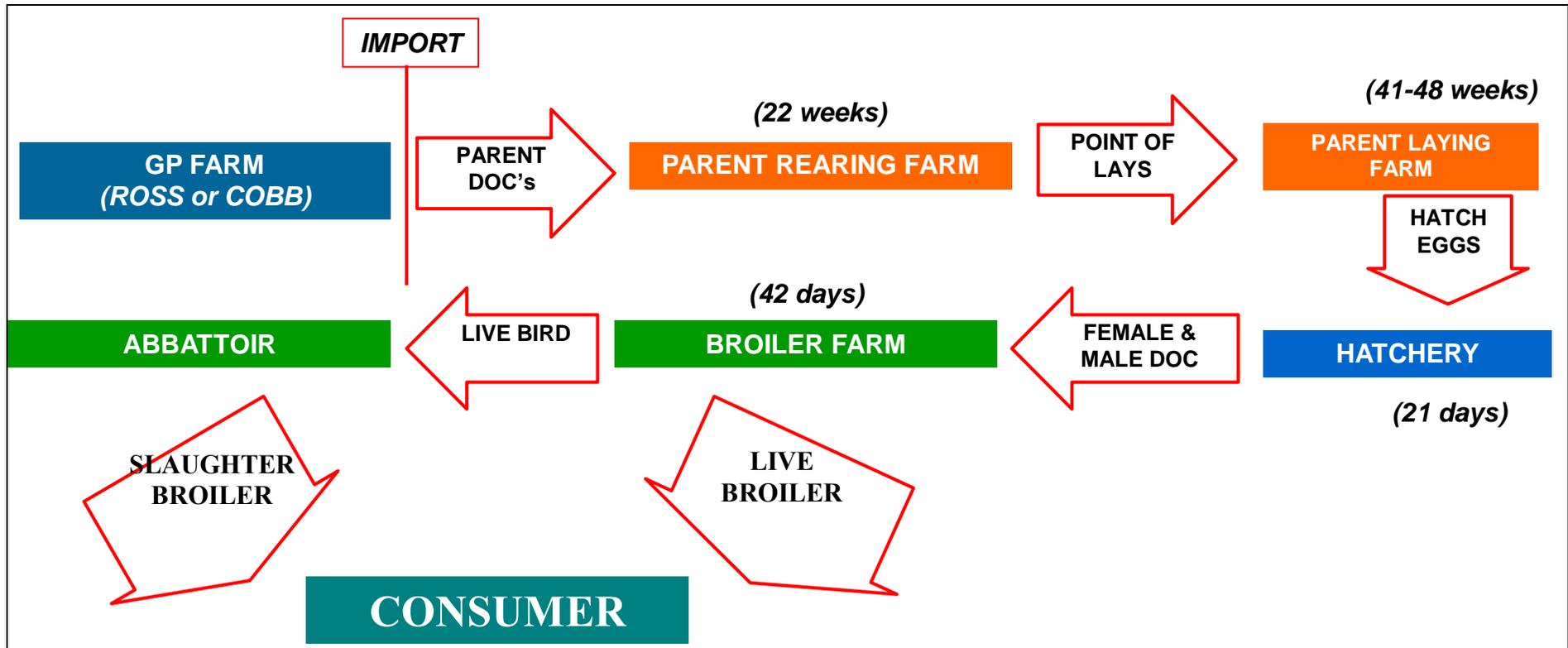


Figure 3-5: Broiler Production Process
Source: STL, 2013

3.6 Manpower and Utility Requirements

3.6.1 Manpower Requirements

The proposed project is expected to temporarily employ about 50 people during construction phase and 30 to 40 during operation phase. Employment will be in the form of managers, skilled labourers as well as unskilled labourers. The project has inherited a total of 25 employees from former flower project which includes administrator, foreman, supervisors, storekeeper, security (x6), electrician, carpenter, workshop technician, and general labourers.

Upon commencement of operation the proposed project will employ five (5) additional personnel as project manager, financial manager marketing manager, maintenance foreman, and a poultry manager.

3.6.2 Land Requirement

Of the 309.6 ha of the titled Makota farm, the proposed integrated poultry production is expected to utilize a maximum of 30 hectares to be occupied with the following main infrastructures:

1. Feedmill complex and rearing sites including their fences;
2. Boreholes, storage and reticulation;
3. Access roads to poultry sites;
4. Weighbridge with small office;
5. Ten Grain Silos (22000T);
6. Small Feedmill / Soya Processing (existing building);
7. 4 poultry sites
8. New Staff Cottages.

For expansion of the project and the establishment of additional poultry sites, additional land close to the existing farm will have to be purchased. Makota farm will only be used for poultry activities. The existing cropping lands may continue to be utilized for crop production

3.6.3 Electricity

Total connected load will be 33 KV supplied through three phase 220kVA distribution transformer from national electricity grid. However, due to recurrent power cuts from the national grid the proponent will install a 110 kVA Perkins generator set for backup. A further 500kVA supply will be installed at the feed mill site

3.6.4 Water Requirement

Water will mainly be used, for drinking and sanitation purposes in the hatchery and 4 layer sites. The main source of water will be the boreholes to be drilled onsite. For efficient and sustainable water use, the boreholes will be reticulated to storage facilities onsite. It is estimated that about 25,000 m³ per annum of clean water will be required.

3.6.5 Access and Service Roads

There is one main access road to the proposed project site stretching for about 1.5km to the Iringa-Mbeya highway. The project will also require onsite access roads to connect existing and to-be-constructed infrastructure. As there are already a number of access roads, the proposed project will make most use of these and construct new ones only when it is necessary to do so.

3.7 Project Development Phases

3.7.1 Mobilization and Construction Phase

Mobilization and construction phase will involve deployment mainly in terms of recruiting the required labour force for construction works, transportation of construction equipment as well as purchasing and transporting construction materials from local sources. These will include: cement; iron sheets; steel bars; pipes, etc. from local shops; stones, aggregates, and sand from nearby quarry sites and borrow pits. The construction phase will be divided into two sub-phases. The initial construction phase will involve putting in place the following infrastructure:

1. A feed mill complex and 2 rearing sites including their fences;
2. Water supply facilities (boreholes, storage and reticulation);
3. Electricity application;
4. Access roads to poultry sites;
5. Weighbridge with small office;
6. Two grain silos (4,400T);
7. Small feed mill / soya processing (renovation of an existing building);
8. New Staff Cottages.

The final construction phase, to be implemented in FY2014 to FY 2017 will entail putting in place the following additional infrastructures:

1. Two layer sites and their fences;
2. Water supply facilities (borehole for hatchery; 2 layer sites);
3. Electricity (supply to 2 layer sites and hatchery);
4. Access roads to poultry sites;
5. 8F grain silos (17 600T);
6. Office at silo complex;
7. Large feed mill;
8. Hatchery;
9. Two staff cottages; and
10. Two senior staff houses.

3.7.2 Operation Phase

At operation phase, the following three legs of business are expected:

1. Feed mill Processing and Storage Capacity
 - FY2014: 7,540T/annum
 - FY2022: 10,000T/month
 - 20 T/Hour Feed mill
 - 10 x 2,400T Silos
 - Soya Processing
 - Dar es Salaam Mixing & Distribution Operation
2. Commercial Layers Production
 - FY2015: 40,000 eggs/ week
 - FY2022: 120,000 eggs/ week
3. Day Old Chicks Production Capacity
 - FY2014: 1.9 million DOCS'
 - FY2022: 300,000 DOC's/week
 - Makota Hatchery: 100,000 DOC's/week

3.7.3 Decommissioning Phase

The project is tentatively scheduled to start in early 2014 and will extend over a period up to 10 years at which stage the developments on the project will be completed. The project is then expected to continue for longer than 25 years. Unless some unexpected factors triggers an immature closure of the business, decommissioning of poultry production facilities for the proposed project is not anticipated to be in the near future. However, it is important that the developer throughout the life span of the project establishes a monitoring program for the environmental and social aspects and the findings be included in audit reports that would feed into a decommissioning plan if deemed necessary. The decommissioning plan will be prepared in line with applicable regulations.

As for the demobilization of contractors and engineer's campsites and workshops, the campsites will have to be reclaimed, re-contoured and restored so that the pre-disturbance vegetation can re-establish itself in a short period of time. All waste, refuse materials and equipment shall be removed by the contractor at the end of construction. Pits and quarries should be backfilled with clean and/ or granular material, levelled or sloped and if necessary re-vegetated.

3.8 Waste Generation and Management

3.8.1 Construction Phase

During construction stage of the project waste materials to be generated will include among others:

- Soil Wastes such as landscape and land clearing debris, gravel and aggregate products, concrete, masonry scrap and rubble (brick, concrete masonry, stone), and plastics and paper from cement bags
- Gaseous emissions. The majority of the air pollution will be in the form of dust, being generated during construction.

Sufficient waste management on a construction site is crucial to ensure sustained building.. Such wastes as rubbles and other debris will be used for landscaping purposes on site.

3.8.2 Operation Phase

3.8.2.1 Solid Waste

During proposed project operation solid waste that will be generated include, animal waste primarily manure, carcasses, and sediments and sludge from on-site wastewater treatment facilities that might have traces of growth enhancers and antibiotics. Broilers produce approximately 1.5 tonnes of dry poultry litter per 1,000 birds in about seven weeks, comprising 50% manure and 50% litter. Layers and breeders produce far less than broilers as they are on restricted feeding and the bedding or wood shavings are only replaced once or twice a year. Manure is a beneficial waste as it is treasured by crop farmers as a fertilizer.

Other wastes include solid organic wastes and by-products from feed and egg processing activities, various kinds of packaging (e.g. for feed additives), used ventilation filters, unused / spoilt medications, and used cleaning materials. Other wastes are domestic wastes such as food and general wastes, and office wastes including paper, cardboard, and printer cartridges/ribbons and human sewage

3.8.2.2 Waste Water

Water requirements in poultry production activities will be mainly for drinking and cleaning. Process wastewater generated during these activities residues of chemicals such as chlorine used for washing and disinfection. These may have negative repercussions on downstream water resource as they have high eutrophication potential.

Effluents generated by poultry operations come from such different sources as: runoff from poultry housing; feeding and watering, and waste storage and management facilities. Both types of effluents have the potential to contaminate surface water and groundwater with nutrients, ammonia, sediment, pesticides, pathogens, and feed additives and antibiotics. Therefore, waste management approaches such as application of animal waste as manure may lead to non-point source effluents due to runoff. Other Wastewater sources may include non-contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage.

3.8.2.3 Gaseous Emissions

Gaseous emissions from poultry process mainly consist of ammonia due to animal waste, odours from sheds and waste management, dust caused by feed storage, loading and unloading, as well as dry waste management. Ammonia gas and other sources of odour may also be generated primarily due to denitrification of manure and can be released directly into the atmosphere at any stage of the manure handling process. Other sources of odours include, manure piles. Other air emissions are from combustion sources, such as electrical generators.

3.8.3 Waste Management

All effluent and other wastes generated during the proposed project operation shall be properly managed and disposed of without adverse effects on people's health and the environment. Liquid and/or solid wastes should not be spread on the property within the prescribed distance of dwellings, watercourses or roads. In the following sub-sections description on how different forms of waste will be managed is made.

3.8.3.1 Poultry Manure

Poultry manure is referred to as material that is 100% bird droppings. Closely associated with that is poultry litter that consists of manure mixed with bedding material (i.e. saw dust, rice husks, etc.). Meat birds produce approximately 1.5 tonnes of dry poultry litter per 1,000 birds in about seven weeks, comprising 50% manure and 50% litter. Chicken litter will be removed from breeder houses once a flock has been culled. Broiler breeder houses will be cleaned once in approx. 47 weeks and layer breeder houses once in approx. 57 weeks. Chicken litter will be sold to crop farmers to be utilized as fertilizer and litter will be loaded directly from breeder houses onto trucks and transported off the farm. No waste disposal facilities will be required for the litter.

3.8.3.2 Waste Water Management

Wastewater that will be generated by the project is due to such activities as facilities cleaning as well as domestic activities. In addition to sweeping poultry sheds to remove litter, they shall be washed in order that any residual materials are removed. The process will lead to wash-down water containing very small amounts of organic matter and microbes. No direct discharge shall be made into environment instead all water resulting from the washing down of the poultry houses or hatchery will be passed over fine mesh screens to remove solid particles which will then be composted for fertilizer, the remaining

water will be processed through a septic tank system on the site to breakdown any organic matter and then released into a soak pit.

Similarly, all wastewater from processing halls and domestic activities (staff housing and cottages) shall be handled through septic tanks with soak away pits and later on disposed to designated oxidation ponds. Moreover, storm water from roof tops shall be directed towards the installed septic tanks and not directly into the surrounding environment.

3.8.3.3 Management of Odours

In order to control odours emanating from animal waste in the sheds and decay of dead birds the proposed project will take the following measures:

- optimizing the frequency of shed clean-out;
- frequent addition of lime and salt into bird mortality tanks
- maintaining low dust levels since odours are absorbed and carried by dust particles;
- maintaining recommended bird stocking densities;
- making use of modern technology and replacing malfunctioning and/or old, inefficient equipment;
- install adequate ventilation that shall achieve maximum possible dilution of odour strength during shed cleanout;
- using dense vegetation buffer screens to effect turbulent airflow (for odour dispersion), installing dust filters and redirecting odour away from sensitive areas; and
- Removing the litter from the site to the farmers lands directly from the poultry house at time of cleaning

3.8.3.4 Management of Feed Processing Waste

During operation, the proposed project will ensure proper feed waste management systems such air filters are properly utilised.

3.9 Project Boundaries

Identification of boundaries under which the project falls is an essential component of an ESIA study. These include; spatial, temporal and institutional boundaries.

3.9.1 Spatial Boundaries

The Makota Farm is located on the Southern highlands of Iringa Region in Mgama Ward of Iringa Rural District. The farm is about 30 km from Iringa Municipality.

Primary spatial boundaries include 309.06 hectares Makota farm. About 50% of the Farm is occupied by residential houses and infrastructures of the former flowers project. These include: Shed 900m² (offices, stores, workshop, and cold-room); an Earth Dam (65,000m³) constructed in 2007/2008 for the flower project; Power (33KV line, 220 kVA transformer, 110 kVA Perkins Genset); Farm House (3 bedrooms), and hothouse. The remaining 50% of the farm is still covered with natural vegetation (trees, shrubs and grasses of different species).

Secondary boundaries include four villages bordering the farm in all directions, these are; Tanangozi, Kaning'ombe, Makota and Ihemi. About 1.5 km from the farm is the Iringa-Mbeya highway. The

highway has a strategic international importance as it links Tanzania to southern and central African countries such as Mozambique, Zambia, Malawi, and DR Congo (see figure 3.7 below).

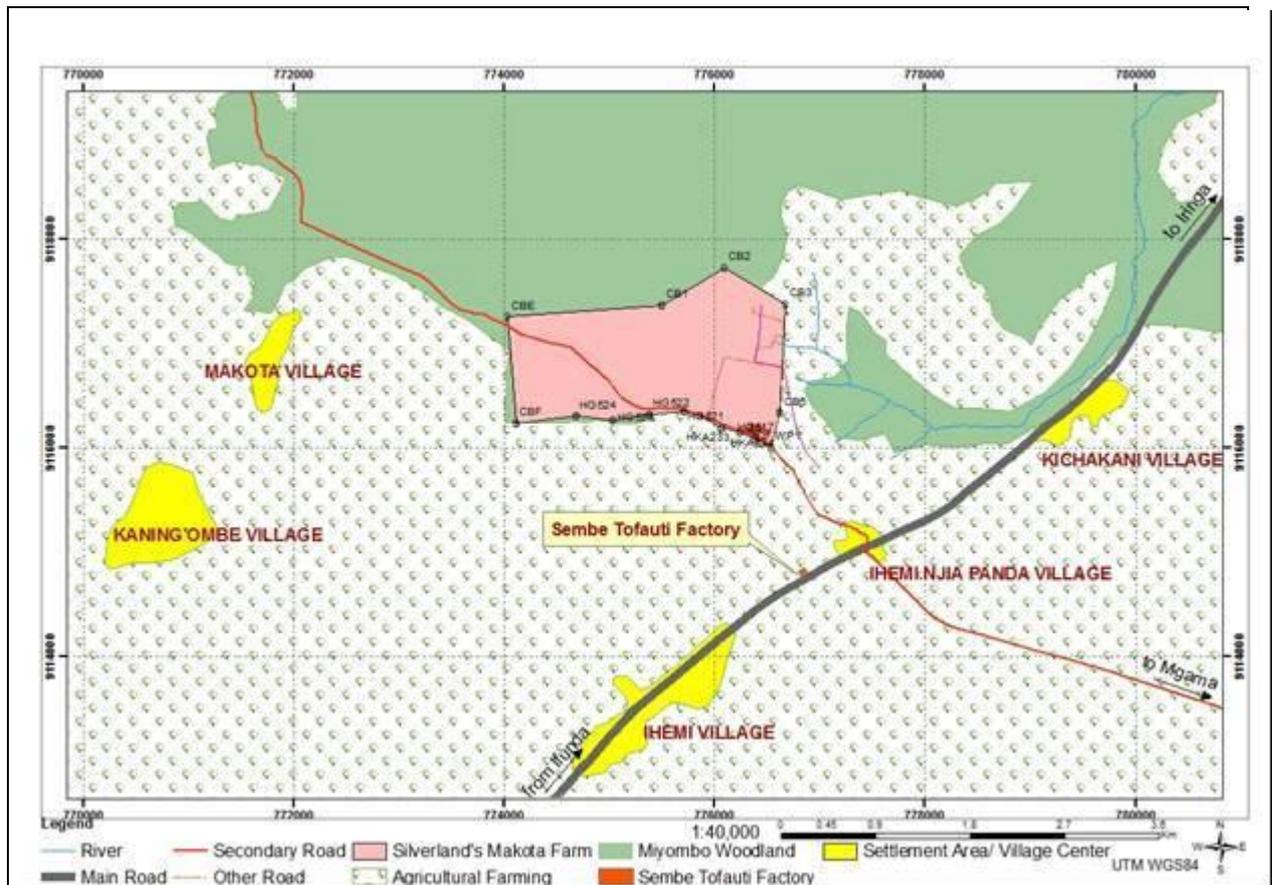


Figure 3-6: Proposed Project Spatial Boundaries

Source: Field Study, July 2013

3.9.2 Temporal Boundaries

Time horizons of the project consist what are referred to as institutional boundaries. The project tentative time period is scheduled to start in 2013 and will extend over a period more than 25 years. During the ESIA study, the temporal boundaries of each positive and negative impact will further be characterized as direct or indirect; duration i.e. long-term or short-term; reversible or irreversible; localized impact or regionalized impact; and time of their occurrence i.e. mobilization phase; construction phase; operation phase; and decommissioning phase.

3.9.3 Institutional Boundaries

Institutional boundaries primarily entail those that impinge upon the project both technically and legally. These include:

- The Ministry of Livestock and Fisheries Development
- Ministry of Agriculture, Food Security and Cooperatives (MAFC); Ministry of Industry and Trade
- The Vice President's Office - Division of Environment (VPO-DoE),
- National Environment Management Council (NEMC),
- Prime Minister's Office Regional Authorities and Local Government (PMORALG),
- Community Based Organisations, Local NGOs, Farmer Groups/Associations, and
- Works and Supervision Contractors.

4. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

STL needs to ensure that its project activities are in line with all relevant national policies, legislations and standards operating in Tanzania. In this chapter relevant policies, legal and administrative framework that are relevant to this project are covered. The project proponent shall observe these frameworks in the designing, implementing and decommissioning the proposed project activities.

4.2 Applicable Policy Framework

4.2.1 National Environmental Policy (NEP), 1997

NEP is a mother policy in regards to all environmental management matters in Tanzania. It defines environmental issues as both social and ecological systems and adopts a key principle of sustainable development. The policy further defines strategic plans for environmental management at all levels and provides an approach for mainstreaming environmental issues for strategic decision-making.

According to the NEP, it is mandatory to undertake EIA before any development project likely to have significant environmental impacts is given a go-ahead. This is to ensure that development projects are implemented in an economically viable, socially acceptable and environmentally acceptable manner. Since activities of the proposed project may lead to land degradation and produce wastes that may pollute water and air, appropriate mitigation measures must be in place to prevent and/or reduce the impact as a compliance with this policy.

4.2.2 The National Livestock Policy, 2006

Tanzania's livestock policy of 2006 has a clear development vision, based on Tanzania's Development Vision 2025 which, amongst other things, envisages for a commercially based, modern and sustainable livestock sector by the year 2015 with the aid of improved and highly productive livestock to ensure food security, improved income for the household and the nation while sustaining the environment.

On that remark, the policy explicitly notes the need to safeguard the environment in all livestock related endeavours. It refers to the environment air, land and water; plant, animal and human life; the social, economic, recreational and cultural factors that influence the lives of human beings and their surroundings. Therefore, sustainable livestock farming and its related activities require proper utilisation and management of the environment.

4.2.3 National Land Policy, 1997

The National Land Policy of 1995 (revised in 1997) recognizes the need for protecting environmentally sensitive areas. It stresses on protection of the environment and natural ecosystems from pollution, degradation and physical destruction. Together with that the policy recognizes the importance of social services such as water supply, road networks, and energy development that take place on land for human benefits should be done in a right manner so as to protect land for other uses and avoiding land degradation.

The policy necessitates the need to ensure that project operation is as per with Iringa district planning and that the acquired land shall be protected against pollution and degradation by devising appropriate environmental management measures such as waste management.

4.2.4 National Water Policy, 2002

One of the key issues noted in the policy is the role of water as a basic natural resource for socio-economic development. It establishes that water is fundamental for activities such as industrial production, irrigated agriculture, livestock keeping, mineral processing, hydropower production, navigation and recreation and tourism. Despite the fact water is an essential component for most socio-economic development activities and particularly the proposed project, the policy still stresses on sustainable use of water so as to maintain environmental flow which is essential for riparian biodiversity, wetland systems, freshwater-seawater balance in deltas and estuaries. This can be accomplished, notes the policy, by controlled exploitation of water and treatment of wastewater (effluents) before emptying it into the environment.

4.2.5 The Sustainable Industrial Development Policy, 1996

The policy recognizes the need for sound environmental management in the promotion of sustainable development. In order to ensure promotion of environmentally friendly and ecologically sustainable industrial development, the policy urges among other things, undertaking of EIA and appropriate mitigation measures be enforced for all projects at pre-implementation stage.

4.2.6 National Trade Policy, 2003

Growth and development depends on sustainable and optimal use of the world's renewable and non-renewable resources. This entails judicious exploitation of existing resources and the protection and preservation of the environment. Tanzania attaches great importance to the growing need to protect and conserve the environment and has consistently upheld environmental conservation measures. Nevertheless, the capacity to administer and enforce implementation of the environmental regulation is weak and frequently violated allowing continuation of degradation of the environment and compromises the sustainability of its resource base. The push for economic transformation and attainment of higher rates of growth tends to lead to environmentally degrading production practices. This highlights the need for pro-active measures to mitigate against the emergence of environmentally harmful production practices in developing economies.

4.2.7 Agricultural Marketing Policy, 2008

The relationships between agricultural marketing and the environment are complex. Market liberalization can have negative effects on certain groups of people that depend on natural resources through poor management in resource extraction and pollution emissions through processing. Stock movements to markets, disposal of packaging materials, and solid waste at market places are other forms of environmental hazards of marketing activities. Market liberalization can also have positive effects through opening up new export markets for activities that are environmentally friendly, including production of organic or speciality products for niche markets with premium prices based on fulfilling certain environmental management practices. In some countries practices for reward of subsidies or observance and participating in environmentally friendly practices and penalties (pay as you pollute) to discourage continued environmental degradation and destruction are in place. Agricultural marketing policies reflected in public investment, the trade regime, credit, taxes, and subsidies may favour certain production activities, for example, large livestock farms in fertile valley bottoms. In contrast, some poor farmers can be forced to carve out their living on steep slopes, resulting in deforestation and erosion. Hence, it is crucial that environmental concerns are considered when designing strategic interventions in agricultural marketing so that negative externalities are minimized.

The objective of the policy in this regard therefore, is to ensure that environmental matters in all agricultural marketing related interventions are mainstreamed. To realise that, the policy stipulates that;

policy and legal framework for environmental conservation and management is implemented by all stakeholders accordingly, and awareness is created to agricultural marketing stakeholders on environmental conservation and management.

4.2.8 The Construction Industry Policy, 2003

The policy generally acknowledges importance of the construction industry in Tanzania. However, it cautions that construction can be a major source of environmental damage and occupational health problems due to lack of awareness of environmentally sound practices and technologies that may lead to: resource deterioration; physical disruption and chemical pollution; destabilisation of fragile hill slopes; deforestation; loss of land by soil erosion, and silting of reservoirs and disruption of aquatic ecosystems. The policy advocates for sustainable construction practices that are environmentally friendly, the policy advocates for a number of aspects which are very relevant for the proposed project.

4.2.9 National Energy Policy, 2003

It is noted in the policy that crosscutting all energy sub-sectors and all relevant sources of energy are the environmental impacts of energy exploration, production, distribution and consumption (under which the proposed project falls). The policy promotes energy efficiency and conservation as a means towards cleaner production and pollution control measures.

4.2.10 National Women and Gender Development Policy, 2000

Environment and human development are highly interdependent. Persistent environmental mismanagement has adverse effects of gradually impairing human development. With increasing levels of pollution and degradation due to indiscriminate abstraction, poor land use practices, encroachment of land for agriculture, urbanization and industrial development, the lives of both women and men are negatively impacted. In that view the policy stipulates that communities and other stakeholders, in this case STL, at all levels be sensitized on the importance of establishing gender balance in environmental management committees, to protect and preserve their surroundings and environment. These could be accomplished, the policy suggests, though; sensitising communities and other stakeholders on gender balance in environmental management, and provision of tools and facilities for the protection and conservation of environment.

4.2.11 National HIV and AIDS Policy, 2001

This policy identifies HIV/AIDS as a global disaster, hence requiring concerted and unprecedented initiatives at national and global levels. It recognizes HIV/AIDS as an impediment to development in all sectors, in terms of social and economic development, with serious and direct implications for social services and welfare. Thus, the policy recognizes the linkage between poverty and HIV/AIDS, as the poor section of the society are the most vulnerable. One of the specific objectives of the policy is to strengthen the role of all the sectors, public, private, NGOs, faith groups, people living with HIV/AIDS, 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.

4.2.12 National Human Settlements Development Policy (NHSDP), 2000

The NHSDP recognizes environmental planning and management as one of the broad human settlement issues. According to this policy; "environment means the physical, economic and social conditions in which people live, influencing their feelings and development".

Therefore, the relevancy of this policy towards the proposed project is the improvement in quality of life in human settlement through improvement of social services. This can be achieved through the so called corporate social responsibility (CSR). Similarly, the project proponent has to recognize that quality life include the right to live in clean and safe environment of all project staff that will be housed in the project proposed site. Air pollution, waste pollution or any other environmental or social malaise that might jeopardise quality of settlement in particular and life of workers in general should be avoided.

4.2.13 National Strategy for Growth and Reduction of Poverty (NSGRP) II, 2010

The Second National Strategy for Growth and Reduction of Poverty II (NSGRP II or MKUKUTA II in its Kiswahili acronym) is a continuation of the government and national commitments to accelerating economic growth and fighting poverty. It is a successor to the first National Strategy for Growth and Reduction of Poverty implemented from 2005/06 to 2009/10. MKUKUTA II emphasizes on:

- (i). focused and sharper prioritization of interventions - projects and programmes in key priority growth and poverty reduction sectors;
- (ii). strengthening evidence based planning and resource allocation in the priority interventions;
- (iii). aligning strategic plans of Ministries, Departments and Agencies (MDAs) and Local Government Authorities (LGAs) to this strategy;
- (iv). strengthening government's and national implementation capacity;
- (v). scaling up the role and participation of the private sector in priority areas of growth and poverty reduction;
- (vi). improving human resources capacity, in terms of skills, knowledge, and efficient deployment;
- (vii). fostering changes in mind-set toward hard work, patriotism, and self-reliance;
- (viii). mainstreaming cross cutting issues in MDAs and LGAs processes;
- (ix). strengthening the monitoring and reporting systems; and
- (x). better implementation of core reforms, including further improvement of public financial management systems.

With particular reference to items 5, 6, and 7, the proposed project will contribute to the goals of NSGPR II by respectively providing quality feed and poultry products, create employment opportunities at different project management levels, improved individual productivity and that of the whole project to bring about desired economic growth and reduced poverty among local communities especially those surrounding the project.

4.2.14 Development Vision 2025

Development Vision 2025 is a long-term development philosophy that articulates a desirable future condition, which the nation envisages it will attain. It describes plausible course of action to be taken for visions achievement. It seeks to actively mobilize the people and other resources towards the achievement of shared goals.

The vision provides hope and an inspiration for motivating the people to search and work harder for the betterment of their livelihood and for prosperity. Major attributes of the vision include high quality livelihood; peace, stability and unity; good governance; a well-educated and learning society; and a competitive economy capable of producing sustainable growth and shared benefits. The proposed project could contribute to the attained of the vision in its area of operation through introduction of a

modern integrated poultry production farm, creation of employment opportunity to locals as well as contributing to the national revenue at minimal and/or zero social and environmental cost.

Table 4-1: Other relevant Policies

SN	Policy	Ministry Responsible	Relevance to the Proposed Project
1.	The National Health Policy (2003)	Health and Social Welfare	<p>Ensuring that health of people and workers is maintained</p> <p>Need to create awareness through workers health promotion that the responsibility for one's health rests in the individuals as an integral part of the family, community and nation</p> <p>Reducing the risks of diseases through improvement of sanitation</p>
2.	Community Development Policy, 1996	Lands, housing and Human Settlement Development	The project should contribute towards community development for the eradication of poverty
3.	National Employment Policy (1997)	Labour and Youth Development	<p>Employment creation</p> <p>Promotion of self-employment and entrepreneurship through the availability of reliable energy.</p> <p>The employment should involve various groups of people including women, youths and people with disabilities</p>

4.3 Applicable Legal Framework

4.3.1 Environmental Management Act No. 20 of 2004

This is a principal law that govern all environmental matters in the country. Section 81 of the Act refers to an obligation to undertake EIA by project developer. The third schedule of the act that is made under this section identifies the types of projects subject to undergoing EIA. In that respect, subsection 1 in Part VI of the Act requires a project proponent or developer to undertake an EIA at his/her own cost prior to commencement or financing of a project or undertaking. The Act prohibits any development to be initiated without an EIA Certificate.

Section 86, subsection 1, specifies that "the NEMC shall upon examination of a project brief, require the proponent of a project or undertaking to carry out an EIA study and prepare an Environmental Impact Statement" (EIS). Section 87 of the act underpins the review of the EIS. According to subsections 1-4, the statement should be submitted to the NEMC, which carries out a review through its Technical Advisory Committee (TAC). The council is also obliged to make a site visit during the review process for inspection and verification at the proponent's cost.

4.3.2 Environmental Impact Assessment and Audit Regulations, 2005

The EIA and Audit Regulations No. 349 of 2005 were made pursuant to the Environmental Management Act No. 20 of 2004. The regulations form the basis upon which EIAs and Environmental Audits for various types of development projects with significant environmental impacts are undertaken. The regulations outline the EIA process from project registration to the issuance of EIA certificate.

4.3.3 The Grazing Land and Animal Feed Resources Act No 13 of 2010

This Act provides for the management and control of grazing lands, animal feed resources and trade for other related matters. Relevant sections include Part IV on control, manufacture and composition of animal feed resources; Part V on container, packaging and labelling of animal feed resources; and Part VI on general provisions.

Provision 21.-(1) requires that *“A person shall not manufacture, export from or import into Mainland Tanzania any animal feed resources unless he has obtained a permit issued by the competent authority”*. Competent Authority means Director, a local government authority or any person who, in accordance with the provisions of this Act, has powers to issue a permit.

Provision 23.-(1) requires that *“A person who wishes to register premises for manufacturing animal feed resources shall make an application to the Director in the prescribed manner”*.

Provision 31 requires that *“All animal feed resources shall conform to and be manufactured or processed in accordance with the current Tanzanian and International Standards of good manufacturing practices specified in the Third Schedule”* of the Act.

Provision 34.-(1) requires that *“A person shall not, in the course of his business, sell, supply or have in his possession, for the purpose of selling or supplying any animal feed resources a container or package which is not labelled”*.

4.3.4 The Animal Diseases Act, 2003

This Act makes provisions for control and prevention of animal diseases for monitoring production of animal products, for disposal of animal carcasses and for other related matters. Most relevant sections of the Act include Part III on measures for checking livestock diseases, Part V on powers of inspectors, Part VII on compulsory animal diseases prevention measures, Part VIII on general provisions and control of animal diseases and Part IX on miscellaneous provisions.

Section 22.-(1) on certification of farms and ranches requires that any person who desires to deal with the farming import or export fish, birds, reptiles, mammals, molluscs and animals other than livestock shall, for the purpose of disease control, register with the Director responsible for veterinary services under the Ministry of Livestock and Fisheries Development (MLFD).

4.3.5 The Animal Diseases (Hatcheries and Breeding Flocks) Regulations, 2010

Regulation 6.-(1) requires that any person who intends to establish a hatchery or breeder farm shall make an application accompanied with a proposed site plan and design to the Director of Veterinary services in the MLFD for approval prior to the construction work.

4.3.6 Land Act, 1999

The Land Act No. 4 of 1999 is the principal law in regards to all land matters such as management of land, settlement of disputes and related aspects other than the Village Land Act No. 5 of 1999 that specifically deals with “village land” matters. The proposed project shall be implemented on land that has been legally acquired by STL by complying with conditions of occupancy of the subject land.

4.3.7 The Village Land Act, 1999

The Village Land Act, (No. 5), 1999 was enacted specifically for the administration and management of land in villages. Under the provisions of this act, the village council is responsible for the management of the village land and is empowered to do so in accordance to the principles of a trustee managing property on behalf of a beneficiary. In addition, the village council is required to manage land by upholding the principles of sustainable development, relationship between land uses, other natural resources and the environment. Although the proposed project is located in an area that is far from settlements it is still located within land managed under the village land act and hence the importance of the knowledge of this legislation.

4.3.8 The Occupational Health and Safety Act, 2003

The Occupational Health and Safety Act No. 5 of 2003, regulates health, safety and welfare of persons at work in factories and all other places of work in Tanzania. It also provides for the protection of persons other than those at work against hazards to health and safety arising out of or in connection with activities of persons at work. Part IV, section 43 (1) provides for safe access and safe working place while Part V covers health and welfare provisions. In view these specific provisions and the Act in general the contractor and developer are obliged to ensure safe working environment to all its workers, provide clean and safe water, as well sanitary and first aid facility.

4.3.9 Environmental Management (Air Quality Standards) Regulation, 2007

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

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

4.3.10 Environmental Management (Soil Quality Standards) Regulation, 2007

These regulations set limits for soil contaminants in agriculture and habitat, enforce minimum soil quality standards, prescribe measures designated to maintain, restore and enhance the sustainable productivity of the soil and prescribe minimum soil quality standards for sustaining ecological integrity and productivity of the soil. According to the regulations, among others, the National Environmental Standards Committee has the powers to set pollutant limits and specify procedures for determination of the quality of soil for protection of the soil from degradation as a result of anthropogenic activities such as agricultural and mining activities and waste disposal. Owners and operators of a main polluting activity are required to voluntarily register with NEMC and obtain a soil pollutants discharge permit. Obligations of polluters are also given. According to the regulations, the NEMC plays a crucial role in soil quality compliance and enforcement.

Recording and reporting requirements, Offences and penalties for non-compliance as well as how appeals against aggrieved decisions should be handled are stipulated. Contaminant limits for selected soil pollutants mainly halogenated hydrocarbons (example, trichloroethylene, dichloromethane, tetrachloroethylene, carbon tetrachloride, etc.), fuel hydrocarbons (benzene, ethylbenzene, total xylenes, toluene, etc.), organic and inorganic pesticides (lindane, Atrazine, DDT, sulphur, Hexachlorobenzene, Aldrin, etc.) and their respective test methods are specified. The Regulations also cover contaminant limits for some heavy metals (e.g. arsenic, cadmium, nickel, copper, zinc, etc.) together with their test methods. Most of the pollutants covered in these regulations will not be produced from the project activities in appreciable concentrations. However, there is a potential for soil pollution from petroleum hydrocarbons due to the use of fossil fuels for running machineries, plants and vehicles during the construction phase. Fossil fuels will be applied in a rational manner to minimize residues and consequently soil and water pollution. Nonetheless, the developer is committed to abide to the provisions of these regulations should any of the project activity produce anyone of the pollutants covered in the regulations.

4.3.11 Environmental Management (Water Quality Standard) Regulation, 2007

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

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

The developer shall abide to provisions of these regulations for minimizing the impacts of the project activities to groundwater and nearby surface water sources and marine ecosystems.

4.3.12 Industrial and Consumer Chemicals (Management and Control) Act, 2003

The management and control of the production, importation, transportation, exportation, storage, dealing, and disposal of chemicals and for matters connected therewith are provided for by the Industrial and Consumer Chemicals (Management and Control) Act of 2003. Should the project intend

to import or use chemicals for its activities the proponent or contractor shall then need to declare and obtain authorization from relevant authorities. Similarly, the contractor shall have to comply with other Act requirements particularly in importation, storage, use and disposal of wastes from those chemicals.

4.3.13 Foods, Drugs and Cosmetics Act, 2003

This is an Act to provide for the efficient and comprehensive regulation and control of food, drugs, medical devices, cosmetics, herbal drugs and poisons. Part three of this Act provides provision regarding food. The Act emphasizes that no person shall manufacture for sale, sell, and supply or store products regulated under this Act except in premises registered for that purpose. Further, the Act stipulates that no person shall manufacture, import, distribute, sell or expose for sale pre-packaged food unless that food or food product has been registered by the Authority. It also instructs that any person who sells any food which is not of the nature, substance or quality of the food demanded by the purchaser shall be guilty of an offence. Existing STL premises shall be registered by Tanzania Food, Drugs and Cosmetics Authority and granted a license. STL is highly equality-oriented and will ensure customers' satisfaction by diligently fulfilling their food safety and quality. However, STL shall endeavour to comply with the requirement of the Act as a food dealer company.

4.3.14 The Water Supply and Sanitation Act, 2009

The Water Supply and Sanitation Act, No. 12 of 2009, is the principal legislation aiming at promoting and ensuring the right of every person in Tanzania to have access to efficient, effective and sustainable water supply and sanitation services for all purposes. Upon operation, the proposed project will have an obligation to guarantee protection and conservation of water sources through avoiding discharge of wastes to water sources or water bodies, both surface and underground.

4.3.15 The Water Resources Management Act, 2009

The Water Resources Management Act No.11 of 2009 provides for institutional and legal framework for sustainable management and development of water resources. The objective of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled. The Act emphasizes prevention and controlling of pollution and degradation of water resources. Section 39 of the Act stipulates that, an owner or occupier of land on which any activity or process is undertaken which causes or is likely to cause pollution of water sources, shall take all reasonable measures to prevent any such pollution from occurring. Also, the Act emphasizes on the issue of water use permits as it require any person who abstracts or uses water from surface or underground water sources to apply for a water use permit.

STL shall have a responsibility of ensuring that its takes all reasonable measures to prevent pollution of water sources and obtain a permit from Rufiji Basin Water Office (RBWO) in Iringa as it plans to extract water from underground sources on site.

4.3.16 The Tanzania Bureau of Standards Act, 2009

Under Tanzania Bureau of Standards (TBS) Act of 2009, the bureau is given the mandate to undertake measures for quality control of commodities, services and environment of all descriptions and to promote standardization in industry and trade. In order to regulate the food industry, TBS has formulated food products standard with which STL shall comply in processing of eggs.

4.3.17 The Workers Compensation Act, 2008

This Act provides for compensation to employees for disablement or death caused by or resulting from injuries or diseases sustained or contracted in the course of employment and establishment of Fund for administration and regulation of workers compensation. Under this Act, STL shall be obliged to compensate employees in case of injuries, death, and diseases while rendering their services to the employer. The proposed project will involve construction and operation phases which may subject workers into injuries or health risks. It is therefore a responsibility of the project proponent to make sure that all requirements of this Act and working standards are adhered to in order to ensure safe working environment for workers and prevent accidents and other occupational health and safety risks.

4.3.18 The Occupiers Liability Act, 1968

This Act governs the liability of occupiers and others for injury or damage resulting to persons or goods lawfully on any land or other property from dangers due to the state of the property or things done or omitted to be done thereon. The Act emphasizes the proponent (occupier) to be responsible in ensuring safety for the visitors around project premises. Due to the nature of the project the proponent shall have a duty of care for all visitors to ensure that they are reasonably safe in using the premises for the purposes for which they have been invited or permitted by the proponent to be there.

4.3.19 The Employment and Labour Relations Act, 2004

This Act entails provisions for all core Labour rights and related matters including to; establish basic employment standards, provide a framework for collective bargaining, provide for the prevention and settlement of disputes. As the proponent shall employ people during construction and operation of the proposed project s/he should make sure that all the requirement of this Act are adhered to. The proponent shall ensure that s/he promotes an equal opportunity in employment and strives to eliminate discrimination in any employment policy or practice. S/he should provide the legal framework for effective and fair employment relations and minimum standards regarding conditions of work.

4.3.20 The HIV and AIDS (Prevention and Control) Act, 2008

This Act governs prevention, treatment, care, support and control of HIV and AIDS; public health issues in relation to HIV and AIDS, and provision of appropriate treatment, care and support using available resources to people living with or at risk of HIV and AIDS and to provide for related matters.

The relevance of this Act to this proposed project is that it requires the employer in consultation with the responsible Ministry to establish and coordinate a workplace programme on HIV and AIDS for employees under proponent's control and such programme shall include provision of gender responsive HIV and AIDS education, distribution of condoms and support to people living with HIV and AIDS. The proponent therefore, shall have a responsibility to promote awareness to its workers on causes, modes of transmission consequences, prevention and control of HIV and AIDS.

4.4 Applicable International Standards and Policies

4.4.1 IFC Performance Standards on Biodiversity Conservation

According to Performance Standard 6 of the World Bank's International Finance Corporation (IFC) (2012) protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as "the variability among living organisms from all sources including, inter alia,

terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.”

This Performance Standard addresses how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project’s lifecycle including (i) protect and conserving biodiversity; (ii) maintain the benefits from ecosystem services; and (iii) promote the sustainable management of living natural resources through the adoption of practices which integrate conservation needs and development priorities.

As a matter of priority, the standards provides, the proponent should seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented. Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the proponent should adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the project’s lifecycle.

4.4.2 IFC Environmental, Health and Safety Standards

Performance Standard 4 on Community Health, Safety, and Security (IFC, 2012) recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. While acknowledging the public authorities’ role in promoting the health, safety, and security of the public, this Performance Standard addresses the proponent’s responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups. Performance Standard 2 on Labour and Working Conditions notes of the need for the proponent to ensure workers safety and health. Specifically, the standard requires the proponent to (i) promote the fair treatment, non-discrimination, and equal opportunity of workers; (ii) establish, maintain, and improve the worker-management relationship; (iii) promote compliance with national employment and labour laws; (iv) protect workers, including vulnerable categories of workers such as children; migrant workers, workers engaged by third parties, and workers in the client’s supply chain; (v) promote safe and healthy working conditions, and the health of workers, and (vi) avoid the use of forced labour.

4.5 Institutional Framework

EIA practice in Tanzania places different functions and responsibilities on all parties involved in the EIA process of any proposed development undertaking to which EIA is obligatory. In table 4.2 below is a list of key institutions that underpins the proposed integrated poultry production. The Environmental Management Act No.20 of 2004 gives NEMC the to undertake enforcement, compliance, review and monitoring of environmental impact assessment as well as playing a central role in facilitating public participation in environmental decision-making, exercise general supervision and coordinating over all matters relating to the environment.

The Act empowers NEMC to determine the nature of assessment a proposed project should be subjected to, approves consultants to undertake EIA studies, invites public comments and also has the statutory authority to issue, in consultation with the Minister responsible for Environment, the certificates of approval. NEMC is currently the designated authority to carry out the review of EIA including site visit and handling TAC meeting, monitoring and auditing of environmental performance of the project (periodic and independent re-assessment of the undertaking).

Table 4-2: Institutional Framework

Level	Institution	Roles
National	The Vice President's Office (Division of Environment, NEMC)	<ul style="list-style-type: none"> - Co-ordinate Environmental Management Policy, Environmental Management Act and EIA guidelines - Approval of ToR, Review of EIA - Issuing an Environmental Certificate - Environmental Monitoring and Compliance Auditing - Advise Government on all environmental matters
	Ministry of Land, Housing and Human Settlements Development	<ul style="list-style-type: none"> - Land use planning, - Issuing of Right of Occupancy, - Valuation and compensation.
	The Ministry of Livestock and Fisheries Development	<ul style="list-style-type: none"> - Diseases control, - Promoting quality poultry feeds, - Provision of technical support services, - Promoting high genetic potential of the local breed, - Empower farmer organizations, - Provide regulatory framework in hatcheries and breeding farms.
Regional	Iringa Regional Commissioner's Office	<ul style="list-style-type: none"> - Oversee and advice on implementation of national policies at Regional level - Oversee enforcement of laws & regulations - Advice on implementation of development projects and activities at Regional level
	Rufiji Basin Water Office-Iringa	<ul style="list-style-type: none"> - Issuing water use permits - Oversee water resource management - Oversee enforcement of laws & regulation pertaining to water resource
District	Iringa District Commissioner's Office	<ul style="list-style-type: none"> - Oversee and advice on implementation of national policies at District level - Oversee enforcement of laws & regulations - Advice on implementation of development projects and activities at District level
	Iringa District Council (District Executive Director Office)	<ul style="list-style-type: none"> - Overseeing all development activities in the District
Ward	Ward Development Committees (Ward Executive Officer, Ward Extension officers), Ward Environment Committee	<ul style="list-style-type: none"> - Oversee general development plans for the Ward - Provide information on local situation and Extension services - Technical support & advice - Project Monitoring
Village (community)	Councils (Chairman/VEO, Environment Committee): and Other leaders (Religious, Education, Elders etc)	<ul style="list-style-type: none"> - View on socio-economic and cultural value of the sites and project operations. - Rendering assistance and advice on the implementation of the project - Project Monitoring (watchdog for the environment, ensure wellbeing of residents and participate in project activities)
Project	Silverlands Tanzania Ltd.	<ul style="list-style-type: none"> - Project design and planning and facilities construction - EIA study - Project implementation (operation) - Project monitoring and internal auditing - Project decommissioning

5. BASELINE CONDITIONS OF THE PROJECT AREA

5.1 Introduction

This chapter presents information on existing environmental and socioeconomic condition of the proposed project area. It discusses aspects pertaining to geology and soils, climatic conditions, hydrology, ambient air quality and noise levels as well as land use. Further, the chapter presents details related to flora and fauna as well as socio-economic environment.

5.2 Geographical Location of Makota Farm

The Makota Farm is located on the Southern highlands of Iringa Region in Mgama Ward of Iringa District. The farm is about 30 km from Iringa Town and is about 1.5 km from Iringa – Mbeya highway (see figure 5.1 below). Iringa District is located at latitude of 7.77°S and longitude of 35.69°E. Iringa District is predominantly rural such that, in the vicinity of the Makota Farm, the main adjacent land uses are smallholder farming of maize, cassava, potatoes, pulses such as beans, and woodlots planted with exotic tree species. The main cash crop is sunflower. Livestock including cattle and goats are the main animal husbandry activities. There are also village forest reserves.

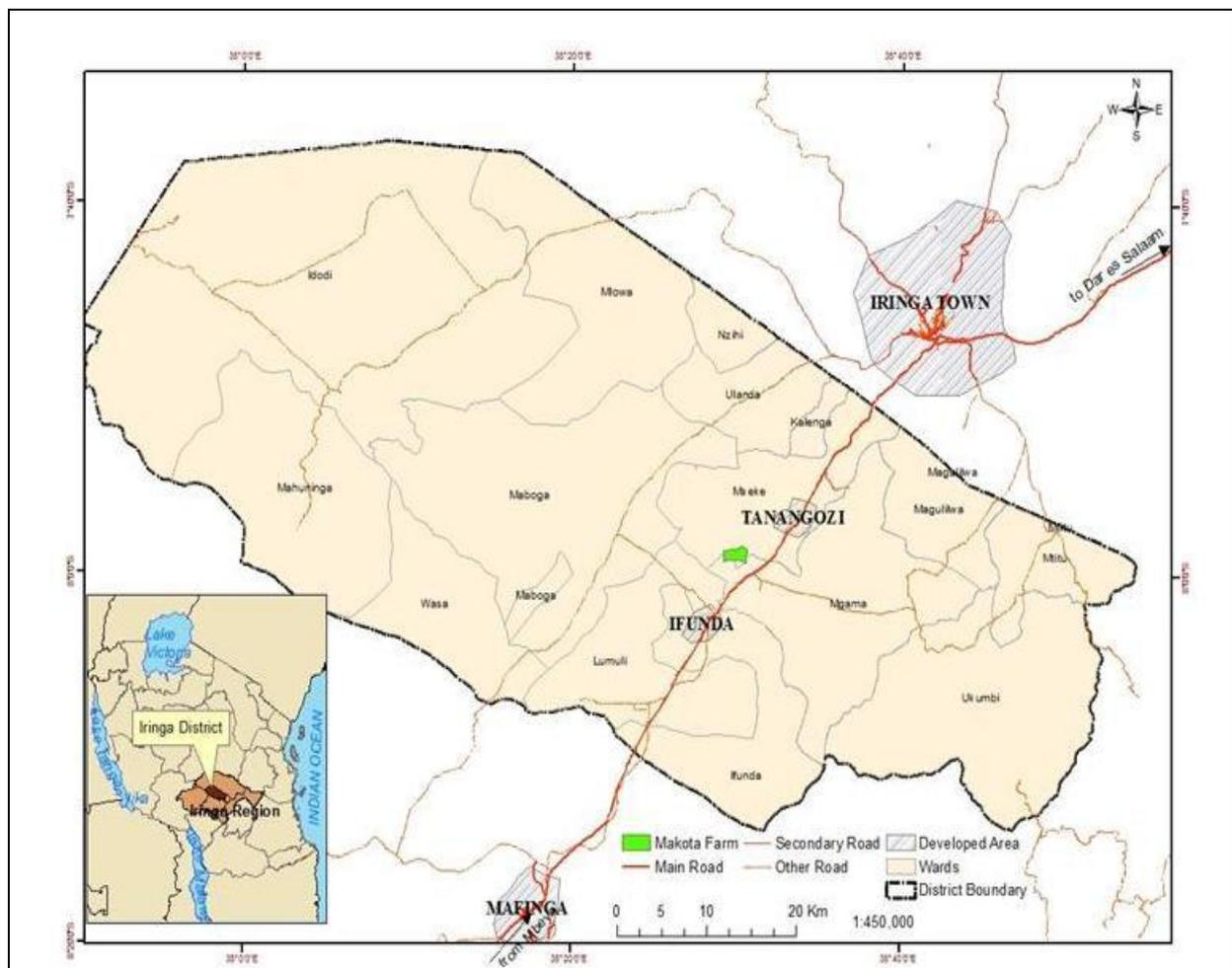


Figure 5-1: Geographical Location of Makota Farm in Iringa District

Source: Available government district and village boundary maps and ground GPS data collection.

5.3 Physical Environment

5.3.1 Topography and Soils

The topography of the proposed Makota Farm is located between 1890-1925 meters above sea level and lies within a 250-300 hectare catchment area. The southern third of the site is steeply sloped (1:20) but tapers down to a gentler slope for the northern sections. There are old contours still visible on the site, but offer very little support in their current state.

Soils in the area are typically well-drained and vary from deep yellowish or reddish sandy clays, to sandy-loams. The topsoil is most often sandy. These soils have developed from a granite or gneiss base and, depending on the clay content, can be weak to moderately strong in structure. Soils in this area can be generally described as “ferric lixisols, with low natural fertility, susceptible to slaking/crusting, compaction and erosion in sloping lands. To be suitable for perennial crops, forestry or arable farming, the soil may require fertilizers and/or liming.

5.3.2 Climatic Conditions

Climate can refer to both the long-term weather patterns in an area and also to the more localised atmospheric conditions, referred to as the microclimate. Climate has implications for many aspects of the environment from soils to biodiversity and land-use practices. Table 5.1 shows the nearest weather stations with long term records. There is also a weather station within the Makota farm but with very few records.

Rainfall is extremely seasonal, highly localised and spatially varied, with a single rainy season from November to April and strongly correlated with altitude, with the higher areas receiving up to about 1600 mm of rain. Only Iringa meteorological station had long term temperature records. The mean annual air temperature varies from about 18°C at higher altitudes to about 28°C.

Table 5-1: Climatic Stations around Makota Farm

Station	Name	Latitude	Longitude	Elevation
9735013	Iringa Met Station	-7.63	35.77	1428
9835039	Mafinga National Service	-8.32	35.30	1829
9735008	Idodi Tarafani	-7.78	35.18	1066

Source: Field Study, July 2013

5.3.3 Hydrology

From the figure below, two catchments B1 (239.96 sq.km) and A1 (310.89 sq.km) draining the Makota farm to little Ruaha river were identified. Their stream lengths from the farm boundary are 39.50 km and 25.65 km for B1 and A1 respectively. An existing dam (65,000m³) is located on the property. But usage of its water will require significant investment on treatment facility; therefore, there is currently no plan to use dam water in production activities.

The dam is within a sub-catchment A2 with a seasonal stream recharging to *Ididiga* spring which is the main source of water for over six nearby villages. On the other side of the farm, a seasonal stream drains sub-catchment B2. No channelling of rainwater runoff into any specific areas was observed.

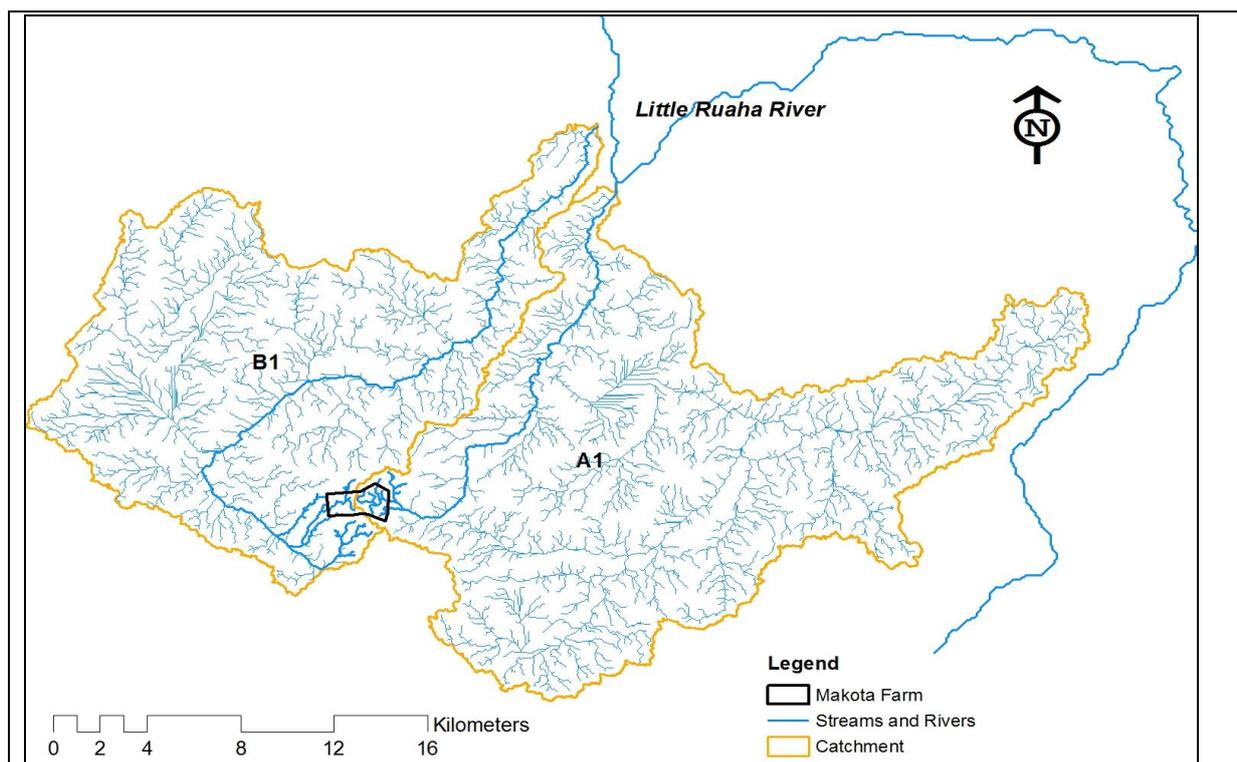


Figure 5-2: Catchment draining the Makota Farm

Source: Masingia, 2013

As for ground water, a hydro census carried out during the field visit shows that shallow wells exist in surrounding wards. However, due to serious water scarcity observed in the nearby villages, it likely that in future, boreholes will be the most reliable option. Table 5.2 presents borehole information in Ifunda ward as available in the database of the Ministry of Water.

Table 5-2: Borehole data within Ifunda Ward

Borehole Number	Location (Village)	Depth (m)	Static Water Level	Remarks
99/87	Ifunda	20	-	Shallow well
100/87	Ifunda	25	14.3	Shallow well
101/87	Ifunda	21.6	13.8	Shallow well
102/87	Ifunda	16	8	Shallow well
103/87	Ifunda	21	15	Shallow well
104/87	Ifunda	30	8	Shallow well
105/87	Ifunda	21	15	Shallow well
106/87	Ifunda	30	-	Shallow well

Source: Field Study, July 2013

5.3.4 Land Use

The farm is largely covered with grasslands, farmland, scattered trees and shrubs (woodland). Various land uses surround the property. These include residential houses, warehouses and other infrastructures previously owned by the flower farming investor.

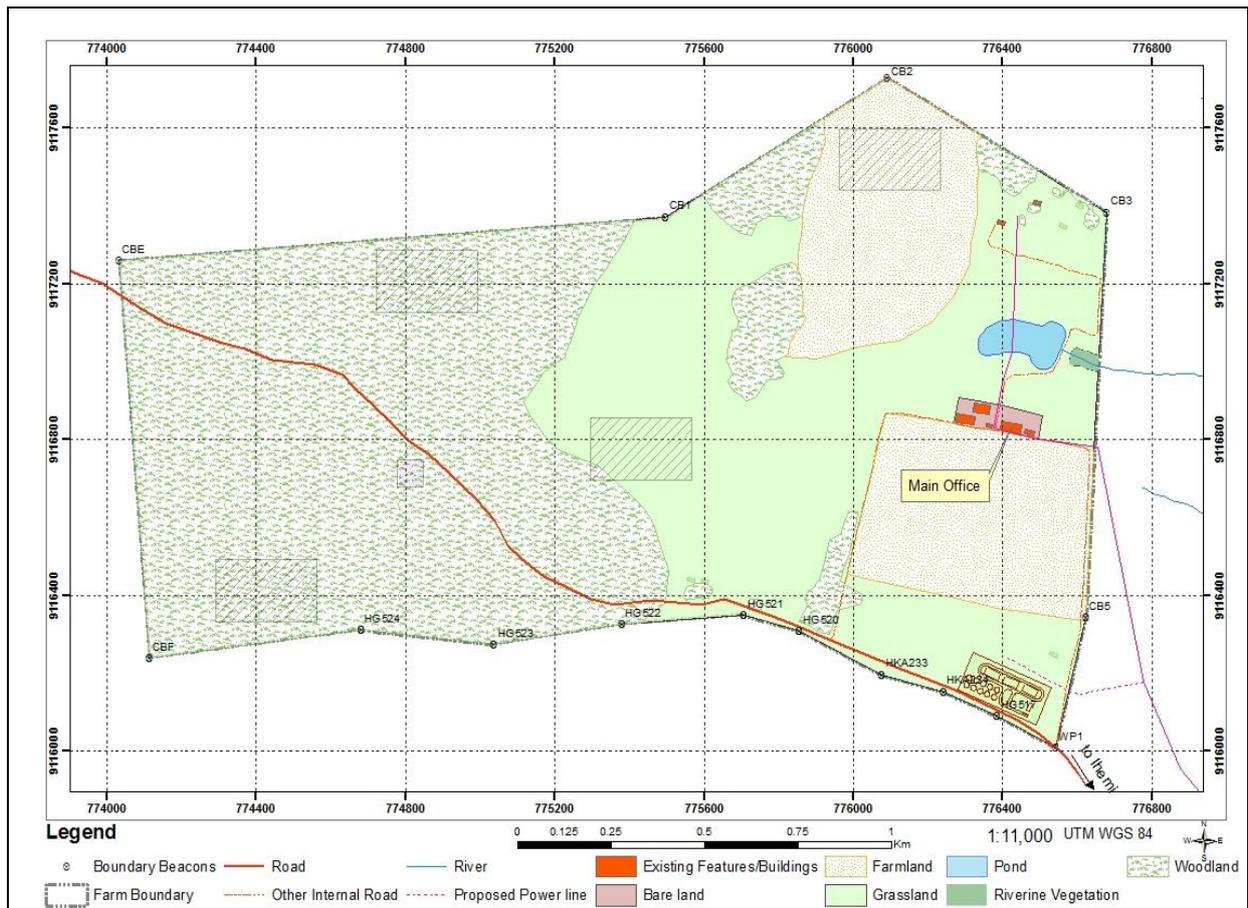


Figure 5-3: Land use map of the Proposed Project on Makota Farm

Source: Field Study, July 2013

5.4 Biological Environment

5.4.1 Flora

During the vegetation survey, climbers, fern, grasses, sedges, herbs, shrubs and trees were sampled (**appendix 8**). Two species of climbers represented into two families and only one species of fern was recorded in Makota farm. The survey also recorded 11 species of grasses all belonging to the family Graminaea. The herb layer in different parts of the Makota farm is covered by 53 species represented in 14 families. Only two species of sedges in one family was recorded. The recorded woody vegetation in Makota farm included 33 shrub species represented in 21 families as well as 31 tree species belonging to 15 families. All vegetation in Makota farm regardless of their habit groups are common and wide-spread species and are recorded by IUCN as Least Concern, meaning that the species are not endangered or threatened to extinction in the wild.

5.4.2 Fauna

5.4.2.1 Small Mammals

Eleven species of small mammals represented in four orders and families were recorded in Makota farm (**Appendix 9**). The small mammal group was dominated by the order rodentia and family muridae (8 species). The majority of members in the muridae family are wide- spread species and well adapted to different habitats in the tropics (Kingdon, 1997). The only habitat-specialist small mammals at Makota farm are the brush-furred mice (*Lophuromys flavopunctatus*) and the Shaggy swamp rat

(*Dasymys incomptus*). The two species are known to inhabit moist areas with the later preferring the swampy habitats. The IUCN conservation statuses of all the recorded small mammal species at Makota farm is Least Concern (LC), meaning that the species are not endangered or threatened to extinction in the wild.

5.4.2.2 Large Mammals

During the field survey no any species of large mammals was recorded in Makota farm. Most parts of the farm have been already under farming for at least the past 10 years. Makota farm as aforementioned is surrounded by villages. Uncultivated parts of the Makota farm have been used for livestock grazing by the surrounding villagers. Therefore, farming and livestock keeping could be among the factors behind the absence of large mammals in the proposed project area.

5.4.2.3 Birds

Forty nine bird species were recorded during the 13-hours of Timed Species Counts (TSCs) and 16 species were caught in mist nets. Of the 15 species in mist nets, only one species, the beautiful sunbird (*Cinnyris pulchella*) was not sighted in the TSCs. The top six frequent species (frequent) in TSC were: Common stonechat (*Saxicola torquata*), red-eyed dove (*Streptopelia semitorquata*), ring-necked dove (*S. capicola*), fülleborn's longclaw (*Macronyx fuellebornii*), pied crow (*Corvus albus*) and collared sunbird (*Hedydipna collaris*) (**Appendix 10**). Six yellow-billed ducks (*Anas undulate*) were using the water reservoir daily and a pair of African wattled lapwing (*Vanellus senegallus*) (figure 5.4) was seen at this water reservoir. African wattled lapwing is the African-Eurasian Migratory Waterbird Agreement (AEWA) species.

The survey revealed a fairly rich avifauna within the boundaries of the farm. This richness can be well explained by the habitat mosaics. For example, the small wetlands habitats attracts ducks, lapwing, weavers and other passerines whereas the woodland had perching birds such as boubou, drongo, hornbill, sparrow hawk, flycatchers and robin chats. Other birds such as sunbirds were recorded throughout the farm while game birds e.g. helmeted guinea fowl used active farm(s).



Figure 5-4: African Wattled Lapwing (left) and *Bubo africanus* (right) on Makota Farm

Source: Field Study, July 2013

None of the bird species recorded is globally threatened as per the World Conservation Union (IUCN). All species are listed as Least Concern (BirdLife International 2013), meaning that their respective

populations are large, stable, and the decline in habitat quality and extent is not worrying. However, Fülleborn's longclaw is a bird of concern in Tanzania because it is not widely distributed in Tanzania though common in its range i.e. south-central and south-western Tanzania (Figure 5-5).

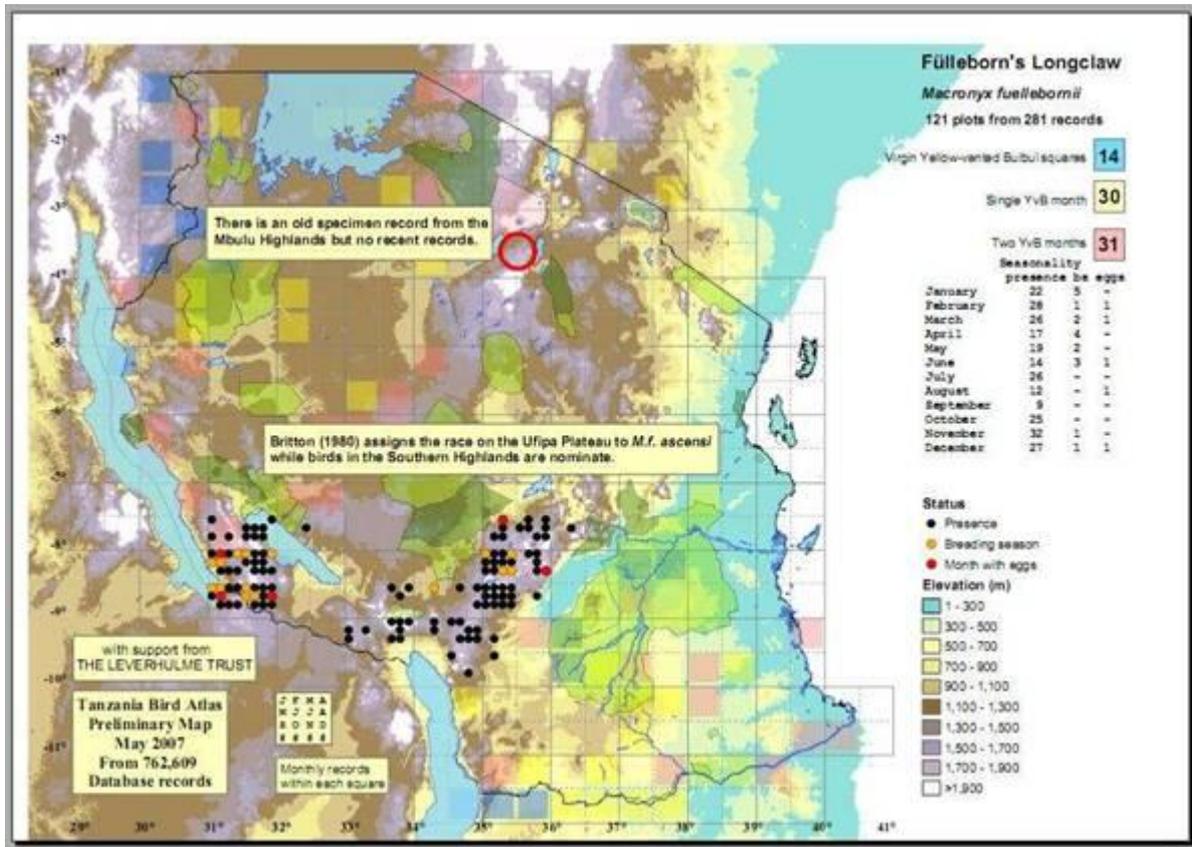


Figure 5-5: Distribution of fülleborn's langclaw in Tanzania

Source: Tanzania Bird Atlas

5.4.2.4 Reptiles

Eight species of reptiles representing eight distinct families were recorded in Makota farm (table 5.3). All species are widespread throughout East Africa, except the Lake Rukwa sand snake (*Psammophis rukwae*), which is known to be confined in the Southern highlands zones of Tanzania (Channing and Howell, 2006). The IUCN conservation status of all the species is Least Concern (LC), meaning that the species are not endangered or threatened to extinction in the wild.

Table 5-3: Reptiles recorded in Makota Farm

Order/Family	Species common name	Species scientific name	IUCN conservation status
Squamata/ Scincidae	African Striped Skink	<i>Mabuya striata</i>	LC
Squamata/ Scincidae	Wahlberg's snake-eyed Skink	<i>Panaspis wahlbergii</i>	LC
Squamata/ Agamidae	Agama lizard	<i>Agama sp</i>	LC
Squamata/Gerrhosauridae	Southern long-tailed Lizard	<i>Latasia longicaudata</i>	LC
Squamata/Lacertidae	Boulenger's Scrub Lizard	<i>Nucrus Boulengeri</i>	LC
Squamata/Gekkonidae	Tuberculate Thick-Toed Gecko	<i>Pachydactylus tuberculosus</i>	LC
Squamata/ Chamaeleonidae	Flap-necked Chameleon	<i>Chamaeleo dilepis</i>	LC
Squamata/Colubridae	Angolan green Snake	<i>Philothamnus angolensis</i>	LC
Squamata/	Lake Rukwa sand snake	<i>Psammophis rukwae</i>	LC

Source: Field Study, July 2013

5.4.2.5 Amphibians

Only three species of anuran species (frogs and toads) representing 2 families were recorded in Makota farm (table 5.4). All the three species are among the common and wide spread anuras in East Africa. The IUCN conservation status of all the species is Least Concern (LC), meaning that the species are not endangered or threatened to extinction in the wild. However, the list of amphibians from the present study should be treated with care. Most amphibians are very active during the wet seasons. Therefore, as long as we sampled the amphibians during the dry season, the list might not be exhaustive.

Table 5.4: Amphibians recorded in Makota farm, Iringa (2013)

Species Order/Family	Species common name	Species scientific name	IUCN Conservation status
Anura/Bufo	Guttural toad	<i>Bufo gutturalis</i>	LC
	Common toad	<i>Bufo regularis</i>	LC
Anura/ Pipidae	Muller's Clawed Frog	<i>Xenopus muellerii</i>	LC

Source: Field Study, July 2013

5.4.2.6 Invertebrates

In a group of invertebrates, 30 species represented in 12 orders and 24 families were recorded in Makota farm (**Appendix 11**). Important invertebrate groups included the butterflies (Order Lepidoptera, 1 family), dragonflies (Order Odonata, 2 families), crickets (Order Orthoptera, 3 families), the termites (Order Isoptera, 1 family), the beetles (Order Coleoptera, 7 families) and the true flies (Order Diptera, 1 family). Spiders were grouped to the order level (Order Araneae). The species in all groups of invertebrates are wide-spread and occur in different habitats in Tanzania and other Southern African countries. However, conservation statuses for most trapped invertebrate species are not well documented.

5.5 Socioeconomic Environment

5.5.1 Population and Housing

The Makota Farm is located in Mgama Ward, Iringa District. According to Tanzania's Population and Housing Census of 2012, the ward has a total of 12,561 people out of which males are 5,943 with the remaining 6,618 constituting of females. Average household size in the ward is 4.3.

5.5.2 Employment

Employment opportunities in Mgama ward are determined by the main economic activities in Iringa district including: agriculture, livestock keeping, trade/industry, natural resources, employment/ investments, and transportation. Agriculture is the major economic activity in the district engaging more than 95% of the population. The second largest occupation is livestock keeping which is practiced mainly in both, low and midland zones of the district. Natural resources sector contributes to people's livelihoods and the district economy especially through forestry, beekeeping, wildlife, and fisheries.

5.5.3 Health Services

The district has 62 health facilities and 120 village health posts in the district. Despite this number health services provision is still a challenge in the district. According to Iringa District Council Profile, top ten diseases that are still a challenge include: Acute Respiratory Infections (ARI); Pneumonia (especially among ≤ 5 years); Diarrhoea; Malaria; Skin infections; Intestinal worms; Urinary Tract

Infection (UTI); Eye infections; Minor surgical, and Non-infectious gastroenteritis. Though the profile does not provide HIV/AIDS prevalence status, it notes of the district's target to reduce HIV/AIDS prevalence from 13% to 12% in two years' time.

5.5.4 Education Services

The district has a total of 144 primary schools with 63,650 pupils (31,861 boys and 31789 girls). There are also about 135 pre-primary classes with a total of 9,093 children. In 2008 for instance, standard seven pass rate was at the tune of 52%. Adult illiteracy rate as of 2009 stood at 17% meaning that 36,494 adults do not know how to read and write. In regards to secondary schools, the district has a total of 27 schools admitting a total of 12,796 (6,853 males and 5,943 females). There are 260 secondary teachers in the district implying a 1:49 teacher-student ratio, which is way above the recommended benchmark of 1:45. Infrastructure wise, the district is still far from sufficiency.

5.5.5 Water

Iringa district council has 123 villages out of which 79 (55%) have water schemes supplying 187,309 people with clean water. About 68% of the population gets water within 400m range.

5.5.6 Roads

The proposed project site (Makota farm) is about 30 km from Iringa Municipality (Town) through the Iringa-Mbeya highway. The highway is paved and falls under Tanzania Roads Agency (TANROADS) road network. About 1.5 km off the highway through a seasonal unpaved road is where the project site is located. Thus, the proposed project area can be accessed easily throughout the year.

5.5.7 Energy

Typical to other rural parts of the country, most villages surrounding the proposed project site still lack electricity despite the fact that a power transmission line passes nearby. One the reason is nature of the houses (muddy wall thatched with grass) that make it impractical for power connection. Affordability may also be another factor. It however should be noted that a few areas including the proposed project site are connected to the national grid. The proposed project site for instance, is connected to a 33KV line with a 220 kVA transformer and an additional connection of 500kVA has been approved.

5.5.8 Recreational and Tourism Attractions

Iringa district boasts for her rich wildlife which spreads across National Park(s), Game Controlled areas and open space. Ruaha National Park, the second largest in the country after Serengeti is located in the district covering about 10km². Ruaha National Park is an interesting ecosystem as it represent a transitional zone where Eastern and Southern African species of fauna and flora overlap. It also is the most southerly protected area where Grant Gazelle, Lesser Kudu, and Stripped Hyena are found. Besides Ruaha National Park, there is Lunda Mwambi Game controlled area (LMGCA) which lies on the North East part of Ruaha National Park. It is a designated local and tourist hunting which attracts a good number of tourist hunters accruing substantial amount of revenue to the surrounding villages.

5.5.9 Cultural Heritage Sites

Makota Farm is located on the Southern highlands of Iringa Region in Mgama Ward of Iringa District. The region has yielded important archaeological and historical traces which contains a long Stone Age (SA) both MSA and LSA records going back to more than 400,000 years ago. It begins with the

Acheulean at Isimila, Korongo and Mgongo sites, both located just outside of the modern regional capital of Iringa. The Stone Age past continues in a series of granite rock shelters (Magumbike and Mlambalasi), burial sites of the nineteenth century Uhehe chief Mkwawa and caves that contains important cultural and historic significances. The project is located about 5km from the Isimila Palaeolithic site that contains fossilized bones including those of a mammal related to the modern giraffe, but having a much shorter neck, and an extinct hippopotamus with unusual periscope-like projections as well as stone artefacts.

6. STAKEHOLDERS CONSULTATIONS

6.1 Introduction

The Environmental Management Act 2004 provides directives and guidelines on public participation during the EIA process. Regulation 17 under Part IV of the EIAAR 2005 stresses that “the developer or proponent shall in consultation with the Council, seek the views of any person who is or is likely to be affected by the project”. Their involvement ensures all interested and affected parties are involved in the project. Detailed stakeholder consultations have been carried as a part of this EIA study as presented in chapter 2 (section 2.3.2).

6.2 Stakeholders' Concerns, Comments and Recommendations

6.2.1 Government Ministries, Departments and Agencies (MDAs)

Table 6-1: Government Ministries, Departments and Agencies Consultations

	Name of MDA	Comment	Concerns	Recommendations
1.	Ministry of Livestock and Fisheries Development (MLFD)	The project is very welcome as it will have immense contribution to the local communities and the national economy through promotion of poultry subsector.	Disease outbreaks associated with poultry farming	<ul style="list-style-type: none"> The investor is required to apply for certificate of registration issued by the Director of Veterinary Services (DVS) in the MLFD to operate hatcheries and breeder flocks. The investor is supposed to consult zonal veterinary office in Iringa on the proposed site plan and design of hatchery and breeder farm prior to construction work. The investor will be required to seek for permits before importing veterinary medicines, eggs or chicks. In case of diseases outbreak, the investor will be required to follow the procedure for notification of diseases including liaising with relevant authorities.
2.	Ministry of Agriculture, Food Security and Cooperative (MAFC) - Environmental Management Unit (EMU)	The project is essential for boosting local economy but should observe environmental and social safeguards	Use of common natural resource shared with local communities like catchment area if any.	<ul style="list-style-type: none"> Project should show clearly and implement what has been agreed and planned in environmental and social management plan (ESMP) Support socioeconomic activities in the surrounding communities and avoid raising unattainable promises Ensure efficient training to the local farmers is provided
3.	Ministry of Industry and Trade	Project is good because will create employment, revenues, local business opportunities and improvement of people's livelihoods	<p>Compliance with national trade, construction industries and cross cutting policies such as proper land acquisition, addressing HIV/AIDS, contract labors issues etc.</p> <p>Environmental pollution including dust emission</p>	<ul style="list-style-type: none"> Have a plan to support socioeconomic to the project surrounding communities Put a realistic budget for EMP's Attach all necessary documents such as certificates in land acquisition, company registration, water right permits, factory layout, and process flow sheet diagram and organization structure in the final report. Consult OSHA before construction for further advices

	Name of MDA	Comment	Concerns	Recommendations
4.	Veterinary Investigation Centre(VIC) – Iringa Zonal Office	The common poultry diseases in Iringa region are new castle diseases (NCD), Murex disease (MD), infectious bursal disease ‘Gumbolo’ (local name) (IBD), fowl pox disease (FPD), Coccidiosis disease (CD), infectious coryzal disease (ICD), fowl typhoid disease (FTD), Salmonellosis disease (SD), Avitalmonellosis disease (AD) and worm infestation disease (WID). The outbreak of these diseases leads to the death of poultry.		<ul style="list-style-type: none"> In order to prevent the outbreak of poultry diseases the developer should use vaccination and hygienic condition “rooting check-up and deworming”. The investor should work together with district veterinary investigation centre for poultry vaccination and technical assistant
5.	Tanzania Food and Drugs Authority (TFDA) - Senior food inspection and Drug inspector and data entry	The Developer should comply with TFDA policies and regulations	<p>Any kind of imported veterinary pharmaceutical is registered by the authority</p> <p>Responsible industry for manufacturing imported veterinary pharmaceuticals should be inspected by TFDA officials and developer should prepare good manufacturing practices inspection fee (GMP inspection fees)</p> <p>If developer will import veterinary pharmaceuticals should pay 02% of freight body value (FOB) fee per trip</p> <p>If developer will not import veterinary pharmaceuticals should not apply for certificate of registration as well as paying FOB, GMP inspection and retention fees</p>	<ul style="list-style-type: none"> The investor will be required to seek certificate of registration before importing veterinary pharmaceuticals issued by TFDA Before importing veterinary pharmaceuticals investor will be required to bring samples (veterinary pharmaceutical) to the TFDA for laboratory analysis All imported veterinary pharmaceuticals should be labelled in either English or Swahili Languages Retention fee for imported veterinary pharmaceuticals should be paid annually
6.	Occupational Health and Safety Authority (OSHA) - Industrial Hygiene Inspector	The Investor is required to comply with occupational health and safety Act No. 5 which emphasizes provision of safety gear	<p>Medical examination to project employees</p> <p>Health and safety system for the project</p>	<ul style="list-style-type: none"> Do medical examination particularly fitness to the workers prior commencement of construction and production processes Formulate healthy and safety policy which will show commitment between investor and workers Formulate healthy and safety committee comprising members from each department Provide health and safety training to the workers Submit architectural drawings to OSHA for advise/recommendations and site visit

	Name of MDA	Comment	Concerns	Recommendations
7.	Rufiji Water Basin Office (RWBO)	There is no anticipated impact caused by the project to the <i>Ididiga</i> dam spring because dam will not be used, therefore project will be useful to the communities.	On-going water shortages issue in the villages surrounding Makota farm is a result of worn out water supply infrastructure which cannot supply the amount of water required by all villages due to population growth as opposed to allegations that the problem is due to drawing water from <i>Ididiga</i> by former flower project owned by Shira Flowers Limited	<ul style="list-style-type: none"> • If developer will need to construct boreholes, he will be required to apply for a water use permit from RBWO. • It is important for a developer to collaborate with the communities on water resource management and to hear their opinions on water use from <i>Ididiga</i> spring if any. • As part of Corporate Social Responsibility (CSR) as well as fostering good relations, the developer may consider constructing boreholes in the surrounding communities.

Appendix 12 contains a list of the people consulted at MDAs level.

6.2.2 Iringa Region and Iringa District Council

Table 6-2: Regional and Iringa district Consultations

SN	Stakeholder	Comment	Concerns	Recommendations
1.	Iringa Regional Agricultural Advisor	<p>Through training that will be offered by developer, skills on maize and soya production among farmers will be improved.</p> <p>The proposed project will provide a reliable local market to small-scale maize and soya farmers in the region.</p>	Poultry production may lead to the outbreak of diseases like avian influenza.	<ul style="list-style-type: none"> • Training should not only focus on maize and soya production but also poultry production and feed processing. • The developer should collaborate with farmers in identifying diseases impacting production and productivity of their birds and factors affecting uptake of control strategies (including indigenous approaches). • Special strategy for waste management should be introduced. For instance, developer may use trench, HIP and silos techniques for fertilizer (manure) decomposition • Proper ventilation in working sites and protective gear for workers health and safety. • Farmers training assessment should be done frequently to help the developer see if there is any improvement afterwards. • The developer together and surrounding communities should prepare and sign an agreement that will show how the local communities will benefit from the project. • The developer should offer better prices for farmers' crops (maize and soya).

SN	Stakeholder	Comment	Concerns	Recommendations
2.	Iringa District Council officials	<ul style="list-style-type: none"> • Poultry and poultry products constitutes an important component of human diet. For instance one egg provides 80 calories and more than 15% of the daily requirements protein. • Local people (skilled and unskilled) will be employed during construction and operation phases. The resulting income will be used to fund children's education. • Promotion of poultry sector through supply of poultry feed and chicks in the surrounding communities and target markets. • Poultry is the least costly alternative compared to cow, goat, sheep and pig. Therefore the local people will afford to purchase poultry and its products. • Reduction of malnutrition as poultry produces more of animal protein from the same amount of feed compared to dairy cattle, pig, goat and sheep. • The project will be more beneficial to those (often landless people) who do not own cattle, goat and sheep because poultry farming does not require large portion of land. • Through this project other forms of trade will grow due to increased income among local people. • Through revenue collection District GDP will rise as well as that of the country 	<p>During construction phases there is a possibility of vegetation clearing. Therefore re-forestation campaign should start after construction phase.</p> <p>Air pollution caused by dust and steam during and after construction phase will be a serious problem to both workers and surrounding villages.</p> <p>Spread of sexual transmitted disease like HIV/AIDS.</p>	<ul style="list-style-type: none"> • Proper care should be undertaken to conserve environment from pollution by insecticides, poultry feathers, carcasses and faeces. • The developer should build special facilities for bird carcasses disposal. • Surrounding communities should be involved in all project stages because project has a specific time bound. This will enable them to use the acquired skills to manage their own poultry projects. • The developer should support local community by providing social services like building school, boreholes, feeder roads, dispensaries and supporting orphans via education. • The developer should not close footpaths, animal tracks, and feeder roads that go through the project area to cement good neighbourhood with the surrounding communities • The developer may organize soya and maize groups who will be given training on the best techniques for cultivating soya and maize. This will go parallel with providing them with subsidies. • The developer and farmers groups should sign a contract that will assure developer will buy farmers proceeds. Through this soya and maize production will be promoted • The developer should solidify good neighbourhood with surrounding villages by offering better prices for their crops, training, employment and support to local development projects. • The developer should provide HIV/AIDS education, awareness and preventive measures to its customers and workers together with surrounding communities. • Majority of local farmers are not cultivating soya due to the lack of market. The developer should then assure them of permanent market for the crop. • The instead of relying on what is available from the market s.

Appendix 13 contains a list of the people consulted regional and district level.

6.2.3 Local Communities

Table 6-3: Consultations with Local Community

SN	Village/ Ward	Comment	Concerns	Recommendations
1.	Ihemi village		Increasing of moral erosion due to the sudden influx of people that could result into increase of theft and prostitution.	<ul style="list-style-type: none"> • Developer should introduce himself and the project to the village government and communities. • Employment opportunities should be given to the communities living around Makota farm project. • Feeder roads like Makota - Mgama that go through the proposed project site should not be closed.
2.	Tanangozi, Kaning'ombe and Makota villages.	<ul style="list-style-type: none"> • Community welfare and standard of living could be improved. • There is no land/boundary conflict between Mseke ward and the proposed project developer. • Luhululu valley in kaningo'mbe is favourable for maize and soya production. • There are no any discovered or reported historic and cultural remains such as cemeteries and monuments in the project area. 	<p>Possibility of polluting Iddiga water source if proper drainage system will not be constructed.</p> <p>Air pollution during different project phases will impact community's health.</p>	<ul style="list-style-type: none"> • An environmental committee should be established to monitor developer's compliance with environmental standards. • The developer should be made aware of his environmental and social responsibility before being allowed to proceed with the project. • Developer should assist developmental project that will be introduced in the villages. • Investor should provide local farmers with subsidies in order to produce better quality crops. • Training to be offered by developer to the local farmers should focus on good agronomic practices • The developer should consider having in place complaints redress mechanism with local communities.

Appendix 14 contains a list of the people consulted at local community level.

6.2.4 Individual and Farmer Groups

Table 6-4: Consultations with Individuals and Farmer Groups

Name of Individual and farmer groups	Comment	Recommendations
<ul style="list-style-type: none"> • Tanangozi women chicken herders (Twi hukage). • Ihemi dairy cattle & farmers association. • Umoja , • Chapakazi 1. • Chapakazi 2. • Winome. • Muongozo maize grower's union. • Kaningo'mbe farmers' association group 	<p>The project is being implemented in a participatory manner unlike some other projects where there is no communications made by developers to the beneficiaries.</p> <p>The project is likely to promote poultry farming in surrounding areas.</p> <p>Increased egg production not only will eradicate nutritional challenges in the region but will also create huge employment opportunities for the people.</p>	<ul style="list-style-type: none"> • Training on maize, soya cultivation and poultry production should be practical rather than theory. • They are ready to cultivate soya only if developer will train and assure them with reliable market as well as providing subsidies. • A modern waste disposal pit is highly recommended to avoid any health hazards to people and the environment.

Appendix 15 contains a list of individuals and farmer groups consulted.

6.2.5 Community Based Organizations

Table 6-5: Consultations with Community Based Organisations

Name of CBO	Comment	Concerns	Recommendations
<ul style="list-style-type: none"> • One Acre Fund (OAF). • Southern Highlands Livestock Development Association of Tanzania (SHILDA). • Tanzania Grass Roots Development (TAGRODE). • Tanzania Chamber of Commerce and Agriculture (TCCIA). • Health for animal and 	<p>The project will improve capacity within the region and the nation at large through training of local farmers.</p>	<p>Possibility of polluting <i>Ididiga</i> water spring if waste water from project operation will not be properly managed.</p> <p>As a request, the developer may help with digging boreholes in <i>Sadani, Kalenga, Ulanga and Mangalila</i> villages due to serious water scarcity during dry seasons.</p>	<ul style="list-style-type: none"> • The developer should assist farmers in produce high quality crops as required and this should be shown in the contract between farmers and the developer. • The developer should ensure that medicines and other chemical are properly stored. • To attract more farmers into soya cultivation, the developer should persuade them by providing training, subsidies and purchasing (soya) at a better price • Developer may collaborate with CBO's and district agricultural extension officers to train farmers because they (extension officers) have been working with and providing

Name of CBO	Comment	Concerns	Recommendations
livelihood (HALI). <ul style="list-style-type: none"> • Farm Inputs Promotions (FIPS). • Tanangozi - Kalenga water user association (TKWUA). 			training to the farmers for a long time. <ul style="list-style-type: none"> • Participatory research should be used to evaluate opinions of village poultry keepers regarding diseases affecting their poultry, identify those factors that would impede and/or facilitate disease control programmes. • The developer should, before starting operation, install a standard waste water treatment system to avoid polluting Iddiga spring when operation starts.

Appendix 16 contains a list of CBOs representatives consulted.

6.2.6 STL's Workers

Table 6-6: Consultations with STL Workers

Comment	Concerns	Recommendations
The proposed project provides employment opportunities to villagers around the farm.	<ul style="list-style-type: none"> • There is no formal work contract and payment scheme. • No clear job descriptions. • Work load for each individual on a daily basis is not specified. • No meals are provided at place of work. • The developer has not provided workers with PPE. • No transport allowance is provided to workers by the developer. • Workers are not health insured. • No housing allowance. 	<ul style="list-style-type: none"> • The developer and workers should enter into a formal employment contract. • There should be a clear job description for each worker. • Workload for each worker should be specified. • The developer should provide meals at work place. • Workers should be provided with PPE. • Workers to be provided with transport (or allowance for) as some come a long way from work place. • All workers should health insured • The developer should provide housing facility for worker or pay allowance for the same.

Appendix 17 contains a list of current STL's workers consulted.

6.3 Summary of Stakeholders' Major Concerns and Recommendations

A number of issues and concerns emanated from the stakeholders consulted. Key issues raised were in relation to the potential impacts of the proposed project on the environment, and surrounding communities as well as the nation at large. These include potential employment opportunities the project would generate to the immediate neighbouring communities and other socio-economic benefits. A summary of issues and concerns are as follows:

- **Job opportunities:** Both local communities as well as district and local authorities expect the proposed project to provide a number of employment opportunities during construction, operation and maintenance phases. Likewise, a few employees who are already employed with the project expressed their wish to have their contract finalised as long as they have the necessary qualification. They also recommended that whenever there are job openings during the projects life cycle, people coming from neighbouring villages be given priority.
- **Waste Management:** Given the nature of project, it is expected that waste (solid, liquid and gaseous) will be produced. In that regard, stakeholders particularly district authorities raised their concern that the proponent should have in place appropriate waste management and disposal mechanisms to avoid any potential negative impacts to both the environment and surrounding communities.
- **Contamination of Water source:** One (*Ididiga* spring) of water sources for neighbouring villages lies right within the project site. Stakeholders had a concern that project execution should not lead to destruction and/or pollution of this water source. Related to that is excessive water drawing that might leave the villages and other downstream users water scarce. The concern was related to a misunderstanding between former Flower project and the villages following construction of a dam that, according to locals, threatened sustainable water availability for the villages neighbouring the project. It was therefore recommended that the developer help in digging boreholes in the villages to compensate any shortage should the envisaged water shortage becomes a reality in the future.
- **Wastewater Treatment:** In connection to the above aspect, stakeholders were of the opinion that project proponent ensures all waste water generated from poultry farming and processing is treated before being disposed.
- **Safety and Health Issues:** The stakeholder's consulted particularly employees who are currently hired by the project expressed their concern about safety and health risks that might associate with the project activities. It was recommended that the developer take into consideration all occupational health and safety standards to ensure employees safety and that of the general public neighbouring the project.
- **Farmers' training and capacity building:** Stakeholders were appreciative of the fact that the developer will train local farmers on better farming methods to ensure quality crops are produced to supply the feed mill with adequate raw materials. It was recommended that the developer also include training on poultry farming to the immediate local communities so as to increase productivity among local poultry farmers.
- **HIV/AIDS and other STIs:** A concern was also raised that the proposed project may lead to increased transmission of HIV/AIDS and other STIs due to the influx of new comers searching for casual and permanent jobs. It was recommended that the developer effect long-term awareness creation program for employees and other project stakeholders.

In line with the recommendations of the consulted stakeholders, particularly MDAs, and in compliance with policy and legal requirements as described in Section Four, the developer will be required to apply for some pertinent certificates, permits, and licences prior to and during the operation phase of the proposed integrated poultry production project as summarized in the in Table 6-7 below. It should be noted that the table is not exhaustive and the developer will be responsible for applying and obtaining any other relevant legal certificates, permits, and licence from responsible authorities for his operations.

Table 6-7: Legal certificates, permits and licence to be applied for by STL

	Certificate, permit or licence type	Responsible authority	When to apply/ Remarks
1.	Certificate of Incorporation of the Company	Business Registrations and Licensing Agency (BRELA)	Already obtained (see appendix 6)
2.	Certificates in land acquisition (Title Deed)	Ministry of Lands, Housing and Human Settlements Development (MLHSD)	Already applied for (see appendix 5)
3.	Certificate of Registration for Taxpayer Identification Number (TIN)	Tanzania Revenue Authority (TRA)	Already obtained (see appendix 7)
4.	EIA certificate	VPO through NEMC	This report is part of the application
5.	Certificate of registration to operate hatcheries and breeder flocks.	Director of Veterinary Services (DVS) in the MLFD	Before commencing project operation
6.	Permits for importing veterinary medicines, eggs or chicks	DVS in the MLFD	Before importation of veterinary medicines, eggs or chicks
7.	Water right permits	Rufiji Water Basin Office (RWBO)	Before drilling of and using boreholes
8.	Certificate of registration for importing veterinary pharmaceuticals	Tanzania Food and Drugs Authority (TFDA)	Before importing veterinary pharmaceuticals
9.	Occupational Health and Safety Compliance Licence	Occupational Health and Safety Authority (OSHA)	Before commencing of project operation
10.	Fire Licence	Ministry of Home Affairs - Fire and Rescue Department	Before commencing of project operation

6.4 Developers' Response to Stakeholders' Major Concerns and Recommendations

Table 6-8: Developer's response to Stakeholders' concerns and recommendations

Comment, concerns, recommendations	Developer's responses
Job creation/opportunities/ Corporate Social Responsibility	<ul style="list-style-type: none"> • It is expected that about 50 people will be employed during construction phase and 30 to 40 during operation phase. Employment will be in the form of managers, skilled labourers as well as unskilled labourers. As of now, the project has already hired 25 people all of whom coming from neighbouring villages. • The project will strongly consider contributing to community development initiatives in areas such as water, education, roads, health etc.
Waste management	<ul style="list-style-type: none"> • Recommended measures for the management and disposal of poultry carcasses include the following: <ul style="list-style-type: none"> - Reduce mortalities through proper animal care and disease prevention; - Collect carcasses on a regular basis to prevent putrefaction; - Compost only disease-free carcasses and ensure that the composting process is managed to prevent leachate and odours (e.g. sufficient cover material, proper temperature and moisture content); - Use reliable commercially available options approved by local authorities that dispose of carcasses by rendering or incineration, depending on the cause of fatality.
Water source pollution/destruction	<ul style="list-style-type: none"> • Together with other waste water treatment mechanisms identified in this section the proposed project will build a whole new water supply facility including digging of two boreholes, storage and reticulation systems for use of the poultry operation.

Comment, concerns, recommendations	Developer's responses
Waste water treatment	<ul style="list-style-type: none"> • The following management techniques will be deployed to reduce the impacts of water runoff from poultry operations. <ul style="list-style-type: none"> - Reduce water use and spills from animal watering by preventing overflow of watering devices and using calibrated, well-maintained self-watering devices; - Install vegetative filters to trap sediment; - Install surface water diversions to direct clean runoff around areas containing waste; - Implement buffer zones to surface water bodies, as appropriate to local conditions and requirements, and avoiding land spreading of manure within these areas.
Farmers training and capacity building	<ul style="list-style-type: none"> • The project will offer extension services to small-scale farmers who will be connected to the project as supplier of maize and soya required for feed production. • The project will promote poultry sector through supply of poultry feed and chicks in the surrounding communities and other target markets in Iringa, Mbeya, Songea, Dodoma and Dar es Salaam. • Similarly, the project is likely to encourage the development of small scale broiler farms for the day old chicks to fully grown broilers.
Occupational Health and Safety Issues	<ul style="list-style-type: none"> • To ensure that occupation safety and health standards are adhered to the project will implement the following: <ul style="list-style-type: none"> - Prevention of falls into openings for water supply systems, underground manure storage tanks, and other confined spaces through installation of covers, fences, and other fall prevention methods; - Training on correct bird handling techniques; - Provision of adequate, reliable supply and full use of appropriate personal protective equipment (PPE) such as gloves and aprons to prevent scratches for all project workers; - Entry to all confined spaces shall be restricted through adequate signage both in English and Kiswahili shall be used in the project area. - Workers will be informed of potential risks of exposure to biological agents and provide training in recognizing and mitigating those risks; - Workers with allergic reactions to biological agents will not work with these substances.
HIV/AIDS and other STIs	<ul style="list-style-type: none"> • To mitigate the impact, the developer shall work closely with the various stakeholders to have an educational awareness campaign during the construction and operation phases to prevent the further spread of HIV/AIDS. All the stakeholders (including communities and their leaders, schools and health centres, civil societies and CBOs) will be involved in the awareness campaign to ensure that its sustainability.
Applying for relevant legal certificates, permits, and licence	<ul style="list-style-type: none"> • The Company will apply and obtain all relevant legal certificates, permits, and licence to guide its operations

7. IMPACTS ASSESSMENT

7.1 Introduction

This chapter presents the relevant environmental and social issues that may occur (potential impacts) throughout the project cycle. The assessment is based on identified potential impacts through fieldwork, measurement, stakeholder's consultations, interviews and experience drawn from similar projects. The proposed project is expected to have both positive and negative impacts on environment. Specifically, the chapter covers the main environmental and social impacts that have been identified during construction, operation and decommissioning phases of the proposed project.

7.2 Impacts Assessment Methodology

7.2.1 Impacts Identification

Potential positive and negative impacts associated with the proposed project were preliminarily identified during scoping study through expert opinion and stakeholder consultations. Further impacts were identified through expert analyses of information and consultations during full ESIA study. The identification process included the following:

- identification of project boundaries;
- identification of stakeholders within the project boundaries;
- expert identification of potential impacts;
- stakeholders identification of issues to arise from project implementation, and
- harmonization of potential impacts and issues.

7.2.2 Impacts Prediction

Impact prediction involved the assessment of each identified impact using a set of criteria and rating scales. The following assessment criteria were used:

- Nature;
- Extent;
- Intensity;
- Duration; and
- Probability.

Similarly, rating scales employed by the study included:

- positive, negative or neutral
- low, medium or high
- local, regional, national or international
- short-, medium- or long-term
- improbable, probable, highly probable or definite

Table 7-1: Impacts Assessment Criteria and Rating Scales

Criterion	Rating Scale
Nature	<ul style="list-style-type: none">- Direct,- Indirect,- Cumulative or synergistic These apply for both positive and negative impacts.
<i>Extent:</i> spatial limit of the impact	<ul style="list-style-type: none">- <i>Local:</i> site-specific and/or immediate surrounding areas of Makota farm (Mgama ward)

Criterion	Rating Scale
	<ul style="list-style-type: none"> - <i>Regional</i>: Iringa, and Mbeya regions - <i>National</i>: Tanzania - <i>International</i>: beyond Tanzania's boundaries.
<i>Intensity</i> : severity of the impact	<ul style="list-style-type: none"> - <i>Low</i>: where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected. - <i>Medium</i>: the affected environment is altered but natural, cultural and social functions and processes continue though in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected. - <i>High</i>: natural, cultural or social functions and processes are altered to the extent that it will temporarily or permanently shift to another regime; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
<i>Duration</i> : predicted lifetime of the impact	<ul style="list-style-type: none"> - Short-term (0 to 5 years) - Medium term (6 to 15 years) - Long term (16 to 30 years) - the impact will cease after the operational life of the project either because of natural processes or by human intervention
<i>Probability</i> : impact occurrence likelihood	<ul style="list-style-type: none"> - <i>Improbable</i>: the possibility of the impact occurring is very low - <i>Probable</i>: there is a good possibility (<50% chance) that the impact will occur - <i>Highly probable</i>: it is most likely (50-90% chance) that the impact will occur - <i>Definite</i>: the impact will occur regardless of any prevention measures (>90% chance of occurring)

7.2.3 Impact Significance Rating

The approach used to rate the significance of potential impacts and later assess the effectiveness of the mitigation or enhancement measures is to apply significant ratings to each impact based on objective criteria, such as magnitude, extent and duration of that impact, to yield a final evaluation of the significance of impacts before and after mitigation. The application of significance rating reduces the number of variables that need to be considered by the decision maker, and in the meantime providing pertinent information about the implications of the proposed project. The significance rating criteria are given in table 7.2 below.

Table 7-2: Significance Rating Criteria

First Step Criterion	Categories
Extent or Spatial influence of Impact	<ul style="list-style-type: none"> - Local/Site specific - Regional - National - International
Magnitude of Impact at that spatial scale	<ul style="list-style-type: none"> - High: natural and/or social functions and/or processes are severely altered - Medium: natural and /or social functions and /or processes are notably altered - Low: natural and /or social functions and/or processes are

First Step Criterion	Categories
	negligibly or minimally altered
Duration of impact	<ul style="list-style-type: none"> - Short Term (ST): 0-5 years - Medium Term (MT) 5-10 years - Long Term (LT): 15+ year

In addition, other criteria considered to evaluate whether or not adverse impacts are significant include:

- environmental loss and deterioration;
- social impacts resulting directly or indirectly from environmental change;
- non-conformity with environmental standards, objectives and guidelines, and
- likelihood and acceptability of risk

Criteria to evaluate adverse impacts on natural resources, ecological functions or designated areas include:

- reductions in species diversity;
- depletion or fragmentation on flora and fauna habitat;
- loss of threatened, rare or endangered species;
- impairment of ecological integrity, resilience or health e.g.
 - Disruption of food chains;
 - Decline in species population;
 - Alterations in predator-prey relationships

The criteria used to evaluate the significance of adverse social impacts that result from biophysical changes include:

- threats to human health and safety for example from release of persistent and/or toxic chemicals;
- decline in commercially valuable or locally important species or resources such as fish, forestry and farmland;
- loss of areas or environmental components that have cultural, recreational or aesthetic value;
- displacement of people for instance to give way for transmission line or large dams and reservoirs;
- disruption of communities by influx of a workforce particularly during project construction, and
- pressure on services, transportation and infrastructure

Environmental standards, objectives and targets to evaluate significance include:

- prescribed limits on waste/emission discharges and/or concentrations;
- water quality standards established by law or regulations;
- environmental objectives and targets contained in policy and strategy; and
- approved or statutory plans that protect areas or allocate, zone or regulate the use of land and natural resources.

7.3 Construction Phase Impacts

A substantial portion of potential impacts resulting from implementation of the integrated poultry production project at Makota will occur during the construction phase and will be related to construction activities and associated facilities. These impacts will include the following;

7.3.1 Impacts on the Physical Environment

7.3.1.1 Soil Erosion and Pollution

There is a possibility of soil erosion and pollution to occur during construction phase of the project. The clearing of vegetation could lead into soil erosion when the cleared land is exposed to natural agents such as wind and surface run-off. Removal of top soil after site clearance by agents such as wind, rain water, and surface run off is a likely action to occur. Similarly, accidental oil spills from construction equipment and discharge of wastewater from equipment washing to the environment might accelerate soil pollution to some extent. Oil spills may infiltrate into soil causing soil pollution and later water pollution during rainy season. However, this impact is localized around machinery, maintenance areas or garage and areas of concentrated activities.

Severity of impact is localized with low intensity due to the nature of project, which shall require minimum number of people during construction and shall not require heavy construction equipment. It is expected that the impacts will be low, local, and they will occur mostly during the construction stage (short term).

7.3.1.2 Land Degradation

Most of the building materials such as stones, aggregates, and sand required for construction of the proposed project will be obtained from nearby quarry sites and borrow pits. Since substantial quantities of these materials will be required for construction of the development, the availability and sustainability of land resources at the extraction sites will be negatively affected as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health and safety risks.

Similarly, during construction of the proposed project a lot of solid waste will be generated. These include papers used for packing cement, plastics, timber remains, landscape and land clearing debris, asphalt pavement, gravel and aggregate products, concrete, masonry scrap and rubble (brick, concrete masonry, stone) among others. These will have an implication on dump environment.

It is expected that the contractor will obtain materials for construction purposes from licensed suppliers or from authorized areas. Likewise, disposal of construction waste will be on designated sites. The extent of this impact is localized with a low intensity. It is likely that the impact may occur. The impact can be highly improved/eliminated with mitigation. Therefore, the impact is negative and of low significance.

7.3.1.3 Air Pollution

Air pollution is quite likely to occur during construction phase. This is due traffic and other equipment using fossil fuels that release hydrocarbons and other gases including carbon dioxide, nitrous oxides, sulphur oxides, and particulate matters which may pollute the air. Likewise, activities like land clearing, vehicle movement, excavations for sheds and buildings foundations, construction drive ways and landscaping may generate dust especially during the dry season. Other sources of air pollution will occur due to decomposition and/or burning of the cleared vegetation and dust from gravel drive ways. The level of air pollution originating from the above mentioned sources are expected to be low, localized and short term. No serious impacts are expected on people and the environment as whole.

7.3.1.4 Surface Water Pollution

Surface water quality may be polluted due to increased erosion, run off from construction site, and contamination in the event of oil spills from equipment and machinery. The extent of this impact will depend directly on the magnitude of other causal factors such as level of clearance, awareness, etc. Soil erosion during construction stage may result into changes in hydrological status. The change is mainly alteration of river discharge and riverbed condition due to siltation. Thus the project may cause siltation of watercourses as a result of suspended materials downstream.

There is a spring (*Ididiga*) right within the project site which provide water to the neighbouring villages. However, based on the proposed farm layout, the construction activity is nowhere near the dam or spring and apart from some dust which will be no more than generated by the road passing through the farm so no significant impacts expected.

7.3.1.5 Impacts of Litter

The potential effects of litter generated from construction activities on the physical environment would be minimal representing more of an effect on the aesthetics than on pollution. This impact during facilities construction is short-term and therefore considered of low significance. Among the mitigation measure that should be used to reduce the impacts of litter is the good keeping of the generated litter through planning for placement and disposal of. Therefore, the temporary nature impacts of litter on aesthetics that is easily mitigated by the good litter management practices result in low significance following implementation of a construction phase mitigation measures.

7.3.2 Impacts on Biological Environment

7.3.2.1 Impacts on Flora

The clearance of most vegetation during construction to leave space for construction of sheds, silos, feed mill and other building facilities and access roads will bring negative impacts to flora population. Moreover, direct exposure to nitrous oxides (NO_x) may cause growth inhibitions in some plants. Spatial and temporal variations in land uses at Makota farm due to farming activities in the past have created habitat heterogeneity in the area. Although the Makota farm possesses some patches of marshland, grassland and woodland which are considered to be suitable habitats, no special plant species of international conservation importance was recorded at Makota. The impacts are therefore considered of low significance.

7.3.2.2 Impacts on Fauna

The nature of the site as farmland with few facilities has not attracted several organisms to find refuge in the area although some including different types of birds, reptiles, amphibians, mammals and invertebrates are found. The clearance of vegetation and presence of noisy machinery, trucks and workforce will create unfavourable environment for most of these organisms while crawling organisms will eventually vanish following construction of paved surface. However, the temporary nature of the construction activities will result in impacts of short-term duration and therefore the impact is considered of low significance.

7.3.3 Impacts on Socioeconomic Environment

7.3.3.1 Workers Accidents and Hazards during Construction

Construction workers are prone to accidents resulting from construction activities. These accidents may have acute or chronic impacts depending on nature, severity and intensity. In this regard, construction and mobilization activities of the proposed integrated poultry production could result into accidental injuries and hazards, etc. which could negatively impact the workforce. Because of the intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. At times, such injuries may be from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others.

7.3.3.2 Vibration and Noise

The level of noise and vibration are likely to increase during the construction phase. The noise will be mainly come from vehicles and equipment operation during construction activities as well as people working on the project construction. This is a short-term impact and it will be felt mostly around construction sites and its peripherals. There will be no drilling activities or involvement of heavy or high noise machinery. For residential areas located within 5km from the Project site boundary, it is predicted that the construction phase and operation of the proposed project will not pose any significant and the annoyance level is within the “no to little” impact category.

Considering technological advancement in construction industry, it is anticipated that machinery and equipment to be used during construction will be modern, versatile, and quieter than the old ones. It is also likely that they will require fewer numbers of operators reducing noise from workers. Therefore, the levels of noise and vibrations are anticipated to be within the tolerable limits, short term and localized. In view of the above and the fact that construction will concentrate on non-residential area, no significant impact is anticipated and the impact can be highly mitigated.

7.3.3.3 Employment Opportunities

On the other hand, the proposed project will have, during construction phase, potential positive impact to the local community through provision of employment. It is expected that about 50 people will be employed during construction phase. Employment will be in form of managers, skilled labourers as well as unskilled labourers. Therefore, apart from employment benefits accruing to local people other national and international experts are likely to be employed by the project especially at senior positions.

7.3.3.4 Income Generation among Suppliers

During construction phase, the proposed project plan to source most construction materials from local and/or national sources including cement, iron sheets, steel bars, pipes, etc, from local shops. This demand therefore, will create market for local people in Iringa and/or elsewhere in the country engaged in supplying construction materials leading to significant positive economic benefits to suppliers both in Iringa and Tanzania at large albeit on short term basis.

7.3.3.5 Impacts on Security

The presence of labourers and expensive construction equipment, machinery and materials in the sites could potentially pose a security risk at the project site. Furthermore, offenders may capitalise on the

increased movement during construction and anonymity created by the construction activities to carry out criminal activities in the site and surrounding areas. This impact is likely probable due to low security measures from the fact the site is slightly far from police station(s) that could otherwise prevent criminal activities around the project site. Accordingly, the impacts on the area's security are considered to be of medium significance. Therefore, appropriate security measures should be provided at the site through fencing, security checks/screening of workers and their guests and 24 hours security watch by expert security men (normally privately contracted) to prevent such criminal activities from happening at the site.

7.3.3.6 Impacts on Knowledge

Whilst the operations related to constructions of concrete structures and installation of electrical wiring system and equipment are well known to local experts, the equipment and technology for modern poultry production facilities is relatively new to most practising local engineers and consultants. This integrated poultry production project will therefore benefit local experts in updating their modern and large scale poultry knowledge and have opportunity for practical learning by participating in the whole process. This positive impact could be enhanced by making a large number of local experts participate in the process and consequently the level of this impact would be highly significant.

7.3.3.7 Increased STDs and HIV/AIDS Cases

The project is expecting to employ a significant number of permanent staffs and casual labourers during operation and construction. Social interactions among staffs and with locals cannot be avoided. Considering the nature with which HIV/AIDS is contracted and spread, this number is significant to make a serious contribution to the pandemic.

Also, presence of monetary strength will act as catalyst and thus enhance such social interactions between the project workers and people of the nearby centres. The extent of this impact is localized with a medium intensity. It is likely that the impact may occur. The impact can be highly improved/eliminated with mitigation. Therefore, the impact is negative and of high significance.

7.3.3.8 Informal Business Growth

During construction period the informal sector will benefit from the operations. This will involve different local entrepreneurs such as local food vending (*Mama Lishe*) operators who will be selling their products and services to be used on site. Such a move for instance, shall promote *Mama Lishe* entrepreneurs in the local areas as most of the workers working on the proposed project site will be buying food from them.

7.4 Operation Phase Impacts

The operation of the proposed integrated poultry production and associated facilities will potentially be related to changes in the biophysical and socio-economic environment within and around the farm and associated facilities.

7.4.1 Impacts on the Physical Environment

7.4.1.1 Soil Erosion and Pollution

During operation phase no significant soil erosion impacts are expected as most of the activities will not lead to soil disturbance with exception of soya farming which if well managed can hardly lead to any significant erosion impacts on site. However, poultry carcasses and manure (which contains considerable amounts of nutrients such as nitrogen, phosphorus, and other excreted substances like antibiotics) can lead to significant soil erosion impact on site unless they are well mitigated.

7.4.1.2 Surface and Ground Water Pollution

Improper disposal of poultry carcasses can contribute to water-quality problems especially in areas prone to flooding or where there is a shallow water table. Depending on disposal method (burial, incineration, composting or rendering), large volumes of carcasses can generate excessive amounts of leachate and other pollutants, increasing the potential for environmental contamination.

Similarly, effluents generated from various sources including runoff from poultry housing, feeding, and watering; waste storage and management facilities as well as poultry processing activities have the potential to contaminate surface and ground with nutrients like ammonia, sediment, pesticides, pathogens, and feed additives and antibiotics and excreta. Therefore, the impact is negative and of high significance.

7.4.2 Impacts on Biological Environment

7.4.2.1 Impacts on Flora and Fauna

Proposed project operation will be associated with a risk of disease transmission from poultry to game birds. Most poultry diseases are caused by *Campylobacter* and *Salmonella* species mainly found in poultry manure. Viruses such as the H5N1 strain of avian influenza “bird flu”, which affected several Asian countries in 2008, can also be passed from poultry to game birds. With exception of a small portion of the farm that will be used for construction of facilities, the rest of the site will be maintained to its current status. Therefore, there is potential significant negative impact on game birds on Makota farm. Should such infection affect migratory birds the impacts extent may be global. As for flora, there won't be significant negative impacts on site as the whole site was used for farming implying predominance of crops as opposed to other forms of fauna.

7.4.3 Impacts on Socioeconomic Environment

7.4.3.1 Occupational Health and Safety

During operation employees may be exposed to health and safety hazards. Employees in poultry production facilities may become exposed to a series of physical hazards related to equipment and vehicle operation and repair, trip and fall hazards, and lifting heavy weights, which are common to other industries. Employees can also be exposed to pesticides, disinfecting agents, minerals, antibiotic and

products. Moreover, workers may be exposed to odour, dust and a range of pathogens such as bacteria, fungi, mites and viruses (including “bird flu”) transmitted from live birds, excreta, carcasses and parasites and ticks. In addition, noise and vibration exposure may result from proximity to noisy machinery such as compressors, automatic packing machinery, condensers, ventilation units, and pressurized air, among other sources.

7.4.3.2 Spread of Poultry Ailments and Pathogens

During operation phase of the proposed project there is a risk of disease transmission from poultry to humans. The main zoonotic diseases associated with poultry are caused by *Campylobacter* and *Salmonella* species which are found in poultry manure. Both pathogens can cause diarrhoea, cramping, fever, nausea and vomiting. Viruses such as the H5N1 strain of avian influenza “bird flu”, which affected several Asian countries in 2008, can also be passed from poultry to humans. Respiratory hazards could also be a potential source of disease transmission and infection of the lungs. Particular jobs, such as shed clean out or batch exchange of birds, should be completed using respiratory protection. Therefore, the impact is negative and of high significance. Employees working with poultry will undergo medical tests to ensure they are not carriers of these pathogens which can be passed on to the chickens.

7.4.3.3 Impacts on Security

The presence of expensive equipment and materials at the facilities will always attract thieves in the surroundings and could potentially pose a security risk to the well-field facilities. This impact is likely due to isolated nature of the sites from major police stations that could otherwise reduce the potentiality for criminal activities around the facilities. A provision of 24 hours security services and fencing of vulnerable areas of the facilities including buildings and wells will reduce the impacts to a low significance level.

7.4.3.4 Impacts on Road Traffic

Vehicles going into and from the project site facilities for any purposes will use public roads to access the facilities. The anticipated additional vehicles every hour on roads around the site could not cause significant inconvenience to other road users including vehicles, motorcycles and pedestrians. The movements into and/or from the facilities and off public roads into the facilities could impact negatively on traffic flow in the roads. This impact is periodic upon peak days when supplies are delivered to or products taken from the site. Given that proper planning is effected to ensure smooth traffic flow in the area, this impact is considered to be of low significance.

7.4.3.5 Air Emissions

During operation stage it is envisaged that the proposed poultry farm operation activities will generate air emissions primarily odours, dust, refrigerators and exhaust emissions. Nuisance odours will emanate from chicken housing, manure management and mortality tank used for disposing dead birds. Odour will be released in greater than normal quantities during the cleaning of sheds or when litter/manure is disturbed. Dust might emanate from feed storage, loading and unloading as well as waste management activities. Exhaust emissions such as CO, NOX and SOX will be generated from generators and vehicles carrying feed, birds and chicken meat.

However, the level of air pollution originating from the above mentioned sources are expected to be low, localized and will be confined within the project site. Most of the milling loss will be moisture loss

and the amount of dust generated during the feed manufacturing process is expected to be significantly minimal. Moreover, the proponent shall not use second-hand refrigerators and air conditioners which are designated to use CFC-12 (R-12) or CFC-11 (R-11) as coolant; brand new CFC refrigerators and air conditioners; vehicles fitted with an air conditioner or refrigeration units with CFC coolants; and aerosol product which uses CFCs as carrier gases or propellants.

With appropriate mitigation measures in place no serious impacts are expected on people and the environment in general. The impact can be highly improved/eliminated with mitigation. Therefore, the impact is negative and of low significance.

7.5 Decommissioning Phase Impacts

The Project will be designed, built, and maintained to operate efficiently for several years. Tentatively, the project time period is scheduled to start in early 2014 and will extend over a period up to 10 years at which stage the developments on the project will be completed. The project is then expected to continue for longer than 25 years. Should decommissioning happen after 10 years or 25 years and after, the impacts presented below will be anticipated.

7.5.1 Loss of Aesthetics due to Abandoned Project Facilities

Upon closure of the project, STL may decide to demolish the facilities including all other temporary structures. Loss of aesthetics may result from the demolished waste remaining on site for a long time to the extent of becoming an eyesore.

7.5.2 Loss of Employment following Project Closure

If for whatever reason the project is closed down, the people employed by the project will lose their jobs. This will have significant impact on these people and their families. Other dependants of the project, such as suppliers of various services (e.g. Security Company) will lose the market.

7.5.3 Loss of Revenue to both Government and the Proponent

As noted earlier on both local and Central government will be receiving revenue from the project. In case of project decommissioning, the revenue accruing to these parties will cease.

7.5.4 Abandoned Infrastructure

If STL ceases operations there will remain behind machinery and structures which will need proper disposal. If proper decommissioning process is not done STL may abandon buildings and other project facilities which may permanently render the project land useless.

7.6 Summary of Impacts Assessment

7.6.1 Summary of Major Potential Impacts

The table below provides assessment summary of potential impacts in connection with the proposed poultry farm project.

Table 7-3: Potential Impacts Assessment Summary

Phase	Environmental and Social Impact	Impact Assessment	Description
Mobilisation and Construction	Vegetation clearance - Loss of vegetation cover - Loss of species habitat	Negative impact but low significance and short term.	Certainly to occur as site needs to be prepared before construction.
	Stockpiling of materials - Land and air pollution - Security hazards	Negative impact low significant and short term impact.	Certainly will occur during preparations to start construction - Some people might try to steal the construction material from site necessitating security
	Increased erosion due to land clearance	Negative impact but low significance and short term	Likely impact due to land clearance and subjection of forces of nature such as wind and water
	Noise - Disturbance and nuisance to onsite and offsite receptors	Negative impact with moderate to high significance and short- term	Likely impact due to construction activities on the site
Construction and Operation	Oil pollution to soil and water - Machine services - vehicles	Negative impact with low to moderate significance	It is a likely impact because of normal construction activities and oil use for vehicles, equipment and machinery.
	Metal pollution - cutting, - worn-out parts	Negative impact with low significance	Low impact as most steel used for construction is pre-fabricated and put together on site. Very little steel fabrication will take place on site
	Waste water - Contamination of soil - Public health risks, nuisance	Negative impact of low to Moderate significance and short-term to long term	Little waste water will be generated because of construction activities and the presence of people at the construction site.
	Accidents - Body injuries and death - Electrocutation - Deaths	Negative impact with moderate to High significance and short –term.	Likely due to construction activities that involve cutting, hammering, lifting, movement, etc.
	Employment	Positive impact with high significance, short to long term.	The construction will require human resource of diverse skills during construction and operation

Phase	Environmental and Social Impact	Impact Assessment	Description
			of the plant
Operation	Economic development	Positive impact with medium to high significance and short to long term.	This is intention of the who project that electricity should be available to customers at any time and as required by customers for their economic activities
	Improved livelihoods	Positive impact with medium to high significance and medium to long term effect.	Likely due to availability of employment opportunities, availability of income to stimulate economic activities, improved quality health care services and educational facilities Supply of a source of good quality protein to the community and country which will improve the average protein intake
Decommissioning	Completion of de-construction works and closure of the plant unemployment	Direct impact adverse, medium term, reversible but high significance.	Likely due to reduced level of activities.
	Wastes	Direct, medium adverse impact with moderate significance	Likely due to site rehabilitation and useless of some parts and equipment
	Accidents	Direct, medium adverse impact.	Demolition works and movement of item.

7.6.2 Residual Impacts

The impact assessment exercise has shown that if all impacts associated with the project are properly managed, a majority of the environmental risks will be controlled to acceptable levels. However, there will be still residual impacts which remain after all mitigation measures are instituted. Generally, no residual impacts are anticipated during the construction of the project.

During the operation phase, residual impacts in the context of noise and vibration, and water pollution are minimal and deemed insignificant. Air pollution, in particular nuisance odours generation from poultry farm operation is a long term concern although its impact are not considered significant. In terms of ecological impacts, no rare, endangered or protected flora or fauna species were identified at the project site. Species found were common species and thus the impact is considered minor.

Operation of the poultry farm and feed production activities pose potential dust and nuisance odours during manure collection and management activities. Although long term in nature, this impacts is considered minor given the distance of sensitive receptors, which is at least 700m away from the site boundary and up wind.

The health of the local communities is not likely to be affected by the air pollutants that will be emitted from the proposed poultry farm.

Socio-economically, out-migration of young people is a problem in the area with average monthly household income below the national average due to a lack of employment and economic opportunities. The high fragmented nature of the village land and multiple-ownership also deter economic use of the land. The Project will inject investment into the area, directly creating employment opportunities, and possibly generate spill over benefits in the region.

8. MITIGATION AND ENHANCEMENT MEASURES

8.1 Introduction

This chapter presents mitigation measures and/or compensatory actions and enhancement measures for the identified impacts. Many of the potential impacts identified in the preceding chapter can be eliminated or reduced/enhanced through the implementation of appropriate mitigation/enhancement measures either at the planning stage or when applied to specific project tasks and activities.

The proponent will ensure that any significant impacts identified is managed (mitigated/enhanced) within its capability in collaboration with other relevant stakeholders. A contractor on behalf of STL will:

- plan and design the project with environmental consideration to reduce the impacts to the natural and social environment;
- raise awareness of employees and communities surrounding the project site regarding environmental protection, social interaction with communities, security, safety and health issues (e.g. infectious diseases such as HIV/AIDS, STIs diseases, accidents and theft);
- ensure daily environmental and safety management best practices to minimize and prevent accidents, spill of hazardous material, soil erosion and improve waste management;
- put in place a mechanism for waste collection and safe disposal of all kinds of wastes generated from the working site;
- make a provision of monitoring the implementation of mitigation measures during construction and operation phases; and
- continually improve the mitigation measures following monitoring and evaluation exercise.

8.2 Mitigation Measures

8.2.1 Construction Phase Impact Mitigations

8.2.1.1 Protection of Flora

In order to protect plant species from potential negative impacts, the proponent shall ensure that:

- the contractor is responsible for informing all employees about the need to prevent any harmful effects on natural vegetation on or around the construction site as a result of their activities;
- clearing of natural vegetation is kept to a minimum;
- Unnecessary removal, damage and disturbance of natural vegetation are prohibited;
- re-vegetation of the proposed project site is undertaken;
- indigenous trees are planted around project area to enhance natural habitat

8.2.1.2 Land Degradation and Soil Erosion Control

Potential negative impacts on land and soils shall be mitigated by ensuring that:

- the contractor implements erosion control measures as an on-going exercise;
- during construction, the contractor protects all areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking any other measures necessary to prevent storm water from concentrating in streams and scouring slopes, banks, etc.;
- any tunnels or erosion channels developed during the construction or maintenance period shall be backfilled and compacted and the areas restored to a proper condition;

- areas where construction activities have been completed and where no further disturbance would take place are rehabilitated through re-vegetation;
- ground clearance is minimized and if possible concentrated only to the specific building foundation areas, and only when it is necessary;
- prompt reclamation of exposed soils is done;
- construction during long rains period should be done with caution to avoid soil from being washed away;
- topsoil excavated from buildings foundations is stored for re use on other areas like rehabilitations of quarries

8.2.1.3 Soil and Water Pollution Measures

Measures to mitigate soil and water pollution impacts during construction phase shall ensure that:

- concrete mixing directly on the ground is prohibited and only be undertaken on impermeable surfaces;
- concrete batching activities are located in an area of low environmental sensitivity;
- all runoff from batching areas is strictly controlled, cement-contaminated water is collected, stored and disposed of at an approved site;
- contaminated water storage facilities are not left to overflow and appropriate protection from rain and flooding are implemented;
- unused cement bags are stored out of the rain where runoff won't affect it;
- used (empty) cement bags are; collected, stored in weatherproof containers to prevent windblown cement dust and water contamination, not to be used for any other purpose and shall be disposed of on a regular basis via the solid waste management system;
- all excess concrete is removed from site upon completion of concrete works and disposed of whilst preventing washing of the excess concrete into the ground;
- entrance or accidental spillage, of solid matters, contaminants, debris and other pollutants and wastes into surface and ground water is prevented;
- awareness of employees to prevent unnecessary oil spills and protection of environment in their daily duties is promoted; and
- all excess aggregate is removed from site and properly disposed.

8.2.1.4 Waste Management

To ensure that solid waste is properly managed and potential negative impacts are mitigated, the contractor shall ensure that:

- all facilities are maintained in a neat and tidy condition and the site is kept free of litter, measures to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse are taken, litter bins, containers and refuse collection facilities for later disposal are provided at all places of work;
- solid waste may be temporarily stored on site in a designated area prior to collection and disposal;
- waste storage containers are covered, tip-proof, weatherproof and scavenger proof;
- waste storage area is fenced off to prevent wind-blown litter;
- no burning, on-site burying or dumping of waste shall occur;
- all solid waste shall be disposed of offsite at a designated landfill site or sold as fertilizer or composted for fertilizer;
- inert construction rubble and waste materials are disposed of by burying in the borrow pits or a designated site;

- all excavated materials, debris from construction works are not to be stockpiled or deposited near or on stream banks or other watercourse perimeter where they can be washed away by high water or storm runoff or can any way enters to water sources itself;
- metal refuse bins or equivalent plastic refuse bins, all with lids, are provided to all buildings;
- domestic refuse is collected and removed from all facilities at least twice per week and transported to the approved refuse disposal site in covered containers or trucks;
- used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery are collected in holding tanks and sent back to the supplier or removed from site by a specialist oil recycling company for disposal at an approved hazardous waste site;
- runoff from fuel depots / workshops / machinery washing areas and concrete batching areas is collected into a conservancy tank and disposed of designated site

8.2.1.5 Surface Water Quality

In ensuring that the quality of surface water on site is maintained, several measures will be taken as follows:

- all excavated materials and debris from construction works shall not be stockpiled or deposited near or on dam banks or other watercourse perimeter where they can be washed away by high water or storm runoff or can any way enter the dam itself;
- as far as is reasonably possible, work near the pond and *Ididiga* spring shall be avoided and enough time is allowed for rehabilitation processes to be effected before the rains commence;
- the nearby pond and spring shall be protected from erosion and direct or indirect spills of pollutants, e.g. sediment, refuse, sewage, cement, oils, fuels, chemicals, wastewater, etc.;
- in the event of a spill, the contractor shall take prompt action to clear polluted areas and prevent spreading of the pollutants.

8.2.1.6 Air Quality Control

The contractor shall ensure air quality by undertaking the following measures:

- ensure that the generation of dust is minimized and implement a dust control programme to maintain a safe working environment, minimize nuisance for surrounding residential areas/dwellings and protect damage to natural vegetation, crops, etc.;
- exposed soil and material stockpiles shall be protected against wind erosion and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors;
- to minimize the pollution caused by dust generation during the construction stage, water will be sprinkled on the construction site and on drive ways as frequently as possible;
- to minimize exhaust fumes, machinery and equipment shall not be running when not in use while ensuring that they regularly serviced; and
- construction vehicles and machinery shall be equipped with standard pollution-control devices to minimize emissions

8.2.1.7 Vibration and Noise Control

Vibration and noise produced by construction work will be managed as follows:

- the contractor shall strive to keep noise generating activities to a minimum;
- the contractor shall restrict all operations that result in undue noise disturbance to local communities and/or dwellings (e.g. drilling etc.) to daylight hours on weekdays;

- the contractor shall inform in advance any local communities and/or residents that could be disturbed by noise generating activities such as drilling or compacting and shall try to keep such activities to a minimum;
- the contractor shall be responsible for compliance with the relevant legislation with respect to noise;
- provision of earplugs and earmuffs to the workers working in high peak noises during the construction stage;
- also use of modern low noise machinery and vehicles is recommended;
- activities that may involve noises and vibration should be withheld at night especially close to human dwellings

8.2.1.8 Landscape and Topography

As construction activities are very likely to lead to negative impact on landscape and topography at project site, such impacts will be brought to a minimum by executing the following measures:

- planting of appropriate indigenous and exotic trees, grass cover and other vegetation types on project area should be encouraged so as to enhance scenic beauty of the area; and
- removal and proper disposal of construction debris need to be effected after completion of construction works and shall not be stockpiled or deposited near or on water sources or other watercourse perimeter where they can be easily be washed away by high water or storm runoff or can any way enter these sources.

8.2.1.9 Occupation Health and Safety Measures

The following safety measure should be observed during the construction stage:

- provision of health and safety induction course to all workers;
- instilling proper code of conduct and work ethics among construction workers and ensure that they are observed;
- provision of Personal Protective Equipment (PPE) to all workers and enforce their use;
- installing first aid kit and hire trained personnel to provide first aid;
- reporting to OSHA within 24 hours of occurrence of any accident or near miss which can cause fatal or permanent disability; and
- workers should be educated on their own safety and safety of others;

8.2.2 Operation Phase Impact Mitigations

8.2.2.1 Poultry Manure and Litter

Poultry manure and litter are high in nitrogen and phosphorus and can contain trace elements and microbes. The isolation of poultry manure/litter from water resources is an essential requirement of all aspects of poultry farming. In order to minimize the amount of manure produced, facilitate handling of animal wastes, and minimize migration of contaminants to surface water, groundwater, and air the following management measures are recommended:

- nutrients from poultry manure/litter shall not be allowed to leach into the environment, either directly from sheds or during any storage prior to removal;
- it is preferable for manure/used litter to be cleaned from the sheds and removed from the site on the same day;
- should the litter to be disposed of on site, buffer distances must be preserved between land disposal areas and sensitive features;

- litter storage on site shall be on an impervious base with all clean rainfall runoff excluded from the site;
- manure may be used as a fertilizer on agricultural land after careful assessment of potential impacts due to the presence of hazardous chemical and biological constituents;
- ensuring production and manure storage facilities are constructed to prevent manure contamination of surface water and ground water (e.g. use of concrete floors, use of roof gutters on buildings to collect and divert clean storm water, and covering manure storage areas with a fixed roof or plastic sheeting);
- keeping waste as dry as possible by scraping wastes instead of using water as a solvent, minimize amount of water used during cleaning (for example, by using high-pressure, low-flow nozzles);
- manure piles shall be located away from water bodies, floodplains, wellheads or other sensitive habitats;
- place dry manure or litter in a covered or roofed area;
- manure storage facilities should have sufficient capacity for 9–12 months of manure production so that manure can be applied to agricultural land at appropriate times; and
- design, construct, operate, and maintain waste management and storage facilities to contain all manure, litter, and process wastewater including runoff and direct precipitation.

8.2.2.2 Poultry Carcasses

Poultry carcasses should be properly and quickly managed as they are a significant source of disease and odours, and can attract vectors. Recommended measures for the management and disposal of poultry carcasses include the following:

- reducing mortalities through proper animal care and disease prevention/control;
- collecting carcasses on a regular basis to prevent putrefaction;
- use reliable commercially available options approved by local authorities that dispose of carcasses by rendering or incineration, depending on the cause of fatality;
- incineration shall only be conducted in permitted facilities operating under international recognized standards for pollution prevention and control;
- in absence of authorized carcasses collection, on-site burial may be one of the only viable alternatives, if allowed by the authorities;
- on-site and/or off-site burial area should be accessible to earthmoving machinery and be designed and located so as to avoid contamination by vapours or leachate from buried, decaying carcasses; and
- open burning shall be avoided.

8.2.2.3 Waste Water Management

The following management techniques are recommended to further reduce the impacts of water runoff from poultry operations:

- reducing water use and spills from animal watering by preventing overflow of watering devices and using calibrated, well-maintained self-watering devices;
- installing vegetative filters to trap sediment;
- water from kitchens, showers, laboratories, sinks etc. shall be discharged into a conservancy tank for removal from the site;
- runoff from workshops/machinery washing bays and concrete batching areas shall be collected into a conservancy tank and disposed of at an approved site;

- onsite wastewater treatment should be done on a regular basis; and
- both non-contaminated and contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage should be routed to the treatment facility, if constructed.

8.2.2.4 Odour Management

Large number of birds in warm conditions and fresh excreta produced daily in shed's confinement often lead to production of unpleasant odour. In ensuring that such odours are managed, the following measures are pertinent:

- controlling temperature, humidity, and other environmental factors of manure storage to reduce emissions;
- making an allowance for composting of manure to reduce odour emissions;
- reducing emissions and odours during land application activities by applying a few centimetres below the soil surface and by selecting favourable weather conditions (e.g. wind blowing away from inhabited areas);
- if need be, applying chemicals (e.g. urine inhibitors) weekly to reduce conversion of nitrogen to ammonia;
- optimizing the frequency of shed clean-out;
- keeping dust levels low, as odours are absorbed and carried by dust particles;
- ventilation that will achieve the maximum possible dilution of odour strength during shed cleanout;
- using dense vegetation buffer screens to filter dust and redirect odour away from sensitive areas; and
- containing litter and manure under weatherproof covering, prior to removal from the vicinity.

8.2.2.5 Vibration and Noise Control

The nature of project is not associated with generation of disturbing noise and/or vibration. However, in instances where this is likely to happen the following measures shall be implemented:

- noise generating activities shall be put to a minimum;
- all operations that result in undue noise disturbance to local communities and/or dwellings to daylight hours on weekdays shall be restricted;
- local communities and/or residents that could be disturbed by noise generating activities such as drilling shall be informed as such well in advance and such activities shall be kept to a minimum;
- the proponent shall be responsible for compliance with the relevant legislation with respect to noise;
- provision of earplugs and earmuffs to the workers working in high peak noises shall be ensured;
- also use of modern low noise machinery and vehicles is recommended; and
- activities that may involve noises and vibration should be abstained at night time especially close to the human settlements.

8.2.2.6 Dust Control

Good farm management is important in minimizing dust problems and should include:

- driving supply and product export trucks at moderate speeds especially on unsealed drive ways;

- covering loads, such as litter, manure and feed;
- using ground-cover plants, shrub and tree screens to intercept dust;
- preventing litter/manure from becoming excessively dry; and
- managing build-up of dust in sheds; and
- watering and paving access roads subject to availability of finance.

8.2.2.7 Management of Spread of Animal Pathogens

The key to developing adequate disease-prevention procedures is to find accurate information about animal diseases and how to prevent them. Some of the recommended general types of management methods to reduce the potential for the spread of animal pathogens include the following:

- establishing sound biosecurity protocols for the entire poultry operation that control animals, feed, equipment, and personnel, entering the facility (for example, quarantine periods for new animals, washing and disinfecting equipment, showering and protective clothing and footwear for personnel, and keeping out stray animals, rodents and birds);
- controlling farm animals, equipment and personnel entering the facility (e.g. quarantine periods for new animals, washing and disinfecting crates, disinfection and coverage of shoes before entry into bird housing zones, and providing protective clothing to personnel);
- preventing the interaction of wild birds with feed, as this interaction could be a factor in the spread of avian influenza from sparrows, crows, etc.;
- vehicles that go from farm to farm (e.g. transport of veterinarians, farm suppliers, buyers, etc.) shall be subjected to special precautions such as limiting their operation to special areas with biosecurity measures, spraying of tires and treating parking areas with disinfectants;
- sanitizing bird housing areas on a regular basis;
- establishing a detailed animal health program supported by the necessary veterinary and laboratory capability;
- identify and segregate sick birds and develop management procedures for adequate removal and disposal of dead birds; and
- training workers in the application of animal health products.

On top of the above measures, STL will have to comply with Provision 22.-(1) of *“The Animal Diseases Act”* on certification of farms and ranches which requires that “any person who desires to deal with the farming import or export fish, birds, reptiles, mammals, molluscs and animals other than livestock shall, for the purpose of disease control, register with the Director of Veterinary Services (DVS) in the Ministry of Livestock and Fisheries Development (MLFD).

STL shall also comply with Provision 21.-(1) which requires that a person shall not manufacture, export from or import into Mainland Tanzania any animal feed resources unless he has obtained a permit issued by the Director responsible for grazing-lands utilisation and animal feed resources.

8.2.2.8 Occupation Health and Safety

The proponent shall provide and maintain a working environment in which employees are not exposed to hazards through:

- maintaining safe workplaces, plant and work systems;
- providing information, instruction and training enabling employees to work without hazards;
- consulting with employee-elected health and safety representatives and/ or other employees about occupational health, safety and welfare;
- providing adequate personal protective clothing and equipment;

- ensuring all work procedures are undertaken without exposing workers to hazards;
- staff needs to be educated on preventing infection by thorough hand washing after work and before eating and also by ensuring all PPE are in good condition;
- disease transmission by other vectors such as vermin and insects shall be controlled with effective pest control management measures;
- respiratory hazards could be a potential source of disease transmission and infection of the lungs thus jobs such as shed clean out or batch exchange of birds, shall be completed using respiratory protection;
- adequate respiratory protection including properly fitted masks equipped with filters especially designed to capture dust and micro-organisms shall be provided;
- ensuring chemicals are stored in a designated enclosed area, and material safety data sheets (MSDS) that provide advice on storage, emergency and first aid of these chemicals are within easy reach;
- ensuring that there are basic first aid facilities for staff and clean up equipment for any spills that occur; and
- training shall be provided for all staff to ensure adequate knowledge of safe manual handling and correct use of equipment and vehicles by covering all safety procedures to ensure that general work safety exists on the poultry farm.

8.2.3 Decommissioning Phase Impact Mitigations

8.2.3.1 Loss of Aesthetics due to Abandoned Project Facilities

In closure of the project, STL may decide to demolish the facilities including all other temporary structures. Loss of aesthetics may result from the demolished waste remaining on site for a long time to the extent of becoming an eyesore. The proponent shall ensure that demolished waste is removed from the site and properly disposed of in designated locations.

8.2.3.2 Loss of Employment

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 families. Other groups of people who are dependent on the project, such as suppliers of various services (e.g. Security Company) will also lose the market.

STL shall augment, by doubling, Social Security Funds which is contributed by its employees. These funds shall be available in case of decommissioning of operations. Furthermore there shall be a severance package for employees. Similarly, since STL is a subsidiary company, some of its work force may be absorbed in other operations locally or abroad.

8.2.3.3 Abandoned Infrastructure

When it happens that operation should be halted there will remain behind machinery which will need proper disposal. If proper decommissioning process is not done STL may abandon buildings and other project facilities which may permanently render the project land useless. However, since the material are made from metal and there is a high demand for scrap metal. The entire plant's infrastructure with exception of buildings can be recycled.

8.2.3.4 Dust and Noise Pollution from Decommissioning

Should demolition of project facilities be desired upon decommissioning it is likely that there will be dust and noise. In order that these impacts are properly managed, the following measures shall be taken:

- ensuring that proper notification is made prior to demolition;
- water shall be sprayed during demolition to ensure dust is controlled;
- the proponent shall ensure that s/he removes all equipment and debris ready to utilize the site for other uses; and
- all waste materials should be cleared and removed from the site and properly disposed of.

8.3 Enhancement Measures

8.3.1 Construction Phase

8.3.1.1 Employment Opportunities

The project expects to hire about 50 people during construction phase. In order that the opportunity is beneficial to local people the following recommendations are pertinent:

- The contractor should give priority to local people to cover manual (unskilled labour) work;
- In case of technical positions, the contractor should give priority to local expert in Iringa and/or elsewhere in the country before considering expatriates.

8.3.1.2 Informal and Local Business Growth

Construction works will attract a more people into the area. These people will definitely need basic services like food and shelter. To ensure that this potential is beneficial to locals the following measures are recommended:

- The contractor shall make arrangements with local service providers such as *Mama Lishe* operators and guest house owners to render their services to construction workers on terms that are conducive to both parties i.e. contractor/employees and service providers;
- Contractors shall promote purchase of construction materials available locally.

8.3.2 Operation Phase

8.3.2.1 Market to Small Scale Farmers

The project is expected to provide a reliable local market to small-scale maize and soya farmers in Iringa, Mbeya and Ruvuma Regions. For this to be beneficial, the following enhancement measures are recommended:

- to give priority to local producers before considering other suppliers in other regions or outside the country;
- proponent should offer competitive price for farmers produce; and
- proponent to enter into a legal agreement with farmers to guarantee that the project will purchase their produce.

8.3.2.2 Extension Services to Farmers

During operation the project expects to provide extension services to local farmers to promote production of better crops. This can be enhanced through making use of local extension officers who have experience with the area and long-term working relation with the farmers; and taking on board local/traditional farming knowledge that will prove beneficial to the plan.

8.3.2.3 Promotion of Poultry Sector

This will be enhanced through the following measure(s):

- supply of poultry feed and chicks in the surrounding communities and target markets both locally and in other region;
- where practical, to provide extension services and/or training on better poultry farming skills;
- the project to encourage the development of small scale broiler and layer farms for the day old chicks to fully grown broilers and produce table eggs.

8.3.2.4 Contribution to Community Development

This potential impact will be enhanced through making direct contributions as part of corporate social responsibility (CSR) by supporting community development initiatives in areas such as education, health, water, feeder roads, etc.

8.3.3 Decommissioning Phase

8.3.3.1 Conservation of Non-Renewable Resource

The following enhancement measures are proposed;

- Responsible ministry to conserve all non-renewable resources for future use.

8.3.3.2 Reduction of Gaseous Emission levels to the Environment

The following enhancement measures are proposed;

- Developer to find alternative sources of energy with less emission of gaseous into the environment.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Introduction

The EIA guidelines define an Environmental and Social Management Plan (ESMP) as a report or document prepared by the proponent after the conduction of ESIA study to present the case for the assessment of their proposal as part of the environmental and social impact assessment process. The ESMP as presented in this chapter contains recommendations and cost estimates for mitigation measures designed to address the negative impacts of the proposed project. The ESMP provides a general outlay of the environmental and social aspects, potential impacts, mitigation measures, performance indicators, monitoring means and frequency, responsibility for monitoring and associated cost estimates.

The responsibility for the incorporation of mitigation measures for the project implementation lies with the Supervising Engineer, who must ensure that the contractor implements all specified mitigation measures. In order for the contractor to carry out environmental management activities during construction, the contractor should draw up an environmental management plan of his/her own to show how s/he will address the mitigation measures during the construction period. The Supervising Engineer is responsible for assessing the contractor's environmental management plan.

The ESMP has been developed with project knowledge and information available to date. As project commencement and scheduling plans are developed and changed, components of the ESMP might require amendments. This is therefore a working document, which can be updated whenever new information is received or site conditions change.

The objectives of the ESMP are to:

- (i). to bring the project into compliance with applicable national environmental and social legal requirements social policies and procedures; and
- (ii). to outline the mitigation/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.

The objectives, activities, mitigation measures and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the project equipment installation and operational phases are outlined in the proposed ESMP in the following section. It outlines corresponding management strategies proposed in chapter 8 that will be employed to mitigate potential negative environmental impacts and assign responsibility for the implementation of mitigation measures.

9.2 Environmental and Social Management Plan

Table 9-1: Environmental and Social Management Plan

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
Construction Phase			
Loss of Biodiversity	<ul style="list-style-type: none"> - Inform workers about the need to prevent any harmful effects on natural vegetation on or around the construction site as a result of their activities. - Clearing of natural vegetation shall be kept to a minimum. - Ensure re-vegetation of the proposed project site. - Plant indigenous trees around project area to enhance natural environment 	Contractor/ Supervising Engineer	1,000
Land Degradation and Soil Erosion	<ul style="list-style-type: none"> - Every care shall be taken to check soil erosion - Landscaping - Ensure management of excavation activities - Provide soil erosion control and conservation structures where necessary - In areas where construction activities have been completed and where no further disturbance would take place, rehabilitation and re-vegetation should commence as soon as possible. - Ground clearance should be minimized and if possible concentrated only to the specific building foundation areas, and only when it is necessary. - Prompt reclamation of exposed soils should be done. - Construction during long rains period should be done with caution to avoid soil from being washed away. - Topsoil excavated from buildings foundations should be stored for re use on other areas for rehabilitation 	Contractor/ Supervising Engineer	1,000
Soil and Water Pollution	<ul style="list-style-type: none"> - Prevention of accidental oil or chemical spillage, solid matters, contaminants, debris and other pollutants and wastes from entering into surface and ground water. - Awareness on environmental protection. - Avoid deposition of stockpiling materials near or on stream banks or other watercourse perimeter - No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) shall be permitted - Water containing pollutants such as cement, concrete, lime, chemicals and fuels shall be discharged into a conservancy tanks for removal from site - Spills during construction or operations shall be absorbed with absorbent blankets, socks, or absorbent material and disposed of in accordance with applicable laws and 	Design Engineer, Supervising Engineer and Contractor/ STL	2,000

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
	<ul style="list-style-type: none"> regulations. - Contractor must dispose solid wastes away from the site to an approved disposal site. - Potential pollutants of any kind and in any form shall be kept. Stored and used in such a manner that any escape can be contained and the water table not endangered - Equipment Storage or wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted - During construction, standard engineering practices such as silt fencing, erosion control material, and construction tracking pads should be implemented to control runoff, erosion, and sedimentation that could affect watersheds. - Proper handling and storage procedures for hazardous wastes e.g. fuel oil should be stored in areas with hard standing and containment to handle spills - Minimize waste production by utilizing best available techniques for site preparation 		
Waste Generation	<ul style="list-style-type: none"> - Waste management on site shall be strictly controlled and monitored. Only approved waste disposal methods shall be allowed. - Ensure that all site personnel are instructed in the proper disposal of all waste. - Ensure that all facilities are maintained in a neat and tidy condition and the site shall be kept free of litter. Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse. - At all places of work provide litter bins, containers and refuse collection facilities for later disposal. - Solid waste may be temporarily stored on site in a designated area prior to collection and disposal. Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof. The waste storage area shall be fenced off to prevent wind-blown litter. - No burning, on-site burying or dumping of waste shall occur. - All solid waste shall be disposed of offsite at an approved landfill site. - The Contractor shall provide metal refuse bins or equivalent plastic refuse bins, all with lids, for domestic waste. Refuse shall be collected and removed from all facilities at least twice per week. - Inert construction rubble and waste materials shall be disposed of by burying in the borrow pits or at an approved site. 	Design Engineer, Supervising Engineer and Contractor/ STL	1,000
Pollution of Water Source(s)	<ul style="list-style-type: none"> - All excavated materials, debris from construction works should not be stockpiled or deposited near or on stream banks or other watercourse perimeter where they can be washed away by high water or storm runoff or can any way enters to water sources itself - As far as is reasonably possible, work in nearby watercourse shall take place outside of the expected rainy season and allow sufficient time for rehabilitation processes to be effected before the rains commence. - The nearby watercourse shall be protected from erosion and direct or indirect spills of 	Design Engineer, Supervising Engineer and Contractor/ STL	1,000

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
	<p>pollutants, e.g. sediment, refuse, sewage, cement, oils, fuels, chemicals, wastewater, etc.</p> <ul style="list-style-type: none"> - In the event of a spill, the Contractor shall take prompt action to clear polluted areas and prevent spreading of the pollutants. 		
Air Pollution	<ul style="list-style-type: none"> - Control speed of construction vehicles - To minimize dust generation water should be sprinkled on the construction site and on drive ways as frequently as possible. - Regular maintenance of equipment. - People who are working and exposed to severe dust and exhaust fumes should be provided with respirators. - The use of low sulphur fuels in construction equipment and ensuring proper vehicle and equipment maintenance. - Construction vehicles and machinery shall be equipped with standard pollution-control devices to minimize emissions. - Civil debris, if generated during construction phase, shall be disposed in low-lying areas for land filling. 	Design Engineer, Supervising Engineer and Contractor	500
Vibration and Noise Emissions	<ul style="list-style-type: none"> - Ensure Noise level complies with the Noise Prevention and Control Rules - All construction machinery are maintained and serviced in accordance with the contractor's specifications - Exhaust mufflers and engine enclosures are in place and in good working order for all construction equipment and industrial trucks. - Noise generation activities to be relegated during daytime. - Ensure that vehicles undergo routine maintenance - Notifying the neighbour in case there would be some noisy events. 	Contractor/ Supervising Engineer / STL	500
Landscape and Topography	<ul style="list-style-type: none"> - Plant trees on project area. These will enhance the scenic beauty of the area. This should involve planting of indigenous trees, grass cover and other vegetation types to improve the vegetation. - Removal and proper disposal of construction debris need to be effected after completion of construction works. All excavated materials, debris from construction works should not be stockpiled or deposited at the site. 	Contractor/ Supervising Engineer / STL	1000
Occupational Health and Safety	<ul style="list-style-type: none"> - Construction worker safety shall be in accordance with contractor prepared site specific health and safety plan that identifies site specific risks, safety equipment, decontamination procedures, action plans, and hospital locations. - Daily site inspections should be done to ensure safe work practices are adhered - All workmen should be provided with personal protective equipment 	Contractor, Supervising Engineer, Municipal and Local Authorities, OSHA	1500

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
Employment Opportunities	<ul style="list-style-type: none"> - The contractor should give priority to local people to cover manual (unskilled labour) work; - In case of technical positions, the contractor should give priority to local expert in Iringa and/or elsewhere in the country before considering expatriates 	Contractor/ Supervising Engineer	Nil
Informal and Local Business Growth	<ul style="list-style-type: none"> - The contractor shall make arrangements with local service providers such as <i>Mama Lishe</i> operators and guest house owners to render their services to construction workers on terms that are conducive to both parties i.e. contractor and service providers; - Contractors shall promote purchase of construction materials available locally 	Contractor/ Supervising Engineer	Nil
		Sub-total 1	9500
Operation Phase Over 10 Years			
Odours and Dust	<ul style="list-style-type: none"> - Measure the air quality quarterly or annually to check the type of air pollutants and their quantities so as to determine compliance with the allowable standards - Regular maintenance of construction plant and equipment - Proper use of PPEs - Optimizing the frequency of shed clean-out - Keep dust levels low, as odours are absorbed and carried by dust particles - Ensure ventilation that achieves the maximum possible dilution of odour strength during shed cleanout; - Use dense vegetation buffer screens to cause turbulent airflow (to disperse odour), filter dust and redirect odour away from sensitive areas; - Contain litter and manure under weatherproof covering, prior to removal from the property - Good farm management is important in minimizing dust problems and should include; <ul style="list-style-type: none"> • Driving supply & product export trucks at moderate speeds especially on unsealed drive ways: • Covering loads, such as litter, manure and feed; • Using ground-cover plants, shrub and tree screens to intercept dust; • Preventing litter/manure from becoming excessively dry; and • Managing build-up of dust in sheds 	Design Engineer, Supervising Engineer, Contractor, Plant OHS Manager	10,000
Surface and Groundwater Pollution	<ul style="list-style-type: none"> - Prevention of accidental oil or chemical spillage, solid matters, contaminants, debris and other pollutants and wastes from entering into surface and ground water. - Awareness on environmental protection. - The contractor shall take reasonable measures to control storm-water and its erosive effects - Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and water table not endangered. 	Design Engineer, Supervising Engineer, STL, Environmental Officer, Local Authorities.	12,000

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
	<ul style="list-style-type: none"> - Reduce water use and spills from animal watering by preventing overflow of watering devices and using calibrated, well-maintained self-watering devices; - Install vegetative filters to trap sediment; - Water from kitchens, showers, laboratories, sinks etc. shall be discharged into a conservancy tank for removal from the site. - Runoff from workshops / machinery washing areas and concrete batching areas shall be collected into a conservancy tank and disposed of at an approved site. - Onsite wastewater treatment should be done - Both non-contaminated and contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage should be routed to the treatment system for industrial process wastewater 		
Vibration and Noise	<ul style="list-style-type: none"> - Noise level should comply with the Noise Prevention and Control Standards - All machinery should be maintained and serviced in accordance with the contractors specifications - Maintain plant equipment (if present/used) - Workers in the vicinity of or involved in high-level noise to wear respective safety & protective gear i.e. earplugs & earmuffs - Appropriate selection of machinery 	Design Engineer, Supervising Engineer and Contractor	3,000
Waste Generation	<p>Poultry Litter and Manure</p> <ul style="list-style-type: none"> - Nutrients from poultry litter/manure should not be allowed to leach into the environment, either directly from sheds or during any storage prior to removal. - It is preferable for manure/used litter to be cleaned from the sheds and removed from the site on the same day. - For the litter to be disposed of on site, buffer distances must be preserved between land disposal areas and sensitive features. - Manure may be used as a fertilizer on agricultural land after careful assessment of potential impacts due to the presence of hazardous chemical and biological constituents. - Ensure production and manure storage facilities are constructed to prevent manure contamination of surface water and ground water (e.g. use of concrete floors, use of roof gutters on buildings to collect and divert clean storm water, and covering manure storage areas with a fixed roof or plastic sheeting) - Locate manure piles away from water bodies, floodplains, wellheads or other sensitive habitats; <p>Poultry Carcasses</p> <ul style="list-style-type: none"> - Reduce mortalities through proper animal care and disease prevention; - Collect carcasses on a regular basis to prevent putrefaction; - Use reliable commercially available options approved by local authorities that dispose of 	Contractor, STL	12,000

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
	<ul style="list-style-type: none"> - carcasses by rendering or incineration, depending on the cause of fatality. - Incineration should only be conducted in permitted facilities operating under international recognized standards for pollution prevention and control; - The burial area should be accessible to earthmoving machinery and be designed and located so as to avoid contamination by vapours or leachate from buried, decaying carcasses; - Open burning should be avoided. 		
Potential for Spread of Animal Pathogens	<ul style="list-style-type: none"> - For the purpose of disease control, register the project with the Director of Veterinary Services (DVS) in the Ministry of Livestock and Fisheries Development (MLFD) and apply for a permit for manufacturing of animal feed from the Director responsible for grazing-lands utilisation and animal feed resources in the MLFD. - Establish sound biosecurity protocols for the entire poultry operation that control animals, feed, equipment, and personnel, entering the facility (for example, quarantine periods for new animals, washing and disinfecting equipment, showering and protective clothing and footwear for personnel, and keeping out stray animals, rodents and birds); - Control farm animals, equipment and personnel and public entering the facility (e.g. quarantine periods for new animals, washing and disinfecting crates, disinfection and coverage of shoes before entry into bird housing zones, and providing protective clothing to personnel); - Medical testing of personnel to avoid carriers of pathogens working with poultry - Prevent the interaction of wild birds with feed, as this interaction could be a factor in the spread of avian influenza from sparrows, crows, etc. - Vehicles that go from farm to farm (e.g. transport of veterinarians, farm suppliers, buyers, etc.) should be subject to special precautions such as limiting their operation to special areas with biosecurity measures, spraying of tires and treating parking areas with disinfectants; - Sanitize bird housing areas; - Establish a detailed animal health program supported by the necessary veterinary and laboratory capability. Identify and segregate sick birds and develop management procedures for adequate removal and disposal of dead birds). - Train workers in the application of animal health products. 	STL, Supervising Engineer, OHS Manager, OSHA	9,000
Public, Occupational Health and Safety	<ul style="list-style-type: none"> - Maintain safe workplaces and work systems; - Provide information, instruction and training enabling employees to work without hazards; - Consult with employee-elected health and safety representatives and/ or other employees about occupational health, safety and welfare; - Provide adequate personal protective clothing and equipment; and 	Supervising Engineer, Maintenance Engineer, STL, OHS Manager, OSHA	12,000

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
	<ul style="list-style-type: none"> - Ensure all work procedures are undertaken without exposing workers to hazards. - Staffs need to be educated on preventing infection by thorough hand washing after work and before eating and also by changing work clothes and boots. - Disease transmission by other vectors such as vermin and insects should be controlled with effective pest control management measures. - Adequate respiratory protection including properly fitted masks equipped with filters especially designed to capture dust and micro-organisms should be provided. - Ensure chemicals are stored in a designated enclosed area, and material safety data sheets (MSDS) are within easy reach of these chemicals. MSDS provide advice on storage, emergency and first aid. - Ensure that there are basic first aid facilities for staff and clean up equipment for any spills that occur. - Training should be provided for all staff to ensure adequate knowledge of safe manual handling and correct use of equipment and vehicles. The training should cover all other safety procedures to ensure that general work safety exists on the poultry farm. 		
Market to Small Scale Farmers	<ul style="list-style-type: none"> - To give priority to local producers before considering other suppliers in other regions or outside the country; - Proponent should offer competitive price for farmers produce; - Proponent to enter into a legal agreement with farmers to guarantee that the project will purchase their (farmers produce) 	STL	500
Extension Services to Local Farmers	<ul style="list-style-type: none"> - Making use of local extension officers who have experience with the area and long-term working relation with the farmers - Taking on board local/traditional farming knowledge that will prove beneficial to the plan 	STL, Local Extension Officers	1,000
Promotion of Poultry Sector	<ul style="list-style-type: none"> - Supply of poultry feed and chicks in the surrounding communities and target markets both locally and in other region; - Where practical, to provide extension services and/or training on better poultry farming skills; - The project to encourage the development of small scale broiler farms for the day old chicks to fully grown broilers 	STL, Local Extension and Veterinary Officers,	5,000
Contribution to Community Development	<ul style="list-style-type: none"> - Making direct contributions as part of CSR by supporting community development initiatives in areas such as education, health, water, feeder roads, etc. 	STL	15,000 ¹
		Sub-total 2	79,500.00
Decommissioning Phase			

¹ This will have to be decided by the board and will depend on the profitability of the operation.

Impacts Identified	Mitigation /Enhancement Measures	Responsible institution	Estimated Relative Cost (US\$)
Impacts due to loss of employment: <ul style="list-style-type: none"> - Loss of income - Reduced ability to support dependants - Loss of quality of life - Loss of benefits i.e. medical, insurance cover etc 	<ul style="list-style-type: none"> - Ensuring that employees are well trained so that they can still be employed - Ensuring that Social Security contributions are remitted to the applicable fund at the right time - Create a severance package in the event of abrupt closure of the facility - The safety of the workers should surpass as a priority of all other objectives in the decommissioning project - Adapt a project – completion policy: identifying key issues to be considered. - Assist with re-employment and job seeking of the involved workforce. - Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. - Offer advice and counselling on issues such as financial matters. 	Project manager & Contractor STL-Human Resource Manager	56,000
Loss of Aesthetics due to abandoned Facilities	<ul style="list-style-type: none"> - The contractor shall ensure that demolished waste is removed from the site and properly disposed of in designated location. 	Contractor	6,000
Scraps and other Debris Onsite	<ul style="list-style-type: none"> - Use of an integrated solid waste management system - Wastes generated as a result of facility decommissioning activities will be characterized in compliance with standard waste management procedures. Disposal locations will be selected by the contractor based on the properties of the particular waste stream. - All machinery, equipment, structures and tools that will not be used for other purposes should be removed and recycled/ reused say in other projects - Where recycling of the machinery, equipment, structures, tools and other waste is not possible, the materials should be disposed at an approved dumpsite(s). 	Contractor, Project Manager	9,000
Occupational Hazards	<ul style="list-style-type: none"> - Ensure that safety measures have been effectively integrated and positioned in respective areas of the project to control and manage any accidents and hazards related to demolition works 	Contractor	1000
Dust and Noise Pollution from Decommissioning	<ul style="list-style-type: none"> - Ensuring that proper notification is made prior to demolition; - Water shall be sprayed during demolition to ensure dust is controlled; - All noise producing equipment should have well-functioning mufflers; - Noise related activities should be kept to a minimum especially at night 	Contractor	1000
		Sub-total 3	73,000
		Grand total (USD) (sub-total 1+2+3)	162,000.00

9.3 Environmental Monitoring Plan

This section discusses the need for programmes covering both internal and periodic external monitoring. The overall objective of environmental and social monitoring is to ensure that mitigation and enhancement measures are implemented and that they are effective. The activities and indicators that have been recommended for monitoring are presented in the EMP in the next section. Environmental monitoring will be carried out to ensure that all construction and operation activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. Such monitoring can act as an early warning system to management, providing a feedback mechanism to enable damaging practices to be altered.

Simple monitoring systems should be set up during construction by the Supervising Engineer (SE) and Contractor and by the Proponent during operation, so that potentially environmentally problematic areas can be detected well in advance and the appropriate remedial action taken. This could simply be a checklist of items that need to be inspected as a matter of routine, or periodically, depending on the nature of the aspect.

9.3.1 Internal Monitoring Programmes

The ESIA study has identified a number of areas of concern. Mitigation measures have been developed and the monitoring of the effectiveness of such mitigation measures is important. It will be the responsibility of STL to conduct regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMP for the Project. The monitoring of many parameters will form part of the routine management of the proposed project from implementation to operations. Therefore, monitoring must be seen as more than merely satisfying compliance with environmental rules and regulations. Without a specific reporting, response mechanism and auditing, monitoring is of little value. The interpretation of monitoring data and its implication for management should be provided to senior management.

The responsibility for mitigation monitoring during the operation phase will be solely for STL. The monitoring unit should produce an annual report which should be publically available for inspection.

It is strongly recommended to STL to consider employing an Environmental and Social Liaison Officer/Environment and Health Officer (or any other desired name) to take this responsibility important for the sustainability of the proposed project.

The table below presents an environmental monitoring plan (EMP) for the proposed Integrated Poultry Production at Makota farm. It describes parameters that can be monitored, and suggests how monitoring should be done, how frequently, and who should be responsible for monitoring action. The recommended monitoring parameters should be taken as a minimum for the Project.

Table 9-2: Environmental Monitoring Plan

Potential Impact	Parameter to be Monitored	Frequency	Standards/Targets	Responsibility	Costs estimates (US\$) per year
Construction Phase					
Air emission	CO, VOCs, NOX, PM10/PM2.5,	Every three month/Daily Inspection	Tanzania Bureau of Standards (TBS), World Health Organisation (WHO) Minimizing air emissions	Design Engineer, Supervising Engineer and Contractor	2,000
Surface and Groundwater pollution	Waste water, oil or grease, solid wastes	Random Inspection	Wastes are adequately handled, disposed of, and contained	Design Engineer, Supervising Engineer and Contractor/ Environmental Officer	1,000
Noise Emissions	Noise level	Random Inspection	Noise limit below 60dBA	Contractor/ Supervising Engineer	500
Occupational Health and Safety	Health and Safety status of the workers	Routine Inspection	All workers use protective gears, no leakages, no exposure, OSHA Standards	Contractor, Supervising Engineer, District and Local Authorities.	5,000
Operation Phase					
Air Emission	Ammonia, Odours and dust	Annually	TBS, WHO Minimizing air emissions control	Design Engineer, Supervising Engineer and Contractor	1,000
Surface and Groundwater pollution	BOD, COD , TSS and Oil and Grease	After every six months	Wastes are adequately handled, and contained	Supervising Engineer and Contractor/ Environmental Officer	1,000
Noise Emissions	Noise level	Annually	Noise limit below 60dBA	Contractor/ S. Engineer	1,000
Waste Generation	Solid and Liquid waste and disposal technique	Monthly and Yearly	Wastes are adequately handled, and contained	Contractor/ Supervising Engineer	2,000
Occupational Health and Safety	Health and Safety status of the workers	Quarterly	OSHA Standards	Supervising Engineer, OSHA.	7,000
Decommissioning Phase					
Scraps and Other Debris Onsite	Rehabilitation	Annually	All buildings, machinery, equipment, structures and tools are removed	Human Resources and Finance Manager	15,000
Air, Water and Soil Pollution	Abandoned structures and decommissioning activities	Once during decommissioning	No haphazard disposal of scrap, Zero Complaints from Neighbours	Contractor	10,000
					43,500.00

9.3.2 External Monitoring Programmes

The EIA and Audit Regulation 50-(1) requires that, in executing a project or development, after an environmental impact statement has been approved by the Minister, the developer shall take all practical measures to ensure the implementation of the EMP by-

- (a) carrying out self-auditing annually;
- (b) preparing an environmental audit report after each audit and submitting the report to NEMC annually or as may be prescribed by NEMC; and
- (c) ensuring that the criteria used for the audit is based on the environmental impact assessment process or after the initial audit.

NEMC has the overall responsibility for issuing approval for the Project and ensuring that ESMP and EMP are implemented accordingly. NEMC reviews environmental monitoring and environmental compliance documentation submitted by developers and they would not normally be directly involved in monitoring the Project unless some specific major environmental issue arises.

STL through a consultant (registered environmental expert) will therefore provide NEMC with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental auditing reports.

9.4 Budget for Implementing ESMP and EMP

There is no easy way for calculating or establishing the actual costs of implementing an ESMP and EMP of a given development project. The estimated costs for implementing the ESMP and EMP as given in the preceding and recapitulated in the tables below are just indicative based on experience from similar projects.

Table 9-3: Environmental and Social Management Implementation Budget

SN	Activity	Date	Amount (US\$)
Construction Phase			
1.	Biodiversity restoration and Management	FY 2013-2014	1000
2.	Land and Soil Erosion Management		1000
3.	Soil and Water Conservation		2000
4.	Waste Management		1000
5.	Water Pollution Control		1000
6.	Air Pollution Control		500
7.	Vibration and Noise Emissions Control		500
8.	Land Scene and Topography Management		1000
9.	Occupational Health and Safety		1500
10.	Workers Recruitment Process		nil
11.	Informal and Local Business Promotion		nil
Sub-Total			9,500.00
Operation Phase Over 10 Years			
12.	Odours and Dust Control	Annually between 2014 and 2023	10000
13.	Surface and Groundwater Pollution Control		12000
14.	Vibration and Noise Control		3000
15.	Waste management		12000
16.	Animal Pathogens and Disease Control		9000
17.	Public, Occupational Health and Safety Program		12000
18.	Soya and Maize Market Promotion		500
19.	Extension Services to Local Farmers		1000
20.	Promotion of Poultry Sector		5000
21.	Contribution to Community Development		15000
Sub-Total			79,500.00

SN	Activity	Date	Amount (US\$)
Decommissioning Phase			
22.	Employment Loss Compensation Scheme	Subject to the date decommission is effected	56000
23.	Loss of Aesthetics due to abandoned Facilities		6000
24.	Scraps and other Debris Onsite		9000
25.	Occupational Hazards		1000
26.	Dust and Noise Pollution from Decommissioning		1000
27.	Reduction of Gaseous Emission level to the Environment		nil
Sub-Total			73,000.00
Grand Total			162,000.00

Table 9.4: EMP Implementation Plan

SN	Activity	Date	Amount (US\$)
Construction Phase			
1.	Air Emissions Control	FY 2013-2014	nil
2.	Surface and Groundwater pollution Control		1000
3.	Noise Emission Control		500
4.	Occupational Health and Safety Programme		5000
Sub-Total			6,500.00
Operation Phase			
5.	Air Emission Control	Annually between 2014 and 2023	1000
6.	Surface and Groundwater Pollution Control		1000
7.	Noise Emissions		1000
8.	Waste Management		2000
9.	Occupational Health and Safety Programme		7000
Sub-Total			12,000.00
Decommissioning Phase			
10.	Scraps and Other Debris Onsite	Upon decision to decommission	15000
11.	Air, Water and Soil Pollution		10000
Sub-Total			25,000.00
Grand Total			43,500.00

Budget Summary:

The total budget for implementing environmental obligations is **TZS 205,500/=** as summarized below.

1. Total budget for implementing ESMP = TZS 162,000.00
2. Total budget for implementing EMP = TZS 43,500.00
205,500.00

10. PROJECT ALTERNATIVES AND COST BENEFIT ANALYSIS

10.1 Introduction

The identification of alternatives is a requirement provided for by the EIA and audit Regulations. Identification of alternatives provides a basis for choice among options available for decision making. This section presents potential feasible alternatives that were considered for the project in terms of site, and technology options. It also presents project cost benefit analysis (CBA).

10.2 Project Alternatives Analysis

10.2.1 The No Project Alternative

A zero alternative entails maintaining existing use to which the proposed project site has previously been put to. This alternative would eventually evade any short term potential negative impacts from project execution. To this end, any potential positive impacts envisaged during midterm and long term project implementation will be missed. As noted earlier on in this report, the site has been used as a commercial flower farm thus it was left in conditions that necessitate putting it back to production. Adopting zero alternative would mean abandoning all the potential that the site offers to investor(s), contribution to government revenue and even local community livelihoods improvement.

10.2.2 Shifted Location Alternative

The current proposed project site was inherited from a previously horticultural project that has already been abandoned. In that respect, retaining the proposed project site is more viable compared to moving it to alternative location.

10.2.3 Modified Project Units Arrangement Alternative

STL intends to drill two boreholes within the property. However, information such as exact location, depth, yield, radius of influence and quality were not yet available. These data will help to determine the groundwater potential to support the proposed activity and the risks associated with infrastructure stability. For an example, the construction of a new well can lead to increased drawdown in existing sources. This in turn can lead to greater pumping (energy) costs in both the existing well and the new well, reduced yields, changes in groundwater quality and potential conflict between users. It is, therefore, expected that hydrogeological investigation will be undertaken and water use licence be applied as required by the local authorities.

10.2.4 Modified Project Designs Alternative

Current proposal and future expansion of the farm facilities must minimise the potential adverse impacts on natural environment. This is achieved by avoiding removal of significant vegetation and by ensuring appropriate separation distances to surface water. Unless otherwise defined by NEMC, recommended minimum distances between different farm facilities are presented in table 10.1. The poultry sheds should also be designed and constructed in accordance with industry best practice guidelines.

Table 10-1: Recommended Minimum Buffer Distances

Facility	Poultry sheds	Farm boundary	Water supply boreholes	Dam and waterways	Existing or future residential zone	Existing or future rural residential zone	Water table
New poultry sheds	20m	100m	50m from discharge area	50m	500m	300m	2m
Manure store	300m	100m	50m	50m	500m	300m	2m
Litter/manure application to land	20m	50m	50m	50m	500m	300m	2m

Source: Field Study, July 2013

10.2.5 Modified Construction Technology Alternative

The proposed development will be constructed using modern, locally and internationally accepted technology and materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Tanzania Bureau of Standards (TBS) requirements.

10.3 Selected Alternative

From the findings of this ESIA study, the existing designs provide the optimum alternative for implementing and operating the proposed project subject to the effective implementation of the proposed ESMP and EMP.

10.4 Project Cost – Benefit Analysis

10.4.1 Introduction

A cost-benefit analysis (CBA) presents a brief comparison of environmental and social costs of implementing the proposed project. Technically, it is not possible to account and evaluate the cost of all adverse and beneficial impacts accrued from the implementation of the project. Reasons for this is the fact that some of the direct and indirect impacts, short and long term impacts, site specific and other cross project boundary impacts that affect a much larger population, are not possible to fully account them for. Evaluation of these impacts is more or less dictated by the cultural and socio-economic characteristic of the surrounding environment to which the project has been subjected, which is very much site-specific.

10.4.2 Cost of the Project

10.4.2.1 Costs for Land Acquisition

STL bought the Makota farm at a cost of USD 650 000. The farm was set up by Marginpar (a Dutch Company) and Shira Flowers Limited to grow flowers for the Dutch market. The project received a grant from the Netherlands Ministry of Development Cooperation. For a number of reasons the project was not successful and the company defaulted on its loans and the lending bank is exercised its rights to recover its loans from the sale of the farm assets.

10.4.2.2 Capital Cost on Equipment Procurement

STL will invest approximately USD11.24m over the life of its project with a further \$9-10m being invested from cash flows. Given the design of the project, a total of USD 20.98 million investment into a 20 ton per hour feed mill, storage silos, rearing and laying houses, hatchery equipment, and related infrastructure will be required. As of now the project is still at design stage thus no equipment with exception of one Tractor and one backhoe wheel loader have been purchased by the project costing approximately USD 200,000/- . The rest of equipment/facilities were inherited from the previous flower farm project.

10.4.2.3 Environmental and Social Costs

The proposed project will be associated with a number of environmental and social costs unless proper mitigation measures are taken into consideration. These include:

- (i). Site clearance and removal of vegetation cover during construction might have some negative impacts on the flora and fauna (large animals, small mammals, amphibians, reptiles, and birds) of the area;
- (ii). Improper disposal of poultry carcasses can contribute to water-quality problems especially in areas prone to flooding or where there is a shallow water table. Depending on disposal method (burial, incineration, composting or rendering), large volumes of carcasses can generate excessive of leachate and other pollutants, increasing the potential for environmental;
- (iii). Poultry manure contains considerable amounts of nutrients such as nitrogen, phosphorus, and other excreted substances such as, antibiotics if introduced through the feed and pathogens might occur from the gastro-intestinal tracts of the birds. Leaching and runoff of these substances has the potential to result in contamination of surface water and groundwater resources;
- (iv). Concerns regarding greenhouse gas emissions and climate change could result from on-farm energy consumption (e.g. energy input for poultry housing systems and feed processing) and greenhouse gases emissions from feed production;
- (v). Implementation of the project will increase mobility, migration and interaction of people, and communities. Extra earnings by project workers could be the sources of increase transmission of communicable diseases such as HIV/AIDS and other STIs if they engage themselves in extra-marital affairs;
- (vi). Poultry facilities are a source of odour and attract flies, rodents and other pests that create local nuisances and carry disease. Odour emissions from poultry farms adversely affect the life of people living in the vicinity. Odour associated with poultry operations comes from fresh and decomposing waste products such as manure, carcasses, feathers and bedding/litter; and
- (vii). In absence of effective management, project workers might be exposed to occupational health and safety hazards. Occupational health and safety hazards related to the daily operations of the poultry sector can be grouped into five categories:
- (viii). Physical hazards (equipment and vehicle operation and repair, trip and fall hazards, and lifting heavy weights);
 - Confined spaces (e.g. manure pits, silos, grain bins, water tanks, or inadequately ventilated buildings);

- Exposure to chemical hazards (pesticides, disinfecting agents, minerals, antibiotic and hormonal products);
- Exposure to organic dust – Apart from dust emitted from construction works, Source of dust in poultry production operations include handling and storage of feed ingredients which may include particles from grain, mites, fungi, and bacteria, as well as inorganic material such as limestone. Other sources of dust include bird manure and associated bioaerosols, and
- Exposure to biological agents - Workers may be exposed to a range of pathogens such as bacteria, fungi, mites and viruses (including “bird flu”) transmitted from live birds, excreta, carcasses and parasites and ticks.

10.4.2.4 Other Costs

In an event of project decommissioning most benefits there are accruing to local community, government authorities and the general public in terms of employment, market creation and taxes, to mention but a few, will all cease.

10.4.3 Benefits of the Project

10.4.3.1 Infrastructural Development

Smooth flow of road traffic particularly trucks delivering construction materials and machinery during construction will require maintenance of road pavement quality.. The accrued benefits might reach other areas outside the project boundaries if longer road stretches will be involved. As a result, accessibility to Makota farm by STL staff will be greatly improved facilitating distribution of goods and services in a more convenient way.

10.4.3.2 Employment

Although mostly of limited duration and number, the benefits to communities will be related to employment opportunities and petty to large trade opportunities. In order to maximize on the benefits of these opportunities, they should be prioritized to local Tanzanians before any foreign nationals or companies are invited. This will require the project to maximize on the use of locally available resources (materials and work force). The developer therefore should maximize the use of skilled personnel, plant and machinery operators, site foremen, etc locally available in Tanzania as well as unskilled casual labourers available around the project areas. It should however be noted in this regard that the project has already hired 25 local Tanzanians at the current stage.

10.4.3.3 Statutory Taxes and Employee Benefits

In addition to the salaries and wages, STL will be paying to the government the applicable statutory taxes, fees and employment benefits namely Pay As You Earn (PAYE), SDL levy of 6% of yearly payroll, 10% of yearly payroll as contributions to the National Social Security Funds (NSSF), CESS, TP’s fees, grading fees, port charges and land rent.

10.4.3.4 Corporate Taxes

It is the Company’s objective to create wealth to its shareholders, in addition to creating employment and paying taxes to the government. In its expected 10 year life-time the Company will make profit and that will be shared among shareholders. Upon full operation of the proposed project, the company will

pay corporate taxes to the Government amounting to 30% of its monthly income. The taxable income will be obtained after deductions of royalty, operational costs and bank loan interests.

10.4.3.5 Project Consumables

Proposed project operation units including its distribution centre in Dar es Salaam will consume a significant amount of parts, materials and inputs until the project phases out. There are consumables which will be imported from overseas as they cannot be sourced locally but many of the consumables will be sourced locally and thus boosting the local industry through development of new business avenues.

Crops (mainly soya and maize) will be the main project consumables. The company's consumption will boost crop marketability and reliable employment generation for soya and maize farmers. These suppliers and their employees add revenue to the government through payment of income tax and other associated taxes.

There are several other domestic consumables such as papers, containers, computers, furniture, building materials (cement, bricks, aggregates etc.), fences etc which are wholly sourced locally. STL will spend quite huge amount of money on these consumables annually. The money will be annually injected into the local economy of the Iringa district areas and as far as Dar es Salaam, Dodoma, Mbeya, Ruvuma and, hence the entire nation.

10.4.4 Cost - Benefit Comparison

Although it is difficult to state the benefit–cost comparison in monetary terms because of the patchiness of the of the financial data that was made available by the developer, it is still convincing to say that the amount of money that will going into both the local and national economy from the project will be quite significant. Based on the facts mentioned in this chapter, when comparing all the benefits accrued from the proposed project to costs, it seems obvious that there are more significant positive impacts than negative ones from the project.

11. PRELIMINARY DECOMMISSIONING PLAN

11.1 Introduction

The decommissioning phase is part of the (eventual/ultimate) reversal phase, which has the additional and often dominant risk factors associated with the materials processed/produced during the life of the project (e.g., toxic and/or explosive chemicals, etc), as well as the potentially decreased structural integrity due to renovations and/or wear and tear. Similar impacts encountered during the construction phase will be experienced in much the same way when the reverse process is set in motion. This chapter gives an analysis of the decommissioning impacts expected in the proposed poultry farm Project. The project planning life span is 10 years.

11.2 The Need for Preliminary Decommissioning Plan

The preliminary plan serves to establish decommissioning as an important consideration from the inception of the project, during design and throughout the operation of the plant. The plan has the following purposes:

- (i). the primary purpose of the preliminary plan is to ensure that the plant designers are cognizant of decommissioning during the initial design of the project facilities so that design choices that would enhance decommissioning are available for types of materials and system components, and location of components;
- (ii). another purpose of the preliminary plan is to identify the ultimate decommissioning options and final facilities status which will be evaluated and narrowed to the decommissioning method of choice as the end of facilities life is approached;
- (iii). the final purpose of the preliminary plan entails demonstrating to regulatory agencies that important aspects of decommissioning are considered as early as possible during the initial design of the project to serve as the starting point to demonstrate that areas such as decommissioning methods, costs, schedules, and operating impact on decommissioning will be reviewed and refined throughout the operating life of integrated poultry production project.

11.2.1 Content of the Plan

The preliminary plan provides a general description of decommissioning methods considered feasible for the proposed project. The description is intended to demonstrate that the methods considered are practical and that they protect the health and safety of the public and decommissioning personnel.

Design contractor(s) should study the proposed decommissioning methods and take steps to ensure that the design incorporates features that will facilitate decommissioning. Considerations include:

- (i). an estimate of manpower, materials, and costs anticipated to support decommissioning;
- (ii). a description of the anticipated final disposition and status of the biomass boiler facility, machinery, equipment camp and site;
- (iii). a discussion demonstrating that adequate financing will be programmed for decommissioning;
- (iv). identification of records that should be maintained during construction and operation which might facilitate decommissioning, including a set of "as built" drawings.

11.2.2 Methodology and Schedule

STL shall fund and implement all aspects of project decommissioning, including but not limited to, all engineering, environmental assessment, permitting, construction, and mitigation activities associated with the removal of the plant, in accordance with this plan and mitigation of project removal impacts on site. STL shall monitor environmental impacts during and after project removal to respond to defined events during the monitoring phase.

STL shall remove the project structures safely and in a manner that:

- minimizes environmental impacts e.g. dust pollution, disposal of unused chemicals or any hazardous material, providing protective gear to decommissioning personnel etc;
- satisfies STL obligations under the EMA Cap 191;
- restores the site to a condition suitable for multiple use; and
- pays all dues (workers, government, suppliers etc.)

Project removal will begin six months after closure and continue for twelve months. Within the six months from closure STL will inventory all components that need to be removed and or disposed of. This inventory will include building structures, machinery, equipment etc. to be demolished/dismantled, 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 three months (this is important to ensure that they are not vandalized). The second three months of the decommissioning will be used to remove concrete structures and foundations. Debris will be used as road fills for rural roads. All disturbed areas will be landscaped and re-vegetated using indigenous trees. Project decommissioning has five phases including:

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 project (i.e. within the first six months). The fourth phase (project removal and associated protective actions) will take place twelve months after closing business. The fifth phase will begin after total removal and due to nature of the project (medium scale, with relatively moderate impacts) removal and continue for at least one year.

Each phase will constitute the following activities:

- *Pre-removal monitoring:* Pre-removal monitoring includes environmental and socio economic status of the plant and the surroundings. 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 issued. This period will also be used to inventory all assets and facilities that need to be disposed of and to prepare a final decommissioning plan for approval by NEMC.
- *Permitting:* STL shall obtain all permits required to undertake removal of the project assets and facilities. This will basically include NEMC, TRA, NSSF, LGAs, etc.
- *Interim Protective Actions:* This will take care of any interim protective measure that needs to be implemented to protect human health and environment, if any.

- *Project Removal:* As noted above, the removal of the project will be completed within twelve months.
- *Post-Removal Activities:* Post-Project removal monitoring will continue for about a year.

11.3 Preliminary Decommissioning Plan

Table 11-1: Preliminary Decommissioning Plan

Planned Activities	Responsible Institution	Duration	Relative cost (US \$)
Provide information to workers on project termination and create awareness to workers who are losing employment about alternative income generating activities (includes giving notes of termination of contracts)	Developer	Three months	-
Payment of compensation and terminal benefits to workers	Developer	One month	60,000
Closure of the feed mill, broiler and layer farms operations (termination of operation services)	Developer	Three weeks	1,000
Taking out all associated facilities and assets such as water pumps, fuel pumps, refrigerators, etc	Developer Contractor	Two months	15,000
Demolition/ dismantling feed mill, sheds, hatcheries, broiler/layers farms.	Developer in collaboration with contractor	Two months	20,000
Collection and sorting out of wastes for reuse, recycle and for disposal	Developer in collaboration with contractor	One month	2,000
Removal of wastes such as rubbles and other wastes by transporting to the dumpsite for disposal.	Developer in collaboration with contractor	One month	10,000
Levelling of land and site restoration to its original condition	Developer in collaboration with contractor	One month	5,000
			113,000.00

12. SUMMARY AND CONCLUSION

12.1 Summary and Conclusion

This ESIA study report presents the analysis and results of the proposed Integrated Poultry Production project in Ihemi village, Iringa District, Iringa Region. The results of the study have shown that the project activities from planning, design, construction up to operation stage will have minimum negative impact to the biophysical and social-economic environment provided that mitigation measures proposed in this report are implemented. The findings of this assessment study support the development and operation of the proposed poultry farm on the provision that all the mitigation and control measures identified in the study are fully implemented by the proponent.

12.2 Recommendations

12.2.1 Recommendations for NEMC

Based on the findings of this study and supplementary information presented in this document the STL is recommended to be issued with an EIA certificate for implementing the proposed project subject to the implementation of the suggested ESMP and EMP for the project.

12.2.2 Recommendations for STL

From this ESIA study, it is evident that the proposed project is associated with both positive and negative impacts during construction, operation and decommissioning phases of the project. The following recommendations are made to enhance the viability of the project:

- (i). The proposed mitigation and enhancement measures (the ESMP) should be appropriately implemented in order to minimize and/ or avoid the identified adverse environmental and social impacts of the proposed project;
- (ii). The EMP should also be implemented to track the effectiveness of mitigation measures and hence further improvement of the mitigation plan. Monitoring will be used as a means of ensuring compliance with national or international standards;
- (iii). The project should employ an environmental, health and safety officer (or any other appropriate name) responsible the implementation of environmental and social obligations (ESMP and EMP) of the project. Alternatively, considering the size of the project's number of employees (maximum of about 50 employees at full operation) and the nature of the identified impacts being not adverse, the STL management may assign as one of the primary responsibilities to one the senior member of the management team; and
- (iv). Without prejudice to any of the mitigation and enhancement measures presented in the ESMP, STL is urged to close ensure the following:
 - (a) Project activities should be conducted beyond sixty meters from the nearby seasonal water course, *ididiga stream*. In addition, make sure that all excavated materials, debris from construction works should not be stockpiled or deposited near or on stream banks or perimeter of the nearby seasonal watercourse.
 - (b) At any time during project operation the *Ididiga stream* and the pond should not be polluted from project activities.

- (c) Since environmental management cannot be realistically achieved without an environmental policy, STL should develop its own Safety and Environmental Management Policy.
- (d) A budget line should be created and financed accordingly for meeting project's environmental and social obligations.
- (e) It is also recommended that STL establishes a continuous environmental monitoring program to ensure that management is well informed of the environmental performance of the project at all times.
- (f) Poultry farm staff should be encouraged to develop a commitment to being good neighbours and protecting the environment. They should be aware of any operations that may cause pollution or nuisance to neighbours and take all practicable steps to minimize impacts.
- (g) Poultry farm managers should actively promote a good relationship with neighbours. Some complaints from farm neighbours arise from ignorance of normal farm operations and fear based on misconceptions. All complaints should be dealt with in a concerned, professional and sympathetic manner. A visitor and complaints log book should be maintained.
- (h) Warning signs should be posted at the farm entrance to advise potential neighbours of possible undesirable environmental impacts associated with normal operations.

12.2.3 Recommendations for LGAs

Since the developer desires to provide smallholder farmers with extension services for better soya and maize farming practices, LGAs through extension officers in the district should give STL the necessary cooperation to ensure that the farmers benefit handsomely from the proposed project.

12.2.4 Recommendations for Local Community's Members and CBOs

- One of the factors that make project implantation in rural Tanzania challenging is lack of security and trust between project proponents and locals leading to incidents of theft, vandalism, etc. It is recommended that local community play its role in ensuring good neighbourhood with the investor. This goes along with ensuring that they refrain from any acts/behaviours that may render project operation problematic.
- In some instances investor may prove difficult to exist harmoniously with locals. Should this happen the local community is urged to follow proper channels of resolving any misunderstanding with the developer as opposed to taking matters into their hands (or opt for unlawful means).

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APPENDICES

Appendix 1: NEMC's Approved To R for Full ESIA Study

1. OBJECTIVES OF ESIA STUDY

In line with section 12 of the EIA and Audit Regulations, 2005, the objectives of ESIA study shall be to-

- (i) establish before a decision is taken by any person, authority, corporate body or unincorporated body including the Government and local government authorities intending to undertake or authorize the undertaking of any activity impacts that may likely or to a significant extent affect the environment or have environmental effects on those activities;
- (ii) encourage the development of procedure for information exchange, notification and consultation between organs and persons when a proposed activity is likely to have significant environmental effects on transboundary or an environment bordering regions, districts, municipalities, towns and villages;
- (iii) ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;
- (iv) anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of development proposal;
- (v) protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and
- (vi) promote development that is sustainable and optimizes resources use and management opportunities.

2. 3. SCOPE OF WORK

The ESIA study shall take into account environmental, social, cultural, economic, and legal considerations, and shall-

- (vi) provide a comprehensive description of the project units, activities, processes and operations;
- (vii) identify the anticipated environmental and social impacts of the project and the scale of the impacts;
- (viii) identify and analyze alternatives to the proposed project;
- (ix) propose mitigation measures to be taken during and after the implementation of the project; and
- (x) develop an environmental management plan (EMP) with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures

Appendix 2: NEMC's Letter of Approval of Scoping Report and ToR



NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)

BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA

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P.O.Box 63154
Dar es Salaam
Tanzania

In reply please quote:

Ref: **NEMC/179 //Vol.10/56**

Date: **11/09/2013**

Silver lands Tanzania (T) Ltd,
P.O. Box 908,
Iringa .

RE: SCOPING REPORT AND TERMS OF REFERENCE (TOR) FOR THE PROPOSED INTERGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION.

Please refer to the subject above.

We acknowledge receipt of your letter of August 19, 2013 submitted with the Scoping report and Terms of Reference (ToR) for the undertaking an EIA study for the aforementioned project.

The Scoping report and ToR were reviewed and found to be generally adequate and therefore can be used to guide the Environmental Impact Assessment (EIA) study for the named project. In this regard, you will be required to submit to NEMC fifteen copies of the EIS accompanied by a Non Technical Executive Summary both in Kiswahili and English languages as required by section 19(2) of EIA and Audit Regulations, 2005 for the contents during preparation of the EIS. However, ensure that:

- All applicable legal and Policy frameworks should be identified and respective requirements addressed in the EIS;
- The description of the proposed project area should be detailed with indication of distances from project site and Village Forest Reserve and all Natural Resources to be discussed with the associated impacts should be addressed;
- Ensure all relevant key stakeholders are consulted including Ministry of Natural Resources and Tourism, Tanzania Forest Services (TFS) and Wildlife Division;
- Indicate all type of species found in the project site;

All correspondence should be addressed to the Director - General

As part from the review process, a site visit will be conducted by four representatives of the Technical Advisory Committee (TAC) so as to verify the information contained in the Environmental Impact statement (EIS) in relation to the actual situation on site and you will be required to organize transport to and from the site. Dates for the reviews and the site visit will be arranged after you have effected payments to the Council to facilitate the review process.

In this regard, you are required to pay to the National Environment Management Council (NEMC) a total amount of **Tshs. 5,934,000/=** which excludes transport cost before or on submission of the EIS to the Council. Attached herewith please find the budget breakdown for your reference and preparations.

In case any clarification or information is required on thus process, please contact us through 0754-046117.

We look forward to your cooperation on this matter,



K.C Sengoe
For: Director General

CC: Juma Kayonko
P.O.BOX 30
Dar es Salaam.

Appendix 3: Questionnaire for Stakeholders (MDAs) Consultations

**STAKEHOLDERS/ PUBLIC CONSULTATION ON THE PROPOSED
INTERGRATED POULTRY PRODUCTION AT MAKOTA FARM (309.6 HA) AT
IHEMI VILLAGE, MGAMA WARD IN IRINGA DISTRICT, IRINGA REGION**

**QUESTIONNAIRE FOR CONSULTATION WITH GOVERNMENT MINISTRIES,
DEPARTMENTS AND AGENCIES (MDAs)**

	Topic/ question	Responses (comments, concerns and recommendations)
1.	As far as your institutional roles, functions and responsibilities are concerned, what do you think should be taken into consideration during the construction and operation of the proposed project?	
2.	What are your comments/ suggestions/ recommendations with regard to the proposed project?	
3.	Any other aspect you would like to share for the proposed project?	

In case of any enquiry, please contact the following ESIA Study Experts:

Name	Position	Mobile	E-mail
Shabani Yahya	In charge of consultations	0717 076 140 0764 842 050	kasoreyah@gmail.com
Juma Kayonko	ESIA Study Team Leader	0787 616 700	kayonkoj@gmail.com

NB: Kindly sign on our stakeholder consultation form to be appended on ESIA Report

We thank you for your candid cooperation

Appendix 4: Flood Estimation using TRRL Flood Model

Makota Farm Catchment A2

DESIGN FLOOD PROGRAMME - DFPI (Continued from Fig. C.1, Table, August 2001 (See in Volume Executive))						Company / Firm	NORPLAN (P) LTD							
THE TRRL EAST AFRICAN FLOOD MODEL - FLOOD ESTIMATION						Client / Issue No.	UPPER CATCHMENT	Table No.						
PROJECT (Hydrological) Assessment (as part of Environmental and Social Impact Assessment Study) for the Proposed Integrated Poultry Production on Makota Farm (533 Ha) in Sinyu, Tanzania						Date Recd.	18 Aug 2010							
PART I: INPUT DATA: TOPO MAPS						PART II: DESIGN FLOOD				PART III: DESIGN FLOOD FOR OTHER RETURN PERIODS				
River/Stream Number: 1 2 3 4 5						River/Stream Number: 1 2 3 4 5				River/Stream Number: 1 2 3 4 5				
A. Determination of Catchment Parameters						B. DESIGN PEAK FLOW Q ₁₀ and Q ₅				C. DESIGN PEAK FLOW Q ₁₀ and Q ₅				
A1. Area (km ²)						A1.1 Q ₁₀ (m ³ /s)				A1.1 Q ₁₀ (m ³ /s)				
A2. Channel Length (km)						A1.2 Q ₅ (m ³ /s)				A1.2 Q ₅ (m ³ /s)				
A3. Channel Slope (%)						A1.3 Q ₂ (m ³ /s)				A1.3 Q ₂ (m ³ /s)				
A4. Peak Shape Co.						A1.4 Q ₁ (m ³ /s)				A1.4 Q ₁ (m ³ /s)				
B. Valuation of other Catchment Physical Parameters						A2.1 Q ₁₀ (m ³ /s)				A2.1 Q ₁₀ (m ³ /s)				
B1. Soil type (log ₁₀ S ₁)						A2.2 Q ₅ (m ³ /s)				A2.2 Q ₅ (m ³ /s)				
B2. Land use (log ₁₀ S ₂)						A2.3 Q ₂ (m ³ /s)				A2.3 Q ₂ (m ³ /s)				
B3. Channel velocity factor (log ₁₀ S ₃)						A2.4 Q ₁ (m ³ /s)				A2.4 Q ₁ (m ³ /s)				
B4. Log time (log ₁₀ S ₄)						A2.5 Q ₁₀ (m ³ /s)				A2.5 Q ₁₀ (m ³ /s)				
B5. Channel loss (log ₁₀ S ₅)						A2.6 Q ₅ (m ³ /s)				A2.6 Q ₅ (m ³ /s)				
B6. Index of value for log ₁₀ S ₆						A2.7 Q ₂ (m ³ /s)				A2.7 Q ₂ (m ³ /s)				
B7. Combining area factor (log ₁₀ S ₇)						A2.8 Q ₁ (m ³ /s)				A2.8 Q ₁ (m ³ /s)				
B8. Return Period (log ₁₀ S ₈)						A2.9 Q ₁₀ (m ³ /s)				A2.9 Q ₁₀ (m ³ /s)				
C. OTHER INPUT AND OUTPUT RESULTS						A2.10 Q ₅ (m ³ /s)				A2.10 Q ₅ (m ³ /s)				
C.1. Q ₁₀ (m ³ /s)						A2.11 Q ₂ (m ³ /s)				A2.11 Q ₂ (m ³ /s)				
C.2. Q ₅ (m ³ /s)						A2.12 Q ₁ (m ³ /s)				A2.12 Q ₁ (m ³ /s)				
C.3. Q ₂ (m ³ /s)						A2.13 Q ₁₀ (m ³ /s)				A2.13 Q ₁₀ (m ³ /s)				
C.4. Q ₁ (m ³ /s)						A2.14 Q ₅ (m ³ /s)				A2.14 Q ₅ (m ³ /s)				
C.5. Q ₁₀ (m ³ /s)						A2.15 Q ₂ (m ³ /s)				A2.15 Q ₂ (m ³ /s)				
C.6. Q ₅ (m ³ /s)						A2.16 Q ₁ (m ³ /s)				A2.16 Q ₁ (m ³ /s)				
C.7. Q ₂ (m ³ /s)						A2.17 Q ₁₀ (m ³ /s)				A2.17 Q ₁₀ (m ³ /s)				
C.8. Q ₁ (m ³ /s)						A2.18 Q ₅ (m ³ /s)				A2.18 Q ₅ (m ³ /s)				
C.9. Q ₁₀ (m ³ /s)						A2.19 Q ₂ (m ³ /s)				A2.19 Q ₂ (m ³ /s)				
C.10. Q ₅ (m ³ /s)						A2.20 Q ₁ (m ³ /s)				A2.20 Q ₁ (m ³ /s)				
C.11. Q ₂ (m ³ /s)						A2.21 Q ₁₀ (m ³ /s)				A2.21 Q ₁₀ (m ³ /s)				
C.12. Q ₁ (m ³ /s)						A2.22 Q ₅ (m ³ /s)				A2.22 Q ₅ (m ³ /s)				
C.13. Q ₁₀ (m ³ /s)						A2.23 Q ₂ (m ³ /s)				A2.23 Q ₂ (m ³ /s)				
C.14. Q ₅ (m ³ /s)						A2.24 Q ₁ (m ³ /s)				A2.24 Q ₁ (m ³ /s)				
C.15. Q ₂ (m ³ /s)						A2.25 Q ₁₀ (m ³ /s)				A2.25 Q ₁₀ (m ³ /s)				
C.16. Q ₁ (m ³ /s)						A2.26 Q ₅ (m ³ /s)				A2.26 Q ₅ (m ³ /s)				
C.17. Q ₁₀ (m ³ /s)						A2.27 Q ₂ (m ³ /s)				A2.27 Q ₂ (m ³ /s)				
C.18. Q ₅ (m ³ /s)						A2.28 Q ₁ (m ³ /s)				A2.28 Q ₁ (m ³ /s)				
C.19. Q ₂ (m ³ /s)						A2.29 Q ₁₀ (m ³ /s)				A2.29 Q ₁₀ (m ³ /s)				
C.20. Q ₁ (m ³ /s)						A2.30 Q ₅ (m ³ /s)				A2.30 Q ₅ (m ³ /s)				
C.21. Q ₁₀ (m ³ /s)						A2.31 Q ₂ (m ³ /s)				A2.31 Q ₂ (m ³ /s)				
C.22. Q ₅ (m ³ /s)						A2.32 Q ₁ (m ³ /s)				A2.32 Q ₁ (m ³ /s)				
C.23. Q ₂ (m ³ /s)						A2.33 Q ₁₀ (m ³ /s)				A2.33 Q ₁₀ (m ³ /s)				
C.24. Q ₁ (m ³ /s)						A2.34 Q ₅ (m ³ /s)				A2.34 Q ₅ (m ³ /s)				
C.25. Q ₁₀ (m ³ /s)						A2.35 Q ₂ (m ³ /s)				A2.35 Q ₂ (m ³ /s)				
C.26. Q ₅ (m ³ /s)						A2.36 Q ₁ (m ³ /s)				A2.36 Q ₁ (m ³ /s)				
C.27. Q ₂ (m ³ /s)						A2.37 Q ₁₀ (m ³ /s)				A2.37 Q ₁₀ (m ³ /s)				
C.28. Q ₁ (m ³ /s)						A2.38 Q ₅ (m ³ /s)				A2.38 Q ₅ (m ³ /s)				
C.29. Q ₁₀ (m ³ /s)						A2.39 Q ₂ (m ³ /s)				A2.39 Q ₂ (m ³ /s)				
C.30. Q ₅ (m ³ /s)						A2.40 Q ₁ (m ³ /s)				A2.40 Q ₁ (m ³ /s)				
C.31. Q ₂ (m ³ /s)						A2.41 Q ₁₀ (m ³ /s)				A2.41 Q ₁₀ (m ³ /s)				
C.32. Q ₁ (m ³ /s)						A2.42 Q ₅ (m ³ /s)				A2.42 Q ₅ (m ³ /s)				
C.33. Q ₁₀ (m ³ /s)						A2.43 Q ₂ (m ³ /s)				A2.43 Q ₂ (m ³ /s)				
C.34. Q ₅ (m ³ /s)						A2.44 Q ₁ (m ³ /s)				A2.44 Q ₁ (m ³ /s)				
C.35. Q ₂ (m ³ /s)						A2.45 Q ₁₀ (m ³ /s)				A2.45 Q ₁₀ (m ³ /s)				
C.36. Q ₁ (m ³ /s)						A2.46 Q ₅ (m ³ /s)				A2.46 Q ₅ (m ³ /s)				
C.37. Q ₁₀ (m ³ /s)						A2.47 Q ₂ (m ³ /s)				A2.47 Q ₂ (m ³ /s)				
C.38. Q ₅ (m ³ /s)						A2.48 Q ₁ (m ³ /s)				A2.48 Q ₁ (m ³ /s)				
C.39. Q ₂ (m ³ /s)						A2.49 Q ₁₀ (m ³ /s)				A2.49 Q ₁₀ (m ³ /s)				
C.40. Q ₁ (m ³ /s)						A2.50 Q ₅ (m ³ /s)				A2.50 Q ₅ (m ³ /s)				
C.41. Q ₁₀ (m ³ /s)						A2.51 Q ₂ (m ³ /s)				A2.51 Q ₂ (m ³ /s)				
C.42. Q ₅ (m ³ /s)						A2.52 Q ₁ (m ³ /s)				A2.52 Q ₁ (m ³ /s)				
C.43. Q ₂ (m ³ /s)						A2.53 Q ₁₀ (m ³ /s)				A2.53 Q ₁₀ (m ³ /s)				
C.44. Q ₁ (m ³ /s)						A2.54 Q ₅ (m ³ /s)				A2.54 Q ₅ (m ³ /s)				
C.45. Q ₁₀ (m ³ /s)						A2.55 Q ₂ (m ³ /s)				A2.55 Q ₂ (m ³ /s)				
C.46. Q ₅ (m ³ /s)						A2.56 Q ₁ (m ³ /s)				A2.56 Q ₁ (m ³ /s)				
C.47. Q ₂ (m ³ /s)						A2.57 Q ₁₀ (m ³ /s)				A2.57 Q ₁₀ (m ³ /s)				
C.48. Q ₁ (m ³ /s)						A2.58 Q ₅ (m ³ /s)				A2.58 Q ₅ (m ³ /s)				
C.49. Q ₁₀ (m ³ /s)						A2.59 Q ₂ (m ³ /s)				A2.59 Q ₂ (m ³ /s)				
C.50. Q ₅ (m ³ /s)						A2.60 Q ₁ (m ³ /s)				A2.60 Q ₁ (m ³ /s)				
C.51. Q ₂ (m ³ /s)						A2.61 Q ₁₀ (m ³ /s)				A2.61 Q ₁₀ (m ³ /s)				
C.52. Q ₁ (m ³ /s)						A2.62 Q ₅ (m ³ /s)				A2.62 Q ₅ (m ³ /s)				
C.53. Q ₁₀ (m ³ /s)						A2.63 Q ₂ (m ³ /s)				A2.63 Q ₂ (m ³ /s)				
C.54. Q ₅ (m ³ /s)						A2.64 Q ₁ (m ³ /s)				A2.64 Q ₁ (m ³ /s)				
C.55. Q ₂ (m ³ /s)						A2.65 Q ₁₀ (m ³ /s)				A2.65 Q ₁₀ (m ³ /s)				
C.56. Q ₁ (m ³ /s)						A2.66 Q ₅ (m ³ /s)				A2.66 Q ₅ (m ³ /s)				
C.57. Q ₁₀ (m ³ /s)						A2.67 Q ₂ (m ³ /s)				A2.67 Q ₂ (m ³ /s)				
C.58. Q ₅ (m ³ /s)						A2.68 Q ₁ (m ³ /s)				A2.68 Q ₁ (m ³ /s)				
C.59. Q ₂ (m ³ /s)						A2.69 Q ₁₀ (m ³ /s)				A2.69 Q ₁₀ (m ³ /s)				
C.60. Q ₁ (m ³ /s)						A2.70 Q ₅ (m ³ /s)				A2.70 Q ₅ (m ³ /s)				
C.61. Q ₁₀ (m ³ /s)						A2.71 Q ₂ (m ³ /s)				A2.71 Q ₂ (m ³ /s)				
C.62. Q ₅ (m ³ /s)						A2.72 Q ₁ (m ³ /s)				A2.72 Q ₁ (m ³ /s)				
C.63. Q ₂ (m ³ /s)						A2.73 Q ₁₀ (m ³ /s)				A2.73 Q ₁₀ (m ³ /s)				
C.64. Q ₁ (m ³ /s)						A2.74 Q ₅ (m ³ /s)				A2.74 Q ₅ (m ³ /s)				
C.65. Q ₁₀ (m ³ /s)						A2.75 Q ₂ (m ³ /s)				A2.75 Q ₂ (m ³ /s)				
C.66. Q ₅ (m ³ /s)						A2.76 Q ₁ (m ³ /s)				A2.76 Q ₁ (m ³ /s)				
C.67. Q ₂ (m ³ /s)						A2.77 Q ₁₀ (m ³ /s)				A2.77 Q ₁₀ (m ³ /s)				
C.68. Q ₁ (m ³ /s)						A2.78 Q ₅ (m ³ /s)				A2.78 Q ₅ (m ³ /s)				
C.69. Q ₁₀ (m ³ /s)						A2.79 Q ₂ (m ³ /s)				A2.79 Q ₂ (m ³ /s)				
C.70. Q ₅ (m ³ /s)						A2.80 Q ₁ (m ³ /s)				A2.80 Q ₁ (m ³ /s)				
C.71. Q ₂ (m ³ /s)						A2.81 Q ₁₀ (m ³ /s)				A2.81 Q ₁₀ (m ³ /s)				
C.72. Q ₁ (m ³ /s)						A2.82 Q ₅ (m ³ /s)				A2.82 Q ₅ (m ³ /s)				
C.73. Q ₁₀ (m ³ /s)						A2.83 Q ₂ (m ³ /s)				A2.83 Q ₂ (m ³ /s)				
C.74. Q ₅ (m ³ /s)						A2.84 Q ₁ (m ³ /s)				A2.84 Q ₁ (m ³ /s)				
C.75. Q ₂ (m ³ /s)						A2.85 Q ₁₀ (m ³ /s)				A2.85 Q ₁₀ (m ³ /s)				
C.76. Q ₁ (m ³ /s)						A2.86 Q ₅ (m ³ /s)				A2.86 Q ₅ (m ³ /s)				
C.77. Q ₁₀ (m ³ /s)						A2.87 Q ₂ (m ³ /s)				A2.87 Q ₂ (m ³ /s)				
C.78. Q ₅ (m ³ /s)						A2.88 Q ₁ (m ³ /s)				A2.88 Q ₁ (m ³ /s)				
C.79. Q ₂ (m ³ /s)						A2.89 Q ₁₀ (m ³ /s)				A2.89 Q ₁₀ (m ³ /s)				
C.80. Q ₁ (m ³ /s)						A2.90 Q ₅ (m ³ /s)				A2.90 Q ₅ (m ³ /s)				
C.81. Q ₁₀ (m ³ /s)						A2.91 Q ₂ (m ³ /s)				A2.91 Q ₂ (m ³ /s)				
C.82. Q ₅ (m ³ /s)						A2.92 Q ₁ (m ³ /s)				A2.92 Q ₁ (m ³ /s)				
C.83. Q ₂ (m ³ /s)						A2.93 Q ₁₀ (m ³ /s)				A2.93 Q ₁₀ (m ³ /s)				
C.84. Q ₁ (m ³ /s)						A2.94 Q ₅ (m ³ /s)				A2.94 Q ₅ (m ³ /s)				
C.85. Q ₁₀ (m ³ /s)						A2.95 Q ₂ (m ³ /s)				A2.95 Q ₂ (m ³ /s)				
C.86. Q ₅ (m ³ /s)						A2.96 Q ₁ (m ³ /s)				A2.96 Q ₁ (m ³ /s)				
C.87. Q ₂ (m ³ /s)						A2.97 Q ₁₀ (m ³ /s)				A2.97 Q ₁₀ (m ³ /s)				
C.88. Q ₁ (m ³ /s)						A2.98 Q ₅ (m ³ /s)				A2.98 Q ₅ (m ³ /s)				
C.89. Q ₁₀ (m ³ /s)						A2.99 Q ₂ (m ³ /s)				A2.99 Q ₂ (m ³ /s)				
C.90. Q ₅ (m ³ /s)						A2.100 Q ₁ (m ³ /s)				A2.100 Q ₁ (m ³ /s)				

Makota Farm Catchment B2

DESIGN FLOOD PROGRAMME - DFPI (Continued from Fig. C.1, Table, August 2001 (See in Volume Executive))						Company / Firm	NORPLAN (P) LTD							
THE TRRL EAST AFRICAN FLOOD MODEL - FLOOD ESTIMATION						Client / Issue No.	UPPER CATCHMENT	Table No.						
PROJECT (Hydrological) Assessment (as part of Environmental and Social Impact Assessment Study) for the Proposed Integrated Poultry Production on Makota Farm (533 Ha) in Sinyu, Tanzania						Date Recd.	18 Aug 2010							
PART I: INPUT DATA: TOPO MAPS						PART II: DESIGN FLOOD				PART III: DESIGN FLOOD FOR OTHER RETURN PERIODS				
River/Stream Number: 1 2 3 4 5						River/Stream Number: 1 2 3 4 5				River/Stream Number: 1 2 3 4 5				
A. Determination of Catchment Parameters						B. DESIGN PEAK FLOW Q ₁₀ and Q ₅				C. DESIGN PEAK FLOW Q ₁₀ and Q ₅				
A1. Area (km ²)						A1.1 Q ₁₀ (m ³ /s)				A1.1 Q ₁₀ (m ³ /s)				
A2. Channel Length (km)						A1.2 Q ₅ (m ³ /s)				A1.2 Q ₅ (m ³ /s)				
A3. Channel Slope (%)						A1.3 Q ₂ (m ³ /s)				A1.3 Q ₂ (m ³ /s)				
A4. Peak Shape Co.						A1.4 Q ₁ (m ³ /s)				A1.4 Q ₁ (m ³ /s)				
B. Valuation of other Catchment Physical Parameters						A2.1 Q ₁₀ (m ³ /s)				A2.1 Q ₁₀ (m ³ /s)				
B1. Soil type (log ₁₀ S ₁)						A2.2 Q ₅ (m ³ /s)				A2.2 Q ₅ (m ³ /s)				
B2. Land use (log ₁₀ S ₂)						A2.3 Q ₂ (m ³ /s)				A2.3 Q ₂ (m ³ /s)				
B3. Channel velocity factor (log ₁₀ S ₃)						A2.4 Q ₁ (m ³ /s)				A2.4 Q ₁ (m ³ /s)				
B4. Log time (log ₁₀ S ₄)						A2.5 Q ₁₀ (m ³ /s)				A2.5 Q ₁₀				

Appendix 5: Makota Farm Title Deed Transfer

Land Form No. 52

THE UNITED REPUBLIC OF TANZANIA

THE LAND ACT, 1999
(No. 4 OF 1999)

POWER OF SALE OF MORTGAGED LAND
(Under Section 133)

C.T. No. 14352
Farm No. 960
L.O. No. 20209
Ihemi Village
IRINGA

In consideration of the sum of United States Dollars Six Hundred and Fifty Thousand (US \$ 650,000) Only, paid by SILVERLANDS TANZANIA LIMITED of P.O BOX 7495, DAR ES SALAAM (hereinafter the "Purchaser") we, FBME BANK LIMITED of P.O Box 8298, Dar es salaam (hereinafter the "Lender") in the exercise of the power of sale conferred by the mortgage registered as Filed Document Number 13898-MBYLR on the 24th day of June, 2011 HEREBY TRANSFER to SILVERLANDS TANZANIA LIMITED the Property registered under the above reference discharged from the said mortgage.

SIGNED and DELIVERED by the said
TIMOTHY JACKSON
on behalf of FBME BANK LIMITED this
_____ day of _____, 2013

[Signature]
SIGNATURE

Signature: [Signature]

Postal Address Box 80496
DAR ES SALAAM

Qualification _____
COMMISSIONER FOR OATHS

DANIEL BERNARD WELWEL
Advocate, Notary Public &
Commissioner for Oaths
P.O. Box 80496
DAR-ES-SALAAM

Certified as a true
Copy
[Signature]
6th April
May


SEALED with the COMMON SEAL of
SILVERLANDS TANZANIA LIMITED in the
presence of us this 21st day of
March, 2013

SIGNATURE

Signature:

Aufuhuma

Postal Address

P.O. Box 7495
Dar-es-Salaam

Qualification

Director

Signature:

[Signature]

Postal Address

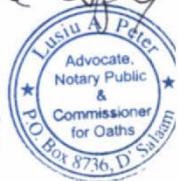
REX ASSOCIATES LIMITED
REX HOUSE
145 Magore St. Upanga
P. O. Box 7495, DAR ES SALAAM

Qualification

Company Secretary

Certified as a true Copy

[Signature]
6th April, 2013



SCHEDULE

ALL that land known as **Farm No. 960 situated at Ithemi village, Iringa District** containing Seven hundred seventy four (774) acres show for identification only edged red on the plan attached to this Certificate and defined on the registered Survey Plan Numbered 12807 deposited at the Office of the Director for Surveys and mapping at Dar es salaam.

Given under my and my official seal the day year first above written.

[Signature]
Asst. COMMISSIONER FOR LANDS

The within named **SHIRA FLOWERS LIMITED** hereby accept the terms and conditions contained in the foregoing Certificate of occupancy.

SEALED with the COMMON SEAL of the)
said **SHIRA FLOWERS LIMITED** and)
delivered in the presence of us)
this)
29th day of APRIL 2009)

Signature: *[Signature]*)

Postal Address: *Box 113*)
IRINGA)

Qualification:)

Signature: *[Signature]*)

Postal Address: *P.O. Box 2508,*)
IRINGA)

Qualification: *DIRECTOR*)

Certified as a true copy
[Signature]
6th May, 2009


TANZANIA



Certificate of Incorporation

Section 15

No 93945

I HEREBY CERTIFY THAT

SILVERLANDS TANZANIA LIMITED

is this day incorporated under the Companies Act, 2002 and that the Company is Limited.

Given under my hand at Dar es salaam

this 19TH day of SEPTEMBER

TWO THOUSAND AND TWELVE.


Asst. Registrar of Companies

Appendix 7: STL's Trade License -TIN Certificate

CTIN:1954814

ISO 9001 : 2008 Certified



TANZANIA REVENUE AUTHORITY

CERTIFICATE OF REGISTRATION

FOR

TAXPAYER IDENTIFICATION NUMBER (TIN)

(ISSUED UNDER SECTION 133 OF THE INCOME TAX ACT NO. 11 OF 2004)

THIS IS TO CERTIFY THAT

SILVERLANDS TANZANIA LIMITED

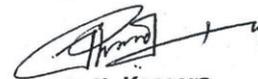
.....

has been registered with the Tanzania Revenue
Authority and assigned the Taxpayer
Identification Number

119-700-108

.....
07-02-2013

with effect from



P. N. Kassera

OFFICIAL SEAL

COMMISSIONER FOR DOMESTIC REVENUE

NOTE: THE REQUIREMENTS UNDER WHICH THIS CERTIFICATE IS ISSUED ARE STATED OVERLEAF

Appendix 8: List of Vegetation Recorded in Makota Farm (July 2013)

Family	Species Name	Habit
Convolvulaceae	<i>Ipomoea involucreata</i> P.Beauv.	climber
Vitaceae	<i>Rhoicisus tridentata</i> (L.f.) Wild & R.B.Drumm.	climber
Dennstaedtiaceae	<i>Pteridium aquilinum</i> (L.) Kuhn	fern
Gramineae	<i>Aristida hardeacea</i> Kunth.	Grass
Gramineae	<i>Bambusa vulgaris</i> L.	Grass
Gramineae	<i>Chloris gayana</i> Kunth	Grass
Gramineae	<i>Chloris virgata</i> Sw.	Grass
Gramineae	<i>Hyparrhenia anthistrioides</i> (A.Rich.)Stapf.	Grass
Gramineae	<i>Hyparrhenia filipendula</i> (Hochst.) Stapf	Grass
Gramineae	<i>Panicum subalbidum</i> Kunth.	Grass
Gramineae	<i>Panicum trichocladum</i> K.Schum.	Grass
Gramineae	<i>Rhynchelytrum repens</i> (Willd.) C.E.Hubb.	Grass
Gramineae	<i>Stenotaphrum dimidiatum</i> (L.) Brongn.	Grass
Amaranthaceae	<i>Amaranthus dubius</i> Thell.	Herb
Amaranthaceae	<i>Celosia trigyna</i> L.	Herb
Caesalpiniaceae	<i>Cassia mimosoides</i> L.	Herb
Chenopodiaceae	<i>Chenopodium ambrocioides</i> L.	Herb
Compositae	<i>Ageratum conyzoides</i> L.	Herb
Compositae	<i>Aspilia pluriseta</i> Schweinf. ex Engl.	Herb
Compositae	<i>Bidens schimperi</i> Sch.Bip. ex Walp.	Herb
Compositae	<i>Blumea aurita</i> DC.	Herb
Compositae	<i>Blumea mollis</i> (D.Don) Merr.	Herb
Compositae	<i>Emilia coccinea</i> (Sims) Sweet	Herb
Compositae	<i>Helichrysum cymosum</i> (L.) Less	Herb
Compositae	<i>Helichrysum foetidum</i> (L.) Cass.	Herb
Compositae	<i>Helichrysum kirkii</i> Oliv. & Hiern	Herb
Compositae	<i>Helychrysum aureum</i> (Hochst.)Merr.	Herb
Compositae	<i>Launaea cornuta</i> (Hochst. ex Oliv. & Hiern) C.Jeffrey	Herb
Compositae	<i>Sececio syringifolius</i> O.Hoffm.	Herb
Compositae	<i>Senecio hochstetteri</i> Sch.Bip. ex A.Rich.	Herb
Compositae	<i>Senecio</i> sp.	Herb
Compositae	<i>Solanecia goetzei</i> (O.Hoffm.) C.Jeffrey	Herb
Compositae	<i>Sonchus orelaceus</i> L.	Herb
Compositae	<i>Tagetes minuta</i> L.	Herb
Compositae	<i>Vernonia chloropappa</i> Baker	Herb
Compositae	<i>Vernonia galamensis</i> (Cass.) Less.	Herb
Compositae	<i>Vernonia glabra</i> (Steetz) Vatke	Herb
Compositae	<i>Vernonia</i> sp.	Herb
Crusiferae	<i>Brassica integrifolia</i> (H.West) Rupr.	Herb
Gunneraceae	<i>Gunnera perpensa</i> L.	Herb
Labiatae	<i>Hyptis suaveolens</i> Petit	Herb
Melastomataceae	<i>Dissotis polyantha</i> Gilg	Herb
Ochnaceae	<i>Ochna holstii</i> Engl.	Herb
Papilionaceae	<i>Crotalaria incana</i> L.	Herb
Papilionaceae	<i>Crotalaria laburnifolia</i> L.	Herb
Papilionaceae	<i>Crotalaria schirensis</i> (Baker f.) Milne-Redh.	Herb

Family	Species Name	Habit
Papilionaceae	<i>Dolichos kilimandscharica</i> Taub.	Herb
Papilionaceae	<i>Dolichos trinervatus</i> Baker	Herb
Papilionaceae	<i>Eriosema glomelatum</i> (Guill. & Perr.) Hook.f.	Herb
Papilionaceae	<i>Indigofera bogdanii</i> Gillett	Herb
Papilionaceae	<i>Indigofera hirsuta</i> L.	Herb
Papilionaceae	<i>Leucas glabrata</i> (Vahl) R.Br.	Herb
Papilionaceae	<i>Mucuna stans</i> Baker	Herb
Papilionaceae	<i>Rhynchosia viscosa</i> (Roth) DC.	Herb
Pedaliaceae	<i>Sesamum angustifolium</i> (Oliv.) Engl.	Herb
Polygonaceae	<i>Polygonum senegalense</i> Meisn.	Herb
Polygonaceae	<i>Rumex usambarensis</i> (Dammer) Dammer	Herb
Rubiaceae	<i>Oldenlandia herbacea</i> (L.)Roxb	Herb
Rubiaceae	<i>Oldenlandia scopulorum</i> Bullock	Herb
Rubiaceae	<i>Otiophora pycnostachys</i> K.Schum	Herb
Rubiaceae	<i>Spemacoce laevis</i> Lam,	Herb
Rubiaceae	<i>Spemacoce subvulgata</i> (K.Schum.) J.G.García	Herb
Schummach.	<i>Pennisetum purpureum</i> Schumach.	Herb
Solanaceae	<i>Datura stramonium</i> L.	Herb
Solanaceae	<i>Physalis angulata</i> L.	Herb
Sphenocleaceae	<i>Sphenoclea zeylanica</i> Gaertn.	Herb
Cyperaceae	<i>Cyperus articulatus</i> L.	sedge
Cyperaceae	<i>Kyllinga erecta</i> Schumach.	sedge
Anacardiaceae	<i>Rhus longipes</i> Engl.	shrub
Anacardiaceae	<i>Rhus natalensis</i> Krauss	shrub
Berberidaceae	<i>Berberis holstii</i> Engl.	shrub
Caesalpiniaceae	<i>Cassia singueana</i> Delile	shrub
Capparidaceae	<i>Boscia angustifolia</i> A.Rich.	shrub
Celastraceae	<i>Catha edulis</i> (Vahl) Endl.	shrub
Celastraceae	<i>Mytenus senegalensis</i> (Lam.) Exell	shrub
Chrysobalanaceae	<i>Parinari curatellifolia</i> Benth.	shrub
Compositae	<i>Inula glomerata</i> Oliv. & Hiern	shrub
Compositae	<i>Senecio maranguensis</i> O.Hoffm.	shrub
Compositae	<i>Vernonia hildebrandtii</i> Vatke	shrub
Compositae	<i>Vernonia usambarensis</i> O.Hoffm.	shrub
Connaraceae	<i>Bysocarpus orientalis</i> (Baill.) Baker	shrub
Geraniaceae	<i>Pelargonium hortorum</i> L.	shrub
Guttiferae	<i>Garcinia buchananii</i> Baker	shrub
Guttiferae	<i>Psorospermum febrifugum</i> Spach	shrub
Labiatae	<i>Ocimum suave</i> Baill.	shrub
Mimosaceae	<i>Dichrostachys cinerea</i> Ait	shrub
Olacaceae	<i>Ximenia caffra</i> Sond.	shrub
Papilionaceae	<i>Eriosema psoraleoides</i> (Lam.) G.Don	shrub
Papilionaceae	<i>Kotschya africana</i> Endl.	shrub
Papilionaceae	<i>Tephrosia pumila</i> (Lam.) Pers.	shrub
Papilionaceae	<i>Tephrosia vogelii</i> Hook.f.	shrub
Polygalaceae	<i>Securidaca longipedunculata</i> Fresen	shrub
Rubiaceae	<i>Pavetta schumanniana</i> K.Schumm.	shrub

Family	Species Name	Habit
Santalaceae	<i>Osyris lanceolata</i> Hochst. & Steud	shrub
Sapindaceae	<i>Allophylus africanus</i> P.Beauv.	shrub
Sapindaceae	<i>Dodonaea viscosa</i> (L.) Jacq.	shrub
Sterculiaceae	<i>Dombeya burgessiae</i> Gerr. ex Harv. & Sond.	shrub
Verbenaceae	<i>Clerodendrum cephalantum</i> Oliv.	shrub
Verbenaceae	<i>Clerodendrum myricoides</i> (Hochst.) Vatke	shrub
Verbenaceae	<i>Lantana virbuinoides</i> (Forssk.) Vahl	shrub
Verbenaceae	<i>Lippia javanica</i> (Burm.f.) Spreng.	shrub
Annonaceae	<i>Cassipourea mollis</i> (R.E. Fries) Alstm	tree
Apocynaceae	<i>Strophanthus eminii</i> Asch. & Pax	tree
Caesalpiniaceae	<i>Brachystegia bussei</i> Harms	tree
Caesalpiniaceae	<i>Julbernardia globiflora</i> (Benth.)Troupin	tree
Caesalpiniaceae	<i>Swartzia madagascariensis</i> Desv.	tree
Connaraceae	<i>Bryocarpus orientalis</i> (Baill)	tree
Euphorbiaceae	<i>Croton macrostachys</i> Delile	tree
Euphorbiaceae	<i>Paivaeusa dactylophylla</i> Welw. Ex. Oliv	tree
Euphorbiaceae	<i>Ricinus communis</i> L.	tree
Flacourtiaceae	<i>Flacourtia indica</i> (Burm.f.) Merr.	tree
Loganiaceae	<i>Strychnos potatorum</i> Linn	tree
Loganiaceae	<i>Strychnos spinosa</i> Lam.	tree
Malvaceae	<i>Azanza garckeana</i> (F.Hoffm.) Exell & Hillc.	tree
Melianthaceae	<i>Bersama abyssinica</i> Fresen.	tree
Melianthaceae	<i>Ekenbergia benguelensis</i> C.DC.	tree
Mimosaceae	<i>Acacia gerrardii</i> Benth.	tree
Mimosaceae	<i>Acacia xanthophloea</i> Benth.	tree
Moraceae	<i>Ficus sur</i> Forssk.	tree
Myrtaceae	<i>Eucalypus maideni</i> F.Muell.	tree
Myrtaceae	<i>Eucalypus saligna</i> Sm.	tree
Myrtaceae	<i>Syzygium cordatum</i> Hochst.	tree
Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	tree
Papilionaceae	<i>Erythrina abyssinica</i> DC.	tree
Papilionaceae	<i>Pisum sativum</i> L.	tree
Papilionaceae	<i>Tephrosia aequilata</i> Baker	tree
Proteaceae	<i>Hackea saligna</i> (Andrews)Knight	tree
Proteaceae	<i>Protea madiensis</i> Oliv.	tree
Rubiaceae	<i>Canthium burtii</i> Bullock	tree
Rubiaceae	<i>Catunaregum spinosa</i> Wolf	tree
Rubiaceae	<i>Multidentia crassa</i> Hiern) Bridson & Verdc.	tree
Rubiaceae	<i>Xeromphis obovata</i> (Hochst.) Keay	tree

Appendix 9: List of Small Mammals Recorded in Makota Farm (July 2013)

Order/Family	Species common name	Species scientific name
Lipotyphla/ Soricidae	Shrew	<i>Crocidura</i> spp
Rodentia/Muridae	Brush-furred mice	<i>Lophuromys flavopunctatus</i> .
	Chestnut climbing mouse	<i>Dendromys mystacalis</i>
	Fat mouse	<i>Steatomys pratensis</i>
	Multimammate mouse	<i>Mastomys natalensis</i>
	Soft-furred rat	<i>Praomys</i> spp
	Temminck's mouse	<i>Mus musculooides</i>
	Shaggy swamp rat	<i>Dasymys incomptus</i>
Woodland thicket rat	<i>Grammomys dolichurus</i>	
Macroscelidea/ Macroscelididae	Four-toed elephant-shrew	<i>Petrodromus tetradactylus</i>
Lagomorpha/ Leporidae	Common hare	

Appendix 10: List of Birds Recorded in Makota Farm (July 2013)

Common name	Species name	IUCN Conservation Status	TSC Mean Scores
Collared sunbird	<i>Hedydipna collaris</i>	LC	1.615
Common stonechat	<i>Saxicola torquatus</i>	LC	4.615
Red-eyed dove	<i>Streptopelia semitorquata</i>	LC	2.462
Ring-necked dove	<i>Streptopelia capicola</i>	LC	2.154
Yellow-billed duck	<i>Anas undulata</i>	LC	0.462
Helmeted guineafowl	<i>Numida meleagris</i>	LC	0.846
Tropical boubou	<i>Laniarius aethiopicus</i>	LC	0.154
Emerald spotted wood dove	<i>Turtur chalcospilos</i>	LC	0.077
Fülleborn longclaw	<i>Macronyx fuellebornii</i>	LC	1.846
Red-cheeked cordon bleu	<i>Uraeginthus bengalus</i>	LC	1.308
Grey-rumped swallow	<i>Pseudhirundo griseopyga</i>	LC	0.308
Speckled mousebird	<i>Colius striatus</i>	LC	0.692
African pied wagtail	<i>Motacilla aguimp</i>	LC	1.000
Pied crow	<i>Corvus albus</i>	LC	1.615
Tawny flanked prinia	<i>Prinia subflava</i>	LC	1.231
Bronze mannikin	<i>Lonchura cucullata</i>	LC	1.077
White-eyed slaty flycatcher	<i>Melaenornis fischeri</i>	LC	0.231
Croaking cisticola	<i>Cisticola natalensis</i>	LC	1.462
Chin-spot batis	<i>Batis molitor</i>	LC	0.077
Green-capped eremomela	<i>Eremomela scotops</i>	LC	0.077
Yellow-bellied eremomela	<i>Eremomela icteropygialis</i>	LC	0.923
Little bee-eater	<i>Merops pusillus</i>	LC	0.385
Common button-quail	<i>Turnix sylvatica</i>	LC	0.692
Southern blue-eared starling	<i>Lamprotornis elisabeth</i>	LC	0.308
Common drongo	<i>Dicrurus adsimilis</i>	LC	0.923
Piping cisticola	<i>Cisticola fulvicapillus</i>	LC	0.615
Black-crowned Tchagra	<i>Tchagra senegala</i>	LC	0.462
Black-backed puffback	<i>Dryoscopus cubla</i>	LC	0.154
Common bulbul	<i>Pycnonotus barbatus</i>	LC	0.462
Yellow-rumped Tinkerbird	<i>Pogoniulus bilineatus</i>	LC	0.462
Francolin sp	<i>Francolinus</i> sp	LC	0.308
African wattled lapwing*	<i>Vanellus senegallus</i>	LC	0.462
Yellow white-eye	<i>Zosterops senegalensis</i>	LC	0.231
Brimstone canary	<i>Serinus sulphuratus</i>	LC	1.308
Singing cisticola	<i>Cisticola cantans</i>	LC	0.615
Fawn breasted waxbill	<i>Estrilda paludicola</i>	LC	0.077
Common waxbill	<i>Estrilda astrild</i>	LC	0.077
White-browed scrub robin	<i>Cercotrichas leucophrys</i>	LC	1.077

Common name	Species name	IUCN Conservation Status	TSC Mean Scores
Slate-coloured boubou	<i>Laniarius funebris</i>	LC	0.385
Temnick's courser	<i>Cursorius temminckii</i>	LC	0.308
Miombo double collared sunbird	<i>Cinnyris manoensis</i>	LC	0.308
Crowned hornbill	<i>Tockus alboterminatus</i>	LC	0.077
White-browed robin chat	<i>Cossypha heuglini</i>	LC	0.462
Variable sunbird	<i>Cinnyris venustus</i>	LC	0.077
Holbu's golden weaver	<i>Ploceus xanthops</i>	LC	0.462

Appendix 11: List of Invertebrates Recorded in Makota Farm (July 2013)

Order	Family	Common name	Scientific name
Araneae			
Blattodea	Blattellidae	German Cockroach	<i>Blattella germanica</i>
	Blattidae	Common Cockroach	<i>Deropeltis erythrocephala</i>
Coleoptera	Carabidae	Anti-mimicking Ground Beetle	<i>Atractonotus mulsanti</i>
	Languridae	Lizard Beetle	<i>Promecolanguris</i> sp.
	Meloidae	Bean Beetle	<i>Mylabris oculata</i>
	Melyridae	Black maize Beetle	<i>Heteronychus arator</i>
	Scarabidae	Rhinoceros Beetle	<i>Oryctes boas</i>
	Scarabidae	Small Green Dung Beetle	<i>Gymnopleurus humanus</i>
	Tenebrionidae	Dusty maize Beetle	<i>Trigonopus</i> sp.
Dermoptera	Forficulidae	Common ear wings	<i>Forficula senegalensis</i>
	Labiduridae	Long-horned Ear wings	<i>Euborelia annulipes</i>
Diptera	Syrphidae	Hover fly	<i>Microdon testaceus</i>
Hemiptera	Tessaratomidae	Inflated Stink Bug	<i>Encosternum delegorguei</i>
Hymenoptera	Eumidae	Masson Wasps	<i>Delta emarginatum</i>
	Formicidae	Drop-tail Ant	<i>Myrmicaria natalensis</i>
	Vespidae	Paper Wasp	<i>Belonogaster dubia</i>
Isoptera	Rhinotermitidae	Damp-wood Termite	<i>Psammotermes allocerus</i>
Lepidoptera	Nymphalidae	Small Orange Acraea Butterfly	<i>Hyalites eponina</i>
	Nymphalidae	Blue Pansy Butterfly	<i>Junonia oenone</i>
	Nymphalidae	Spotted Joker	<i>Byblia ilythia</i>
Mantodea	Thespidae	Stick Mantid	<i>Hoplocorypha macra</i>
Odonata	Protoneuridae	Thread tail Dragonfly	<i>Ellatoneura</i> sp
	Libellulidae	Red Busker Dragonfly	<i>Urothermis assignata</i>
Orthoptera	Anostomatidae	King Cricket	<i>Onosandrus</i> sp.
	Acrididae	Red Locust	<i>Nomadacris septemfasciata</i>
	Acrididae	Yellow Wings Locust	<i>Oedaleus</i> sp.
	Acrididae	Elegant grass mimicking Grasshopper	<i>Leptacris elegans</i>
	Acrididae	Yellow Wings Grasshopper	<i>Tylotropidius</i> sp.
	Tettigoniidae	Grass Katydids	<i>Tylopsis</i> sp.
Phasmatodea	Bacillidae	Stick Insect	<i>Maransis rufolineatus</i>

Appendix 12: MDAs Officials Consulted

SILVERLANDS TANZANIA LIMITED						
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA						
STAKEHOLDERS CONSULTATION FORM - GOVERNMENT MINISTRIES, DEPARTMENTS AND AGENCIES						
S/N	Date	Name	Institution/ Location	Position	Phone number	Signature
01	29/07/2013	JOSEPH LINDO	VETERINARY INVESTIGATION CENTRE (VIC)	L.F.O	0754646746	<i>[Signature]</i>
02	-	Idris A. MENTA	RUFISI BASIN W/O	POWD	0754025930	<i>[Signature]</i>
03	-	JOSEPH SAMILA	RUFISI BASIN W/O	Hydrology Tech.	0755063576	<i>[Signature]</i>
04	02/10/2013	MARGARETH MUKAM	MLFD	PLD (SS)	0784-309856	<i>[Signature]</i>
05	-	Dr. Nuzul M. Malamba	MLFD	PVO	0156 84 62 65	<i>[Signature]</i>
06	-	Sera Hassan Luwongo	-	PVO-Inputs Control	0753 621960	<i>[Signature]</i>
07	17/11/2014	Bahati Xabab Tubayo	TFDA	Senior Food Inspector	0754686231	<i>[Signature]</i>
08	17/11/2014	George Msolo	TFDA	Data Entry	07773002	<i>[Signature]</i>
09	17/11/2014	JAHN @ SANGA	EMU-MAFC	Agric. Officer	065691510	<i>[Signature]</i>
10	17/11/2014	S. G Mbaga	EMU-MAFC	Agric Officer	075104333	<i>[Signature]</i>
11	20/01/2014	Dr. Muzul M. Malamba	VU - MLFD	PVO	0756846265	<i>[Signature]</i>
12	20/01/2014	Caroline. Lijma	Ministry of Industry & Trade	Industrial Engineer	012-058529	<i>[Signature]</i>
13	21/01/2014	Acone Mutansikwa	D SHA	Industrial Hygiene Inspector	0740592490	<i>[Signature]</i>

Appendix 13: Iringa Region and Iringa DC Officials Consulted

SILVERLANDS TANZANIA LIMITED						
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA						
STAKEHOLDERS CONSULTATION FORM - IRINGA MUNICIPAL COUNCIL AND IRINGA DISTRICT COUNCIL						
S/N	Date	Name	Institution/ Location	Position	Phone number	Signature
1	22/07/2013	PATRICK GOLWICE	IRINGA DISTRICT Council	DEP	0757681010	<i>[Signature]</i>
2	22/07/2013	DONALD MSHANI	-	DLEDO	0762462176	<i>[Signature]</i>
3	23/07/2013	FARASI GOLWICE	-	SEDO	0759391642	<i>[Signature]</i>
4	23/07/2013	LUCY N. NYALI	-	DALDO	0754807756	<i>[Signature]</i>
5	23/07/2013	MURAGANZA PAUL	-	EMS-INPUTS	0754985205	<i>[Signature]</i>
6	23.07.2013	ABEL A. MGINWA	-	DALDO	0715402734	<i>[Signature]</i>
7	23/07/2013	CHARLOTTE KASANE	-	AG CHAC	0987298829	<i>[Signature]</i>
8	24/07/13	Eng. LUCAS NIMADAMA	-	DLEDO	0767471480 iringamajira@gmail.com	<i>[Signature]</i>
9	25/07/2013	ALOYCE MOWA	IHEMU VILLAGE	VEO	0712745708	<i>[Signature]</i>
10	-	EZEKIEL MESHUM	-	MWENKATI	0755196160	<i>[Signature]</i>
11	-	YOSHUA LULANDALA	-	Mjumbie	085946510	<i>[Signature]</i>
12	-	CONSOLATA NGODA	-	"	0751232706	<i>[Signature]</i>
13	25-7-2013	MORRIS WILUJI	MIRITI TANKUSU	MIRITI	0754451089	<i>[Signature]</i>
14	25-7-2013	ATIMU KALINGA	KANINGOMBE	MIRITI	0758074949	<i>[Signature]</i>
15	25-7-2013	ABERILUS MWANENWA	KANINGOMBE	VEO	0764440252	<i>[Signature]</i>
16	25/7/2013	LUCY CH. MSIGANIA	TATIANGODI	VEO	0735109490	<i>[Signature]</i>
17	25/07/2013	KIZITO RASPISSA	MAKOTA	VEO	0757396980	<i>[Signature]</i>
18	-	MARIO KIKENYI	MAKOTA	MIRITI	0762656548	<i>[Signature]</i>
19	-	FELISIA M. MALWA	MIPANGO (IRAP)	MWAKAFORDI	0755308487	<i>[Signature]</i>
20	-	MERAD K. MSHULI	WE O-MSEKE	MSEKE	0755053181	<i>[Signature]</i>
21	27/07/2013	PAULUS M. MSONGI	RLO (RS-IRINGA)	AFSA MIFUGO	0754 810199	<i>[Signature]</i>
22	-	MAJID S. M	Ag. DEMO/DNRO	Ag. DEMO/DNRO	0763770720	<i>[Signature]</i>

Appendix 14: Local Communities Consulted

SILVERLANDS TANZANIA LIMITED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA

STAKEHOLDERS CONSULTATION FORM - COMMUNITY CONSULTATIVE MEETING ATTENDANCE LIST

Name of village/ ward: MAKOTA Name of district: IRINGA RURAL DISTRICT
 Name of region: IRINGA Date: 26/07/2013

S/N	Name	Occupation	Phone number	Signature
01	KIZITO RASPISE	VEDO MAKOTA	0757396985	[Signature]
2.	MARO KILXENYI	M/KITI KIJU	0762656843	[Signature]
3	KASIANI KIHAGA	M/KITI TAWA	Box 546	[Signature]
4	CHAIKO KILYI	M/KITI KIONGOSI	Box 546	[Signature]
5	Fidens Mtebe	K/ Shule	Box 546	[Signature]
6.	JOSEPH MUNGOTO	BW/ MIFUNGO	0754083513	[Signature]
7	DESILEYANS	MJUMBE SE-KIJI	Box 546	[Signature]
8	RODREY	MJUMBE	P.O. Box 546	[Signature]
9	JULIAS NYANGI	MJUMBE	0752046133	[Signature]
10	DESILEYANS	M/KITI		[Signature]
11	BERNARDI Mgalama	MJUMBE		[Signature]
12	ADAMAI MLANDAL	MJUMBE		[Signature]
13	Ahadi Ampozi	M/KITI KIONGOSI	0766-288844	[Signature]
14	EGRA KUEGA	MJUMBE		[Signature]
15	TOLANDA CHAI	MJUMBE S/KIJI		[Signature]
16	MAULA MBALA	MJUMBE S/KIJI		[Signature]
17	MINDASA	Mjumbwe, Kisi.		[Signature]
18	BENJAMIN SEMBA	M/KITI KIONGOSI		[Signature]
19	OSCAR Mungoto	M/KITI KIONGOSI		[Signature]
20	PIYUSI MUYEKE	MJUMBE		[Signature]
21	EPIFANYO KABAGO	MJUMBE MAKOTA	0764961355	[Signature]

SILVERLANDS TANZANIA LIMITED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA

STAKEHOLDERS CONSULTATION FORM - COMMUNITY CONSULTATIVE MEETING ATTENDANCE LIST

Name of village/ ward... KANINDOMBE Name of district... IRINGA RURAL DISTRICT
 Name of region... IRINGA Date... 26/07/2013

S/N	Name	Occupation	Phone number	Signature
1	PACAL MUYEKWA	Mus/Kiti	0756054669	Muyekwa
2	ABELIUS MACHWA	VEO	0764440252	Machwa
3	BENJAMIN MCHAMBA	mjumba	0766596105	Mchamba
4	MOTAKUS MCHAMBA	MUZ/ MUKU	0755685245	Mchamba
5	E. KIPANZI	MU/KITI KISONGATI		E. Kipanzi
6	B. KUSIPI	MUKULIMA		B. Kusiipi
7	JOHAKIHA WISIKI	mjumba/ki/kiisi	0752670057	J. wisiko
8	ONEKOKHORO	"	0756514726	O. Kihoro
9	MARIAM MBE	MUUGUZI	0763087630	Mbe
10	KARISTU MHAHA	MUTHU DAMU		Karistu
11	DONATUS MCHAMBA	MKI MUYEKWA		D. Mchamba
12	VITARIUS MCHAMBA	MFAHA MASHARA	0768179936	V. Mchamba
13	CAVILIKA MACHWA	MKULIMA		C. Machwa
14	PELAGIUS MACHWA	MUZ	0764962709	P. Machwa
15	SILAKUS MUYEKWA	MKISONGATI	0769656306	S. Machwa
16	PATRICK MACHWA	VEO - SABASI	0753102587	P. Machwa
17	RUKIA MACHWA	MKULIMA		R. Machwa
18	MARCO MACHWA	MKUHIMA	0762944627	M. Machwa
19	SALESIA SAMBALA	MKULIMA		S. Sambala
20	ELIZA LUNUNGO	MKULIMA	0762969680	E. Lunungo
21	SABINA KIBUGA	MKULIMA		S. Kibuga

SILVERLANDS TANZANIA LIMITED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA

STAKEHOLDERS CONSULTATION FORM - COMMUNITY CONSULTATIVE MEETING ATTENDANCE LIST

Name of village/ward KANIMOMBE Name of district IRINGA RURAL DISTRICT
 Name of region IRINGA Date 25/07/2013

S/N	Name	Occupation	Phone number	Signature
1	SIXTUS KIKOJI	MKULIMA		[Signature]
2	RAMONDI	MKULIMA		[Signature]
3	CHARLES KIMBE	MKULIMA	098708940	[Signature]
4	ANGELISTA TINDA	MKULIMA	0762471666	[Signature]
5	AUGUSTIA KISULU	"	-	[Signature]
6	PIH KASSLA	"	-	[Signature]
7	YOSHIA KIYAMBE	"	-	[Signature]
8	ERRESTI MHELA	"	-	[Signature]
9	BANISA MBOFI	"	-	[Signature]
10	SERADINYAKUNGA	"	-	J. NYAKUNGA
11	SALOME B. MWENDA	"	-	S. MWENDA
12	ORUDA XIMBE	MKULIMA	-	O. twere
13	JULIANA TINDA	MKULIMA	-	J. tinda
14	FANNES DALU	MKULIMA	-	F. dalu
15	ASIA MSHWA	MKULIMA	-	A. mshwa
16	HELENA NYAKU	MKULIMA	-	H. NYAKU
17	KALISENA KIMBE	"	-	[Signature]
18	BANBELINA HELAMBA	"	-	[Signature]
19	NERITA KIYAMBE	"	-	[Signature]
20	MARENZA MBOFI	"	-	[Signature]
21	JESTINA MSHWA	"	-	J. M.

SILVERLANDS TANZANIA LIMITED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA

STAKEHOLDERS CONSULTATION FORM - COMMUNITY CONSULTATIVE MEETING ATTENDANCE LIST

Name of village/ ward KANINGOMBE Name of district IRINGA RURAL DISTRICT
 Name of region IRINGA Date 26/07/2013

S/N	Name	Occupation	Phone number	Signature
	JOYCE KANGALAU	MKULIMA	0758934415	J. Kangalau
	HASHIMU MSOPH	MKULIMA	1975	H. MSOPH
	Richard msoka	Mkulima		R. MSOKA
	BLAUD KUNYALI	Mkulima		B. Kunyal
	Edwardi Kalinga	Kalinga		E. Kalinga
	Delfina Kasela	Kasela		D. Kasela
	ANDRES KALINGA	Mkulima		A. Kalinga
	GASPAR	Mkulima		G. MPOVA
	Delfina	KIVENGA		D. KVENGA
	ANGATA	KUNZA		M. KUNZA
	ZAKAYO	Mkulima	0755552294	Z. ZAKAYO
	REJESIA	SAMBALA		R. SAMBALA
	MATRIDA	MKINI		M. MKINI
	ADELINA	KILYEMZI		A. KILYEMZI
	HELENA	MATIFUMA	0757052459	H. MATIFUMA
	VINCENTI TINDA	MKULIMA		V. TINDA
	VEREVA MPAKWA	MKULIMA		
	GATHERWE KALINGA	MKULIMA		G. Kalinga
	FARASA MSOKLE	MKULIMA		F. MSOKLE
	KACEMBA MBIKA	MKULIMA		
	JENNIFER NYEMBE	MKULIMA		J. NYEMBE

SILVERLANDS TANZANIA LIMITED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA

STAKEHOLDERS CONSULTATION FORM - COMMUNITY CONSULTATIVE MEETING ATTENDANCE LIST

Name of village/ward TANANBOZI Name of district IRINGA RURAL DISTRICT
 Name of region IRINGA Date 26/07/2013

S/N	Name	Occupation	Phone number	Signature
01	NORBERTI KUKUJI	MKULI	0754451007	[Signature]
02	LUCI MSIGWA	CEO	0758101990	[Signature]
03	JOICE KAGOMBO	WAKALA MPESA	0766056476	Kagombo.
04	Mozaketi Kagaji	Mkulima	0717772858	HP Kingani
05	MUSIER KIPANGWA	MKULIMA	0754362807	[Signature]
06	CHRISTINA SAKWA	MKULIMA		Sakwa
07	REHEMA MUKELA	MKULIMA	0753868600	R. Malakala
08	DAINESISAMILA	MKULI	0753863640	D. Samila
09	GABRIEL M.	MKULIMA	0755366702	MPAKO GA.
10	PAULO	KULIMA	0768065678	P. MBILINYI.
11	FILIBETI	Kulima	0753471620	[Signature]
12	Haji Mwanjaji	Kulima	0765146951	[Signature]
13	ISSA MPAKUSI	Mkulima	0753624376 0752719303	[Signature]
14	ANDREW WAKALA	MULIOMBOZI	0752713303	[Signature]
15	CLEVER CHAPWA	Mkulima		C. Chapwa
16	FILIMON KIWANDA	"		Fumon
17	MWADAWA KAGOMBO	BALOZI	0757248104	Kagombo
18	EMMILIANA WAKALA			[Signature]
19	DORA MSUMBE	Msumbe	0762882834	Dora
20	ISAYA NGADE	Msumbe	0766-485599	[Signature]
21	ABDELINA MGOVA	MKULIMA		A. MGOVA

KIKAO CHA VIONGOZI NGAZI ZA VIJITI
NA KATA. 25/7/2013

MATHUDHURI O

SN	JINA KAMILI	WADHIFA	KUTOXA	SADINA
1	MERAD K. Mfuluki	VEO	MSEKE	Mfuluki
2	FELISIA M. MALIVA	MWANAFUNZI	MIPANGO	Mfuluki
3	HOBBERI KIKOJI	MKII	TANANGORI	Mfuluki
4	ATILIO KALINBA	MWANAFUNZI	KANUNGIOMOR	Mfuluki
5	ADELINUS C. MBELEWA	VEO	KANINRIOMOR	Mfuluki
6	LUCY CH. MSIGNIA	VEO	TANANGORI	Msignia
7	ANDREW WIENGA	MKII	TANANGORI	Mwenya
8	MARIO KILJENYI	MKII	MAKOTIA	Mkenya
9	KIZITO RASPTISO	VEO	MAKOTIA	Mkenya

AFISA MTENDAJI WA KATA
MSEKE
IRINGA

Ofisi ya Kijiji IHEMI
S.L.P. 58-IFUNDA
IRINGA.

25/07/2013.

KIKAO CHA UANZISHAJI WA MRADI WA KUKU,
MAYAI NA USINDIKAJI WA CHAKULA CHA KUKU
CHA KAMPUNI YA SILVERLAND TANZANIA LIMITED.
KATIKA SHAMBA LA MAKOTA, KILICHOFA NYIKA
KIJIZI CHA IHEMI TAREHE 25/07/2013.

MAHUDHURIO

1. EZEKIEL MLYUKA	M/KITI	Aduja
2. ALOYCE MUDA	VED-IHEMI	C. ngoda
3. CONSOLATA NGODA	MJUMBE	Yobu Lu
4. YOBU LULANDALA	MJUMBE	

AGENDA.

1. KUFUNGA KIKAO
2. UTANGULIZI
3. MENGINEYO
- 4.

1. AG. NA 01/07/2013. KUFUNGA KIKAO: M/Kiti wa Kijiji alifunga kikao mnamo saa 2:30 AS. kwa kumkaribisha mtalamu wa mazingira na kumtambua lisha kwa wajumbe.

2. AG. No 02/07/2013. UTANGULIZI: Mkiti wa Kijiji wa alimkabisha mtaalamu wa mazingira aweze kutoa utangulizi juu ya shughuli aliyokuya nayo na aheleze kwa ufupi kuwa feye amekuja kujaditiiana juu ya faida na hasara kwa kutokana na mradi wa ufugaji kuku, mayai na usindikaji wa chakula cha kuku.

Wajumbe walimuelewa na wakaomba kuwa mwekezaji awe tayari kusaaidia kijiji kinasokunwa na uhitaji juu ya miradi ya kijiji.

Pia wajumbe walipendekeza kuwa ajira zisizo za kitaalamu zaidi wapewe kipaambeke wananchi wa Ilemi kwani miradi ndipo ulipo.

Wajumbe pia walimweleza mtao mada juu ya mgogoro wa ardhi uliokuwa limejitokeza wa Ek. 29 ambapo wataalamu toka wilayani walikuja kupima na kuona kuwa Ekeni hizi ni za mwekezaji.

Baada ya majibu hayo baadhi ya wananchi hawakuri dhika na wanataka zimejeshwe kijijini. Pia kupitia kikao cha H/shauri ya Kijiji cha tar. 09/07/2013 kiliamua kuwa wananchi wazididhike na majibu ya wataalamu waende kwa Mkuu wa Wilaya.

HITIMISHO.

Kijiji kupitia kikao hiki kimeridhia mradi huu ulanze kwani utakuwa na tija kwa Kijiji hata Taifa.

3. AGENDA No 03/07/2013 KUFUNGA KIKAO: Mkiti wa Kijiji alifunga kikao Sat 4:10 PM. Sahihi ya Mkiti.

PISA MTENDA
IHEMI
DINBA

Sahihi ya VEO
Mwendu.

Appendix 15: Individuals and Farmer Groups Consulted

SILVERLANDS TANZANIA LIMITED						
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA						
STAKEHOLDERS CONSULTATION FORM - INDIVIDUAL AND FARMER GROUPS (POULTRY KEEPERS, MAIZE AND SOYA GROWERS)						
S/N	Date	Name	Institution/ Location	Position	Phone number	Signature
01	25/07/2013	ROZI FRANCIS	TANANHOZI	TUMUKUWE SECRETARY	0755930138	R.F.M. JAW
02	"	OLIVER GALUS	"	" CHAIRPERSON	0768325935	D.G. MBEWEE
03	"	ZUBEDA BONIFAS	"	" ACCOUNTANT	-	
04	"	NORBERTI KIROJI	"	ALFUGATI	0754451009	
05	"	ALOTGE ANWA	ITHEMI	MUMBAJI (KUKU)	0755625594	
06	26/07/2013	ESTHER LULANDA	ITHEMI	MUMBAJI (KUKU)		
07	"	SALUM MSHWARI	ITHEMI	BUNDY CATTLE (KUKU)	0764240500	Selwa
08	"		MAKOTA			
		Fidelis Mtebe	M/KIT. (MUMBAJI)	M/KIT. (MUMBAJI)	0762581704	Fidelis
09	"	DESIRE MSHWARI	ITIKARU MBEWEE	M/KIT. (MUMBAJI)		D. MSHWARI
010	"	ALDIS MPOZI	MANGULA 'B'	M/KIT. (MUMBAJI)	0766748434	Ampenzi
011	"	MESUS MUKWI	MANGULA 'A'	MUMBAJI (KUKU)		M. MUKWI
012	"	DISMA MSHWARI	MANGULA 'A'	MUMBAJI (KUKU)		D. MSHWARI
12		MALISA ..	Mangula M.	MUMBAJI (KUKU)		M. MSHWARI
13		ERICO MUBAGO	Mangula	MUMBAJI (KUKU)	0764161355	ERICO
		Desire Mshwari	"	"		D. MSHWARI

S/N	Date	Name	Institution/ Location	Position	Phone number	Signature
	26/07/2013	DOMINICUS MUKOLE	MAKOTA	MUMBAJI - KUKU	Box 506	
	"	ALOYSI MPOZI	"	"	0766248434	Ampenzi
	"	BENARD MSHWARI	"	"		
	"	AUZEBE MSHWARI	WANGI MBEWEE - FARMERS ASSOCIATION	MUMBAJI (KUKU)	0752713776	
	"	ERICU ELEMILE	"	KATI BU	0763087842	

Appendix 16: CBOs Representatives Consulted

SILVERLANDS TANZANIA LIMITED						
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA						
STAKEHOLDERS CONSULTATION FORM - COMMUNITY BASED ORGANIZATIONS (CBOs)						
S/N	Date	Name	Institution/ Location	Position	Phone number	Signature
01	23/07/13	Gilbert Mshwari	One Acre Fund	Govt Relations	0765376061	
02	24/07/13	Desire Mshwari	TAGRODE	Field Coordinator	0755397702	
03	"	BARTHOLOMEO KINZUBA	TCCIA	Executive officer	0715462307	Through phone.
04	24/07/2013	Dr. Goodluck Paul	HALI PROTECT	Project coordinator	0786744445	
05	"	M. M. Mshwari	Programme Officer	SHILDA	0755971929	
06	"	SALVADORI KALIM	FIPS AFRICANA	DCO	0752898516	
07	27/07/2013	MALIBOMANUS DUMA	TANZANIA WATER USERS ASSOCIATION	CHAIR PERSON	0759461298	R. Duma
08	"	HAMZA MYARUSI	"	MJUMBE	0755723797	
09	"	CHELESIMU KALINGA	"	FUNDI WA JUMUIA	0766664604	

Appendix 17: Current STL's Workers Consulted

SILVERLANDS TANZANIA LIMITED						
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY OF THE PROPOSED INTEGRATED POULTRY PRODUCTION ON MAKOTA FARM (313 HA) IN IRINGA RURAL DISTRICT, IRINGA REGION, TANZANIA						
STAKEHOLDERS CONSULTATION FORM - STL's WORKERS						
S/N	Date	Name	Institution/ Location	Position	Phone number	Signature
1	23/7/13	Mathew B Deub	STL Makota farm	Admin Manager	0754765286	
2	23/7/13	ALFRED MIONE		ELECTRICIAN	0766938530	
3	23/7/13	DANIEL LULANDE		MPLSHI	0756228872	
4	23/7/2013	FANUEL WENO		KIBARUA	0766082922	
5	23/7/2013	SOMIA KIBWA		USAFA	0766380986	
6	23/7/2013	BEIDA MUYUKA		KIBARUA	0753205702	
7	23/7/2013	SPIRO KYARU		KIBARUA	0762482946	
8	23/7/2013	PRUSCO MUGUSI		KIBARUA	0752305249	
9	25/07/2013	OTIMARY MWAUVIRA		KIBARUA	0756656419	
10	23/7/13	PALLA TOSY		KIBARUA	0765900026	
11	23/7/2013	SHABAN KINYAGA		KIBARUA	0768818823	
12	23/7/2013	EDSON NYANUSI		KIBARUA	0762017238	
13	23/7/2013	BERNARDINO KINYA		W ERABER	0753666189	
14	23/7/2013	BRUNO DEUBE		DINA/SELIMANA	0758766846	
15	23/7/2013	FRANCIS MILEMU		KIBARUA	0756286007	
16	23/7/2013	ANTHONY KIBARUA		KIBARUA	0763884477	
17	23/07/2013	FREDAS G. KERELE		S. VISOR	0755547793	
18	23/07/2013	BENITHO LUTINDI		STORE CLEANER	0767266495	