



**AFRICAN DEVELOPMENT
BANK GROUP**

PROJECT: Livestock Infrastructure Support Project

COUNTRY: ZAMBIA

STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA)

EXECUTIVE SUMMARY

Date: April 2013

Task Team	Team Leader:	Jean-Marie Meng-Lihinag, Principal Agricultural Economist, OSAN.3
	Team Members:	Yappy Silungwe, Senior Irrigation Engineer, OSAN.3 Bouchaib Boulanouar, Principal Livestock Officer, OSAN.1 Damian Ihedioha, Principal Agro-Industry Specialist, OSAN.1 Owusu Mensah Agyei, Senior Financial Management Specialist, ORPF.2/SARC Kisa Mfalila, Principal Environmental Specialist, OSAN.4 Lewis Bangwe, Senior Agriculture Officer, ZMFO Natan Jere, Senior Procurement Specialist, ZMFO Everjoyce Muzvondiwa, Gender Specialist (Consultant)
	Sector Manager:	Mrs. Josephine N. Mwangi, OSAN.3
	Resident Representative:	Mr. Freddie Kwesiga, ZMFO
	Sector Director:	Mr. Abdirahman Beileh, OSAN
	Regional Director:	Mr. Chiji Ojukwu, ORSB



MINISTRY OF AGRICULTURE AND LIVESTOCK

LIVESTOCK INFRASTRUCTURE SUPPORT

PROJECT (LISP)

**STRATEGIC ENVIRONMENTAL AND SOCIAL
ASSESSMENT (SESA)**

EXECUTIVE SUMMARY

Project Title	:	LIVESTOCK INFRASTRUCTURE SUPPORT PROJECT
Country	:	THE GOVERNMENT OF THE REPUBLIC OF ZAMBIA
Department	:	OSAN
Division	:	OSAN.3
Project Number	:	P-ZM-AAE-001

1. INTRODUCTION

1.1 The Government of the Republic of Zambia has requested the Bank to support the Livestock Infrastructure Support Project (LISP) with the objective of improving smallholder livestock production and productivity, create market linkages and increase household income. The ultimate objective is to reduce poverty and enhance food security. The Project will be implemented in nine (9) Districts in Northern and Muchinga Provinces. It comprises of three (3) components, (i) Livestock Infrastructure Development, (ii) Capacity Building, and (iii) Project Management. The main outputs include, (i) Livestock Service Centres, (ii) Milk Collection Centres, (iii) Livestock Markets, (iv) Livestock slaughter facilities, (v) 80 km of feeder roads, (vi) Veterinary laboratories, (vii) Veterinary quarantine stations, and (viii) Veterinary check points.

1.2 The LISP will be implemented over a period of five (5) years (2013-2018) and the executing agency will be the Ministry of Agriculture and Livestock (MAL). Planned activities will be coordinated by a Project Coordination Team (PCT) using the existing Government structures. LISP is expected to directly benefit 100,000 livestock keeping households including 30,000 female headed households. LISP will mobilise participating farmers into fully trained and empowered farmer groups. It will increase employment opportunities in livestock husbandry and marketing, and also in livestock and livestock products value chain. Public service capacity for the delivery of livestock related services, mainly disease prevention and control, will be enhanced. The Project will also facilitate participation of the private sector through leasing out some of the livestock infrastructure. About 800,000 people, including 400,000 women, will indirectly benefit from increase in supply of quality livestock products.

1.3 The environmental and social impacts and benefits of the Project have been analyzed through a detailed Strategic Environmental and Social Assessment (SESA) in line with the requirements of the Zambia environmental regulations, and the Bank's Environmental and Social Assessment Procedures (ESAP). This report summarizes the findings of the SESA, the legal and policy frameworks under which the assessments were undertaken, a description of the project environment, an analysis of project alternatives, an evaluation of potential impacts, and information related to Environmental and Social Management Plan (ESMP).

2. PROJECT DESCRIPTION AND JUSTIFICATION

2.1 The Livestock Infrastructure Support Project aims to improve small-holder livestock production and productivity, market linkages and household income by activities clustered under three (3) components, (A) *Livestock Infrastructure Development* with 2 sub-components, rural community infrastructure support and public infrastructure support, (B) *Capacity Building*, and (C) *Project Management*. The *Livestock Infrastructure Development Component* will rehabilitate or construct (i) 190 livestock service centres, (ii) 3 milk collection centres, (iii) 2 livestock markets, (iv) 8 livestock slaughter facilities, (v) 80 km of feeder roads, (vi) 2 Regional and 7 District veterinary laboratories, (vii) 2 veterinary quarantine stations, and (viii) 5 veterinary check points. The *Capacity Building Component* will focus on stakeholder consultations through consultative meetings, seminars and workshops, community/farmer mobilisation and organisation, promotion of women participation, field demonstrations, staff and farmer training, short-term consultancy and procurement of vehicles and equipment. Community engagement on disease control and other sanitary measures, and development of livestock infrastructure will be undertaken from the project inception, by the Department of Cooperatives (MAL), so as to achieve ownership and compliance and also to guarantee long term sustainability. The livestock farmers will manage the community infrastructure while the Government will manage the public infrastructure. Livestock farmers will be trained in various aspects of animal

husbandry. Extension services will be revamped in order to empower producers to achieve improved animal productivity, quality and health. The *Project Management Component* will support the MAL's the National Coordination Unit (NCU) which currently oversees implementation of the Ministry's development projects including fiscal management. The Project will be implemented in nine (9) districts located in Northern and Muchinga Provinces.

2.2 The LISP will be implemented in the Northern and Muchinga Provinces covering a total of twenty-one (21) Districts (Figure 1).

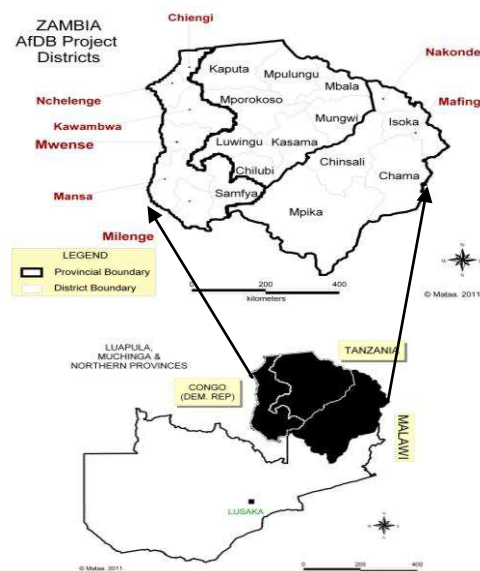


Figure 1 The Provinces earmarked for the implementation of the LISP.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1. The National Conservation Strategy (NCS) was adopted as a policy document by the Government of the Republic of Zambia in 1985 which led to the establishment of environmental legislation and institutional set up in the country. The Environmental Impact Assessment (EIA) process in Zambia is governed by the provisions of the Environmental Protection and Pollution Control Act (EPPCA) No. 12 of 1990, Statutory Instrument No. 28 of 1997—the Environmental Impact Assessment Regulations. Under EPPCA, it is mandatory that all development plans, policies and projects undergo a process of environmental impact assessment and the administrative clearance by the Zambia Environmental Management Agency (ZEMA) in conformity with the provision of the Act. ZEMA is a statutory body created under an EPPCA in 1992 with the mandate of environmental protection, pollution control, and monitoring implementation of mitigation measures highlighted in environmental and social management plans. LISP is covered by a Strategic Environmental and Social Assessment (SESA) which was prepared by the Ministry of Agriculture and Livestock in accordance with the Zambia environmental regulations and the AfDB's Environmental and Social Assessment Procedures (ESAP).

3.2 The important policies for Livestock projects include the Poverty Reduction Strategy (PRS); Vision 2030; National Agricultural Policy (NAP), 2004-2015; and the Fifth National Development Plan (FNDP), 2006 - 2010. Agriculture and food security are major pillars in these policies and the LISP is set to address the same issue. Zambia is a signatory and party to more than twenty one international, conventions, treaties and protocols. Of the many treaties, the following are among the most important: i) The convention of biological diversity, ii) The convention on wetlands of significant importance, iii) The convention concerning the protection of world and natural heritage, and iv) African convention on conservation of nature and natural resources.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1 Zambia is endowed with diverse natural resources, which include some of the most fertile soils, forest and water resources which accommodate diverse species of flora, fauna and fish resources. The following is a review of some of the key country's natural resources.

Topography

4.2 On a regional scale the major topographic features in the study area are plateaus and valleys. The plateaus stand at altitudes of 1000 m to 1500 m above sea level (asl) with occasional high ground (1500 to 2000 m) in the northeast of the country consisting of mountains in Nyika and Mbala areas. The plateau is also covered by large expanses of floodplains in the north (Bangweulu Swamps and Chambeshi swamps).

Geology

4.3 The complex geology and multiplicity of techno-thermal events in Luapula, Northern and Machinga Provinces reflects Zambia's somewhat unique position effectively sandwiched between the Kasai, Zimbabwe - Kaapvall and Tanzania cratons. Differential movements between these stable blocks, together with their buttressing effects, have played an important role in the geological evolution of the country. The geology of the country is dominated by crystalline rocks, although a number of sedimentary sequences also occur. Five main units were noted; i) Ancient (Precambrian) crystalline basement supergroup ii), The Muva Super-group (Precambrian), iii) The Katanga System (Upper Precambrian to Lower Palaeozoic), iv) The Karoo System (Upper Carboniferous to Jurassic), and v) Alluvial Deposits: (Tertiary to recent)

Hydrogeology

4.4 The hydrogeology of Zambia is influenced by the geology of the country as outlined above and follows the five main geological formations. Zambia groundwater potential is estimated at 57.5 km³/year and are a good potential source for the Livestock project, however limited groundwater development has undermined this potential.

Soils

4.5 Based on the FAO/UNESCO classification, the northern plateau soils in Northern Province are orthic ferrasols that are strongly leached brownish clayey to loamy soils derived from acidic rocks with a pH of 4.0 – 4.5.

Climate

4.6 The climate is characterized by alternating wet (rainy) and dry seasons. The rainy season lasts from November to March or April. Annual rainfall averages 1010 mm (range 750–1400 mm) and increases progressively from south to north. The coefficient of variation (CV) of annual precipitation currently ranges from 10 – 20% in Copperbelt and Northern Provinces raising to 30% as one moves south. Average daily temperatures in the LISP districts in Zambia are around 18–20°C during the cool dry season (May–August) and 35°C during the hot dry season (September–November), with an average of 30°C during the rainy season (UN, 1989).

Hydrology

4.7 In Zambia most of the surface water is within the major rivers of the Zambezi, Kafue, Luangwa, Luapula and Chambeshi, and lakes of Tanganyika, Bangweulu, Mweru, Mweru-wa-Ntipa, Kariba and Itezhi-tezhi. Of interest in the study area are rivers Luangwa, Luapula and Chambeshi, and lakes of Tanganyika, Bangweulu, Mweru, Mweru-wa-Ntipa, which contribute significantly to the surface water potential of Zambia. Natural wetlands in the form of swamps and floodplains hold considerable amounts of runoff water but also lose a lot of water through evaporation especially in the dry season. The water resource potential for the project provinces are Northern (including Machinga) (29%), and Luapula (11%). Thus the project area has high water resource potential.

Water Quality

4.8 Very few chemical data are available for both surface and groundwater, on which to base an assessment of the quality of available resources. Limited available data suggest that Zambian

groundwater has generally very low concentrations of dissolved constituents. Surface water quality has been limited to specific studies and in the project area, only data for the Tanganyika water quality project conducted on the 7th of September 2011 was available.

Flora and Fauna

4.9 On a national scale the species diversity in Zambia are estimated to be at 7,774 of which microorganisms constitute 7%, flora 49% and fauna 44% (Chidumayo and Aongola, 1998). Fish biodiversity is highest in Lake Tanganyika which contains 62% of the 409 total fish fauna in the country.

5. PROJECT ALTERNATIVES

5.1 The main areas where alternatives for decreasing the potential for negative environmental impacts are in the livestock activity size, siting and operation. The project will cover a lot of different types of livestock infrastructure ranging from dip tanks, crush pens, slaughter facilities, Farmer training centres and check points. Three implementation options were analysed, i.e. i) targeting small scale farmers as in current project design, ii) targeting large scale farmers and iii) not implementing the project at all. The following is an illustration of the analysis:

Table 1 Analysis of alternatives

	FACTOR	FIRST OPTION Small scale Livestock infrastructure	SECOND OPTION Large scale commercial activities	THIRD OPTION No Action
1.	Ease of setting up	Relatively easy to set up – mainly rehabilitation.	More involving – mainly completely new structures	none
2.	Impact on Environment	Has less effects on the clearance of vegetation due to size.	More extensive affects due to extensive civil works.	none
3.	Economic implications	Has high potential of improving the livelihoods of smallholder farmers	Has highest potential of adding to the economy of the country.	A loss to the whole economy.
4.	Social acceptability	Socially acceptable since costs to be shared are minimal and it benefits many poor.	It will benefit a few individuals and will be held with suspicion by the rest.	none
5.	Displacement of people	Less chances of either displacing people or taking up their land.	High chances of displacing people, denying them access to resources.	none
6.	Cost Implications	Cheaper to construct (UA 17.65 million) and minimal operation and maintenance cost.	More expensive to construct (UA 101.13 million), high cost of equip. and maintenance.	No costs involved.

5.2 From the analysis, the Small-scale Livestock development approach is the better scheme to raise livestock in the study area, especially for the small holder farmers since it is easy to set-up, cheap to establish, cheap to run and maintain. It can easily be run by the farmers even after the project is closed. The “No action option” should not be considered as no one will benefit and the smallholder farmers will continue to be poor and may even become worse.

6. POTENTIAL IMPACTS AND MITIGATION/ENHANCEMENT MEASURES

6.1 Negative impacts

6.1.1 The infrastructure investments supported by the Project (Livestock Service Centres, Livestock Market Centres, Milk Collection Centres, Slaughter Houses and rural feeder roads) will generate localized and short-term negative environmental impacts which will largely occur during the construction/rehabilitation phase of the project. The negative impacts will include: (a) *increase in soil erosion* related to construction and rehabilitation activities particularly in degraded lands with loose soils, (b) *Increased turbidity in water sources* from effluent or runoff containing high content of suspended solids from construction sites. In addition, accidental spillage of fuel, lubricants and other chemicals used in the construction process and wastewater from workers’ camp would likely be a source of water contamination, (c) *Clearance of vegetation covers* during the construction phase. Limited vegetation clearance may occur at the construction sites, and at borrow pits. Removal of vegetation cover would increase erosion potentials and dusts generation into the air. The level of impacts depends on: land area to be cleared and density of existing vegetation cover, which associated

with the amount of waste to be generated and physical characteristics of the soil, (d) *Increased localized noise levels and vibration due to earthmoving equipment and machinery*, construction plants and construction activities such as piling, excavation or installation of equipment, loading of construction materials, concrete pouring, drilling. Increased localized noise levels usually occur in short term. The scope of impacts would depend on (i) number, frequency and working durations of noise sources, and (ii) time of the day (night time), (e) *Reduced localized air quality due to dust from construction sites* and surrounding areas, include the areas along materials transportation route affect localized air quality. Increased dust level along the road used for transportation of as granular construction materials drop, dust from temporary loading of granular construction materials such as sand or stockpile from excavation works, dusts from construction waste dumping sites. The impacts usually last in a relative short time, are of low magnitude but can causes nuisances to local people, and disturb local daily life. The scope of impacts depends on, (i) the number and frequency of vehicles in use, (ii) the quantity of granular materials to be temporarily loaded at a time, (iii) the size of the granular materials, and (iv) weather conditions, and dust emissions, (f) *During the operational phase* the likely impacts would include *solid waste and effluent* from the slaughter houses, milk collection centers, livestock Service Centers and the markets, bio-medical waste from veterinary activities and general health and safety of workers, and Greenhouse Gas (GHG) emissions from increased number of livestock in the project area.

6.2 Positive Impacts

6.2.1 The Project is likely to generate positive social and economic impacts that could lead to reduced poverty levels, improved food security through increased livestock and dairy production, creation of jobs for the local population and youth especially during the construction phase of the Project, diversified agricultural resource base and improved household income. The project will also generate positive environmental impacts which will include: (i) reduced overgrazing and land/soil degradation from adoption of sustainable livestock production technologies, (ii) reduced water pollution from adoption of proper effluent and solid waste management systems, and (iii) reduced emissions from methane through the use of bio-digesters for reuse of manure generated from livestock. The potential to installing bio-digesters to capture gas that can be used for energy will reduce the potential of greenhouse gas emissions and reduce the impact of livestock manure on the soil and water bodies.

6.3 Mitigation Measures

6.3.1 In order to mitigate the potential negative impacts the MAL will implement the following mitigation measures: (a) re-vegetating cleared land, (b) restoration of borrow-pits, use of gabions and appropriate drainage systems to control erosion, (c) installation of systems for solid waste and effluent management. Effluent from slaughter houses, milk collection centres, and livestock service centres which tend to have high BOD and COD, will be collected in closed on-site drainage systems and discharged to on-site simple receiving ponds to ensure that the surface and ground water are protected from potential contaminants. The slaughter houses will have isolated drainage systems in which the treated wastewater will be discharged to receiving ponds. Environmental officers will monitor the quality of effluents discharged to ensure they meet the Zambia wastewater discharge standards, and (d) installation of bio-digesters to capture gas that can be used for energy will reduce the potential of greenhouse gas emissions and reduce the impact of livestock manure on the soil and water bodies.

6.4 Environmental and Social Management Plan

6.4.1 The proposed Environmental and Social Management Plan (ESMP) (Table 6) for the proposed rehabilitation/construction of Livestock infrastructure for the Project, provides guidelines for the management of potential environmental and social aspects at all possible project sites. In each case the EMP identifies parties responsible for monitoring actions, and any training or capacity building needs. The following table is an outline of the significant environmental and social issues.

Table 6 Environmental and Social Management Plan (ESMP)

	IMPACT	MITIGATION/ENHANCEMENT	RESPONSIBILITY	CAPACITY BUILDING
	ENVIRONMENTAL IMPACTS			
(i)	Clearing of Vegetation			
	<ul style="list-style-type: none"> Limited Vegetation clearing may occur during rehabilitation/construction of Livestock infrastructure. Over abstraction of resources may occur for construction purposes. Sensitive habitats may be affected as materials are sought, e.g. Grass from wetlands. Overgrazing from the increased stocks of animals 	<ul style="list-style-type: none"> Sensitive habitats should be avoided. Clearing should be limited to working areas only. Revegetation and reforestation must be prioritized. Over abstraction of construction materials should be avoided. Habitat restoration must be done where effects have been caused. Sustainable range management must be practiced 	MAL, PCU and Contractor	Environmental awareness training
(ii)	Soil and land degradation			
	<ul style="list-style-type: none"> Point source contamination from diesel, lubricants etc around working areas. Increased soil erosion due to vegetation clearing, soil trampling and compaction. Increased rapid runoff due to vegetation clearing and soil compaction diminishing infiltration capacity. Deterioration of soil characteristics due to increased erosion. 	<ul style="list-style-type: none"> Appropriate containment measures for all operational areas and proper disposal of used lubricants. Soil erosion control measures (e.g. re-vegetation, reseeding of grasses, land preparation, terracing, use of gabions, etc) Be specific e.g. xyz hectares of certain type of species to be planted.. Restoration of borrow pits, sand and quarry stone abstraction sites and brick molding sites. 	MAL, PCU and Contractor	Environmental awareness training
(III)	Wildlife Disturbances			
	<ul style="list-style-type: none"> Noise and vibrations cause wild animals to migrate, contamination of the rivers may cause fish kills and destruction of other aquatic life, Migration routes for wildlife may be affected by establishment of new sites. 	<ul style="list-style-type: none"> conduct feasibility studies, (for what?) Minimize vibrations and strong noise (how?), enforcement of parks and wildlife law, avoid contamination of soil and water (how). 	PCU, District Agric. Officer NGOs	Requirement of the Parks and Wildlife Act.
(v)	Exposure to Agro-chemicals			
	<ul style="list-style-type: none"> Use of pesticides may increase better yields, control pests and diseases. This can then expose the farmers to these toxic chemicals 	<ul style="list-style-type: none"> Encourage limit and proper use and handling of chemicals. (how?) Conduct awareness training & workshops on safe handling of chemicals. 	MAL, PCU, Scheme Management Committee	
(vii)	Effluent and Solid Waste			
	<ul style="list-style-type: none"> Most agricultural, livestock, agro-industries, packaging and marketing operations produce solid waste. <ul style="list-style-type: none"> Steam and hot water boilers produce ash Fresh food and processed food markets, waste from canning Livestock production units produce manure, dairy waste, waste from slaughter houses 	<ul style="list-style-type: none"> Seek guidance of local environmental officers to identify acceptable disposal sites. Waste from agricultural activities can be further processed into other uses, e.g. organic manure. Be specific e.g. provision of waste disposal bins at xyz Reuse and recycling must be preferred over disposal of the waste. 	PCU; Local Environmental Officer.	Likely hazardous and non-hazardous construction waste

	IMPACT	MITIGATION/ENHANCEMENT	RESPONSIBILITY	CAPACITY BUILDING
(viii)	Ambient air quality			
	<ul style="list-style-type: none"> Air Quality will be impacted by emission waste from piggery, chicken manure, cattle manure, processing waste etc. Air Quality will be impacted by emissions from vehicles, earthmoving equipment and released particulate matters. Demolition to modify the built environment will lead to considerable levels of cement dust which can affect workers and the public. 	<ul style="list-style-type: none"> Animal waste must be handled properly to avoid smell.(what does this mean? E.g. provide pro Contractors should use dust screens or nets in windows, doorways and ventilators of rooms where demolition or other dusty construction activities are occurring. Dust suppression measures must be instituted at all sites. 	PCU and Contractor	None
(ix)	Ambient Water Quality			
	<ul style="list-style-type: none"> Water quality will be impacted by wastewater discharges from construction activities including onsite sewage and rainwater run-off. Soil and water pollution resulting from the accumulation of solid and liquid waste. Soil and water pollution from chemicals, pesticides & vaccines meant for production. Water quality may be impacted by waste streams from piggery or processing plants. 	<ul style="list-style-type: none"> Contractors to erect proper sanitary facilities. Pollution from lubricants and other wastes to be avoided. Controlled disposal of wastes and effluent by use of appropriate disposal facilities, use of appropriate drainage structures, use of cleaner technologies, proper storage of materials, awareness campaigns (how?) Waste must be recycled and reused to avoid dumping in waterways (how?) 	PCU and Contractor, District Agric. Officer	None
5.3	SOCIAL AND HEALTH IMPACTS			
(iii)	Loss of assets or access to assets			
	Interference with the normal access to assets like grazing or hunting grounds especially in the creation of large rangelands.	<ul style="list-style-type: none"> Where ever possible avoid impacting on people. Create alternative access routes. Preparation and implementation of a Resettlement Policy Framework which will include compensation plans. 	MAL, PCU, Min. of Local Govt.	
(iv)	Loss of natural and cultural heritage			
	Natural features, antics and relics destroyed in the project area e.g. during excavations.	<ul style="list-style-type: none"> Conduct feasibility studies, fencing, introduce proper antiquity education programmes. Come up with a Physical cultural resources management plan Establish procedure for chance finds. 	MAL, PCU, District Agric. Officer, NGOs National Heritage Conservation Commission.	Requirement of the National Heritage and Conservation Act.
(vii)	Occupational Health Safety risks			
	<ul style="list-style-type: none"> The movement of trucks to and from the site, the operation of various equipment and machinery and the actual Livestock agricultural activities will expose the workers to work-related accidents and injuries. Pollutants such as dust and noise could also have negative implications for the health of workers. 	<ul style="list-style-type: none"> All safety precautions must be enforced. Provide PPE to all workers. Institute dust and noise suppression measures. 	MAL, PCU and Contractor	Application of various types of PPE and their proper use.
(x)	Social misdemeanour by construction workers			
	Impacts associated with the contractor's camp include:	<ul style="list-style-type: none"> As a contractual obligation, contractors should be required 	MAL, PCU and Contractor	None

	IMPACT	MITIGATION/ENHANCEMENT	RESPONSIBILITY	CAPACITY BUILDING
	<ul style="list-style-type: none"> Disposal of liquid and solid wastes. Theft, alcoholism and sexually transmitted diseases (especially HIV/AIDS). 	<p>to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc) to implement it during project execution.</p> <ul style="list-style-type: none"> Contractor to curb thefts and misbehaviour through a code of conduct. Contractor to manage any of its waste properly. 		
(xii)	Employment Opportunities			
	Expanded Agricultural facilities and programmes will result in the creation of more long-term job opportunities.	Offer appropriate training for staff to manage the improved facilities.	MAL, PCU and Association Managers	Staff training in operation of improved facilities
(xiii)	Improvement in livelihoods and local economies			
	<ul style="list-style-type: none"> Improved agricultural outputs will enhance the livelihoods of the communities, raising their incomes and hence further improve productivity and lifestyles. (how?) Social conflicts may arise due to increased wealth differentials among the population. 	<ul style="list-style-type: none"> Leadership should promote viable economic activities (be specific on the type of activities). Awareness on replication by others should be a continuous process 	MAL and local leadership	Stake holder training in entrepreneurship

7. Climate Change

7.1 The Project area is experiencing increased frequency and intensity of droughts, resulting in reduced livestock production, increased animal diseases, and land/soil degradation. The project activities will promote climate change adaptation and foster livelihoods diversification which will ultimately enhance the climate change adaptive capacity of the pastoralists and the livestock production systems. The Project will support (i) sustainable management of rangeland and pasture, and (ii) adoption of biogas digesters that will promote the reuse of livestock manure. In building the adaptive capacity of the livestock farmers and the livestock production systems, a complementary GEF project support breeds that are resilient to climate change and develop models for community management of endemic livestock and habitat (pasture and grazing management techniques), strengthen adaptive capacity of communities through training and develop skills and demonstration sites for feed conservation during the dry seasons, restoration of degraded pasture and increased vegetation cover with different drought tolerant perennials.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

8.1 The lead implementing Agent (MAL) with the help of relevant authorities must monitor the environmental effects of project implementation and the success of mitigation measures. This should be done by an independent team of experts to include MAL, ZEMA, Dept of Works, Project PCU, District Councils, DWD, Min. of Health etc. Areas to be monitored include:

- *Soils:* The farmers must ensure that no gullies or rills develop in the project area.
- *Vegetation:* To make sure the local residents do not collect firewood excessively.
- *Loss of natural and cultural heritage:*
To protect some natural features, antics and relics in the project area, including chance finds.
- *Wildlife:* Monitoring must be done to protect wild animals from being snared.
- *Marginal lands/fragile ecosystems:*
Marginal lands and fragile ecosystems must be protected against overuse.

- *Chemical pollution:* In order to monitor the amount of pollutants in the soil or water, samples must be taken regularly from them for pollution testing.
- *Water resources:* Both quality and quantity of water resources in the rivers must be properly managed for sustainable livestock management to persist.
- *Ambient air quality:* All air polluting activities need to be checked regularly to minimise their effect on air quality.
- *Socio-Cultural Issues:* Regular health checks of the work force/farmers are a way to monitor disease patterns.
- *Noise and Vibrations:* Monitor noise levels from the machinery to ensure that it conforms to the limits recommended for noise levels.

8.2 It is recommended that all environmental parameters mentioned above be monitored during the implementation and operation stages and any impacts should be mitigated as soon as possible. The farmers and the PCU should monitor on a daily basis. In the course of monitoring, if and when any significant impacts are detected, the monitoring team should meet and address the issue. All team members should keep records of such meetings.

Table 8: Environmental and Social Management and Monitoring Plan

ISSUE	METHOD OF MONITORING	AREAS OF CONCERN	POSITIVE INDICATOR	FREQUENCY	RESPONSIBLE AUTHORITIES
Soils	The Developer should make a daily inspection of earth works, and ensure that slopes are suitably graded. Once earthworks are complete the PCU should monitor the restoration measures implemented by the Contractor, such as re-vegetation	<ul style="list-style-type: none"> • Soil erosion • Conservation activities • Rangelands management 	an absence of rills, gullies or other erosion features occurs	Regularly and ongoing as project is implemented	Department of Forestry
Vegetation	The farmers must clear area to be used and site works only.	<ul style="list-style-type: none"> • Clearing of the project site and disturbance of animals. • flora and fauna 	No unnecessary vegetation cleared	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> • Department of Forestry • Zambia Environmental Management Agency (ZEMA).
Animals (Game corridors)	The farmers and the Environment Department staff should carry out regular inspections of the area and check that usual animal access routes are maintained.	<ul style="list-style-type: none"> • Game corridors 	Usual animal access routes are maintained /not disrupted. Reduced, human, animal conflict.	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> • Zambia Environmental Management Agency (ZEMA). • Zambia Wildlife Authority
Birds	Interference with nesting sites	<ul style="list-style-type: none"> • Nesting sites • Migratory routes 	Reproductive patterns of birds undisturbed	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> • Zambia Environmental Management Agency (ZEMA). • Zambia Wildlife Authority
Small mammals habitat loss	Ensure that no unnecessary habitat loss occurs.	<ul style="list-style-type: none"> • Animal habitats 	No Mammals are displaced from their habitats.	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> • Zambia Environmental Management Agency (ZEMA). • Zambia Wildlife Authority

ISSUE	METHOD OF MONITORING	AREAS OF CONCERN	POSITIVE INDICATOR	FREQUENCY	RESPONSIBLE AUTHORITIES
Poaching	Monitoring is the responsibility of the Zambia Wildlife Authority and the Police Departments.	<ul style="list-style-type: none"> Poaching 	Number of poaching incidences reduced or eliminated.	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> Zambia Environmental Management Agency (ZEMA). Zambia Wildlife Authority Police department
Crime	The PCU should Liaise with police department if crime/theft becomes a problem.	<ul style="list-style-type: none"> Criminal activities in the area 	Crime theft kept to a minimum. Incidences of stock theft and house breaking minimized.	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> Zambia Wildlife Authority Police department District Administrator
Noise	Noise monitoring should be carried out on an ad-hoc basis by the Environmental Monitor or the PCU to establish noise levels in the work areas.	<ul style="list-style-type: none"> Noise Levels 	Noise levels at the nearest sensitive receiver would be kept to a minimum.	Regularly and ongoing as project is implemented.	<ul style="list-style-type: none"> Ministry Of Health Zambia Environmental Management Agency (ZEMA).
Health	The PCU must ensure that education and awareness campaigns are implemented. The Ministry of Health, local authority should carry out awareness campaigns on animal related diseases, water-borne diseases and carry out vector control methods such as regular spraying of potential breeding sites (ponds)	<ul style="list-style-type: none"> Public health Ensure that stagnant water is sprayed to destroy mosquito larvae. Waste management at Sub-project sites. Disease outbreak due to concentration of people at the Sub-project sites. Disease outbreak due to dust and water pollution. Control and management of various animal diseases 	<p>Reduction in number of cases of such diseases as Avian flu, foot and mouth, AIDS/STD related diseases recorded at hospital and medical clinic</p> <p>Reduction in number of diseases such as malaria and cholera</p>	Regularly and ongoing as project is implemented	<ul style="list-style-type: none"> Health ministry Project PCU MAL
Archaeology	Provision should be made to allow archaeologists to be present on site during the excavation periods if they so wish. The PCU should inspect all excavations, and where archaeological remains are found work must stop until the PCU has given the all clear to proceed. The PCU should contact the Museums Authorities in the event of a significant archaeological find.	<ul style="list-style-type: none"> Archaeological Findings 	Archaeological remains not excavated, or disturbed.	<ul style="list-style-type: none"> Regularly and ongoing as project is implemented Room for chance finds 	<ul style="list-style-type: none"> National Heritage Conservation Commission
Energy	The Developer must inspect the provisions made by the Contractor to supply energy to the workforce, and ensure that fuel wood is not being collected. The Environmental Department should enforce legislation which prohibits cutting down of trees.	<ul style="list-style-type: none"> Types of energy sources used in the project 	Energy supplied by electric generator or other suitable source. Deforestation and resultant erosion controlled and reduced	Regularly	<ul style="list-style-type: none"> Department of Forestry. Zambia Environmental Management Agency (ZEMA).

ISSUE	METHOD OF MONITORING	AREAS OF CONCERN	POSITIVE INDICATOR	FREQUENCY	RESPONSIBLE AUTHORITIES
	The Environmental Department, PCU and local leadership (cultural and political) should sensitize the workers against cutting down of trees.				
Air Pollution	Observations should be made on the level of dust generated during the Agricultural Activity implementation by the Environmental Monitor or PCU. Dampening should be carried out if levels are unacceptable.	<ul style="list-style-type: none"> Levels of dust emissions 	Deposition of dust on surfaces should decrease with increased dampening	Regularly	<ul style="list-style-type: none"> Health ministry Project PCU MAL
Water resources	<ul style="list-style-type: none"> Water resources should be managed well The Ministry of Health should test borehole water quality in the area to ascertain the suitability for human consumption. 	<ul style="list-style-type: none"> Watercourses and impoundments. Surface water quality Ground Water Quality Recommended distances from watercourses. Possible dam construction sites. 	<ul style="list-style-type: none"> Water made available for environmental concerns. Pollution of water resources monitored/detected early and remedial measures taken on time 	Tests for water pollution to be done regularly	<ul style="list-style-type: none"> Health ministry Project PCU MAL Department of Water Development, (DWD) Zambia Environmental Management Agency (ZEMA).
Landscape	The PCU should make visual inspection of earth works to ensure that excessive excavation is not being carried out. Temporary screening may be appropriate in some cases.	<ul style="list-style-type: none"> Visual intrusions Aesthetics 	Landscape alteration reduced to a minimum	Monthly	<ul style="list-style-type: none"> National Heritage Conservation Commission Zambia Environmental Management Agency (ZEMA).
Complaints	The PCU should inspect the record of complaints made by local residents, to be kept by the farmers, and should check that action is taken quickly and that the number of complaints do not rise significantly.	<ul style="list-style-type: none"> Complaints 	Number of complaints decreases.	Regularly	<ul style="list-style-type: none"> Project PCU MAL Zambia Environmental Management Agency (ZEMA).
Local governance	MLGC to ensure the following <ul style="list-style-type: none"> compliance to designs Employment opportunities and recruitment are transparent. Allocation of land is overboard Cultural values are respected. 	<ul style="list-style-type: none"> Land management Land allocations Socio cultural issues Local governance Social Aspects, Land rights 	<ul style="list-style-type: none"> Disputes over land reduced Cooperation of local leadership is secured Locals employed in the projects 	Regularly	<ul style="list-style-type: none"> Ministry of Local Government District Councils Project PCU MAL
Agricultural Activities	<ul style="list-style-type: none"> Ensure that Agricultural Activities follow designs and recommendations given for proper agricultural practices. Ensure overall management of the Programme. Appropriate land use downstream is done and no pollution of crops from contaminated water from 	<ul style="list-style-type: none"> Siting of works, plan 	<p>Land degradation curbed</p> <p>Program running smoothly</p>	Regularly	<ul style="list-style-type: none"> PCU MAL

ISSUE	METHOD OF MONITORING	AREAS OF CONCERN	POSITIVE INDICATOR	FREQUENCY	RESPONSIBLE AUTHORITIES
	spillages occur.				

Table 9: Total Cost for the ESMP (in U.S. dollars) and disbursement schedule

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Training and Workshops	14,400	14,400	14,400			43,200
2. Site-specific ESMPs	30,000	30,000				60,000
3. Mitigation measures	42,000	42,000	42,000	42,000	42,000	210,000
4. Monitoring	10,000	23,793.75	23,793.75	23,793.75	23,793.75	105,175
5. Annual Audit		10,000	10,000	10,000		30,000
6. End-of Project Audit					10,000	10,000
Total						458,375

9. PUBLIC CONSULTATIONS AND PUBLIC DISCLOSURE

9.1 All stakeholders were consulted. The public consultation methods used included i) formal interviews with the individual stakeholders, ii) focussed group discussions with farmers iii) direct observation and discussion in the field. The major elements of the consultation program will be timed to coincide with significant planning and decision-making activities in the project cycle. In terms of Zambia's EA process, public consultation should be undertaken during (i) the preparation of the EA terms of reference; (ii) the carrying out of an EA; (iii) government review of an EA report; and (iv) the preparation of environmental terms and conditions of approval. To meet the consultation and disclosure requirements of the Bank, the Zambia Government will issue a disclosure letter to inform the Bank of (i) the Government's approval of the SIA; (ii) the actual disclosure of these documents to all relevant stakeholders and potentially affected persons in Zambia, and (iii) the Government's authorization to the Bank to disclose these documents. The steps towards disclosure of the Environmental documents have to be completed prior to appraisal of the Project.

9.2 *Results of the Stakeholders' Survey:* Generally everybody, i.e. Government departments, NGOs, Locals in the project area were very supportive of the project and in the stakeholders meetings about 95% of the respondents had no objection to the Livestock infrastructure rehabilitation/construction project being implemented. Some association members had reservations as they held the whole consultation process with suspicion since many such promises have never been fulfilled. The stakeholders also hoped that the project would provide them with an opportunity for livelihood improvement. As a result they expect to be employed during the project lifecycle. An analysis of the Environmental Aspects Raised showed that 30% of the respondents were concerned with deforestation and land degradation that may be caused by the project. The social aspects analysis showed that 35% of the respondents expressed anxiety and anticipation as they were eager to have the project commence but are not sure when it will happen. In terms of the economic aspects the majority of respondents (40%) were very eager to know about employment creation and business opportunities that will be afforded by the project. They expressed that once this is in place, then improved incomes and livelihoods would then be automatic.

10. CONCLUSION

10.1 The proposed project has potential to significantly improve small holder production, productivity and income in the target Provinces, Luapula, Northern and Muchinga. An improvement in the income of the Smallholder farmers will translate to improved food security as they now will have cash to secure other needs. Besides, project development and operation will provide considerable economic opportunity for material/equipment suppliers, construction contractors and agriculture professionals. The environmental impacts that the developmental activities are likely to cause include disturbance of soil from digging of pits and foundations, and road construction activities, tree cutting

and general vegetation clearing, emission of dust and generation of noise. **These envisaged environmental impacts will be experienced during the construction phase and will be localized, minimal, short term and can be mitigated.**

10.2 During the operation phase of the expanded Livestock services, the potential environmental impacts will include Solid and liquid waste, Chemical and Biological wastes, which will be generated from the normal operations of the facilities and can be managed by incorporating the requisite waste and effluent handling units to the facilities. This impact would be exacerbated by inadequately trained livestock staff, However the ESMP presented in the study **will be used to mitigate the impacts during and after the rehabilitation of the Livestock infrastructure. The Final *benefits of this project to the nation will, by far outweigh potential negative effects.***

10.3 It is therefore recommended that the mitigation measures developed for the identified potential environmental and social impacts be strictly implemented for the project to maximise the positive effects and minimise the negative impacts. **The project overall will not have any apparent significant environmental impacts if the recommended mitigations are carried out.**

11. REFERENCES

Aquastat, 1995. Website: <http://www.fao.org/waicent/faoinfo/agricult/agl/aglw/aquastat/zambia.htm>.

GRZ, 2011, Environmental Management Act (EMA), No. 12 of 2011, Government Printers, Lusaka.

Key R. M. 1992. An introduction to the crystalline basement of Africa, Geological Society, London. Special publication, 1992, v69, p 29 -57, Geological Society of London.

UN, 1989. Ground water in eastern, central and southern Africa. National Resources/Water, Series No. 19. United Nations, pp 301-308.

AQUASTAT , 2007, FAO's Information System on Water and Agriculture.

FAO-ADB 2010, Zambia Investment Report On Water And Energy; Water For Agriculture And Energy Development National Investment Brief *Zambia Report On Investments In Water For Agricultural And Energy In Zambia Lusaka July, 2010.*