GOLDENLAY LIMITED
P.O. Box 90444
Baluba Road, Luanshya

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE DEVELOPMENT OF KAFUBU FARM

NDOLA DISTRICT

OCTOBER, 2013

PREPARED BY GREENLINE ENVIRONMENTAL SOLUTIONS LTD, LUSAKA

+260 966/977-656697

EXECUTIVE SUMMARY

Overview

The government of the Republic of Zambia has in the past made pronouncements to make the agricultural sector the main economic earner following instabilities in copper prices and it being a non-renewable resource.

GoldenLay limited is Zambian registered company incorporated on 6th July, 2007. In the last five years, GoldenLay Limited has undergone increased expansion coupled with high demand in its table eggs across the country. Due to this expansion, GoldenLay Limited identified Kafubu Dairy Farm as a potential site for the implementation of its expansion program given the fact that the farm had not been fully utilised to its potential in the last ten years. The Kafubu Farm project was also necessitated by the increased demand for Soya beans, Maize and Wheat which form a significant portion of raw material requirements for feed production for its poultry operations in Baluba.

Project ownership status

The project will be undertaken by GoldenLay limited. The following are the shareholders and directors of the company;

NAME	POSITION	NATIONALITY
Mohammed Bushary	Managing Director	Sri-Lankan
Fletcher Michael Broad	Operations Director	Australian
Peter Macsporran	Non- Executive Director	Zimbabwean
Paul Wythe	Non- Executive Director	British

NAME	NATIONALITY	% SHAREHOLDING
GoldenLay Agri Limited	N/A	99
Fletcher Michael Broad	Australian	1

Project location

Kafubu farm *(formerly Kafubu dairy farm)* is located in Ndola District of the Copperbelt Province. It is approximately 16Km from the Ndola CBD and about 2.5Km off the Ndola – Kitwe highway. The farm No. 9424 is 2,964 Ha in extent and is on title No. 22607 with a 99 year lease from the Zambian government. Kafubu farm lies between 1285m and 1241m MASL. The coordinates of the farm are given below.

SIDES Metres		ANGLES OF DIRECTION	COORDINATES SYSTEM (local-metres)		
				Y	X
		CONSTANT		**-0.00**	**+1440000.00**
A- B	3591.33	305° 48‘ 41"	A	50098.68	615.36
B - C	6135.53	26° 12‘ 19"	B	47186.29	2716.71
C- D	1743.96	86°05‘ 37"	C	49895.67	8221.61
D –E	1561.16	105° 53‘ 51"	D	51635.58	8340.42
E- F	3870.70	179° 25‘ 05"	E	53137.04	7912.79
F- A	4606.07	221° 55‘ 35"	F	53176.35	4042.29

Project objectives

The overall company objective of the Kafubu farm project is to increase the production of table eggs to meet the current market demand. This will be achieved through the expansion of the farming operations at Kafubu farm.

Other objectives of the project will be:

- To be self-sufficient in the production of in-house raw materials for the manufacture of feed. This will entail the cultivation of Soya Beans, Maize and Wheat on the farm.
- Revamp animal husbandry operations through introduction of dairy and beef cattle on the farm to restore the original operations undertaken by the previous owners and supplement the beef and dairy market on the Copperbelt.
- To increase the production for GoldenLay through new poultry operations at Kafubu farm.

The main objective of the Environmental Impact Assessment is to examine impacts on ecological units and processes of the project area including impacts on physical, biological, socio-economic and cultural environment and to provide mitigation measures for identified impacts.

Project activities

GoldenLay Limited intends to revamp and develop the farm into a commercial farm to grow Soya beans, Maize and Wheat. The farm will utilise summer (rain fed) and winter (irrigated) cropping systems. At full production capacity the farm estimates to harvest 675 Mt Soya beans, 450 Mt Wheat and 1200 Mt Maize respectively. The harvested crops will be used as raw materials for the production of stock feed at GoldenLay for the table eggs production. Winter cropping will be carried out by way of irrigation using 6 centre pivots on the farm that will draw water from the ten (10) boreholes to be drilled.

The Kafubu farm project will also involve the construction of 6 poultry houses for layers and 2 for rearing houses. It will also incorporate cattle ranching for beef and dairy animals. The project

will also involve the operation of a complete state of the art milking parlour with capacity to handle 2500L of raw milk per day from its proposed 50 dairy cows.
Revamping and rehabilitation of the existing infrastructure will be undertaken by the developer as part of the project implementation plan.

The proposed project will include installation of centre pivots, sinking of boreholes and extension and distribution of the existing ZESCO power line and construction of fuel storage tank, chemical/fertilizer store, staff housing compound and other support infrastructure.
The farm is an existing operation with 1800Ha of used arable land that will be utilized for cropping operations. Farm operations will involve land clearing, cultivation, planting, pest control systems and harvesting. Other operations will involve rearing of birds (pullets), feeding and medication to point of lay chicken, production of eggs and rearing of beef cattle for commercial purposes including dairy animals. The eggs produced will be distributed throughout the region for sale.

Project investment
The total project investment budgeted for the revamping, development, implementation and operation of the Kafubu farm project by GoldenLay limited is Nine Million United States Dollars **(US $ 9,000,000).** The project proponent has a valid investment licence obtained from the Zambia Investment Centre.

Project alternatives
GoldenLay has considered alternative methods and options for the implementation of the project. These relate to site, processing methods, waste management options and farming method alternatives. The best options likely to prevent environmental impacts have been chosen for the implementation of the project.

Project environmental baseline
Kafubu Farm is located in Ndola District which lies on an altitude of 1269m ASL. Generally, Ndola experiences a sub-tropical climate that is strongly seasonal, with three distinct seasons. Climatic conditions are characteristic of the second agro-ecological region of Zambia with a pronounced dry and rainy season. The rainy season start in November ending in April with a total annual rain fall ranging from 1000 to 1300 mm.

Air quality
Kafubu farm and the surrounding areas have no baseline data on the air quality and dust. The area has no industrial activity and is a designated farming area anthropogenically disturbed by years of farming activities. The project site is surrounded by establishments of agricultural nature such as Battledore and Simpito's farms. On analysis of the area, it was concluded that the air quality is generally good owing to the lack of industrial activity likely to cause air pollution.

Geology

The geology of Ndola area is characterized by numerous rock-types. It is mainly underlain by deep weathered sedimentary rocks of the Katanga Super group, which can be further subdivided into the Kundelungu Series, but also by the Mwashia Group and the Roan and Mine Groups. The characteristic features include the calcareous mudstone and siltstone along the Zambia-Congo DR border from the southeast to the northwest in Misundu area.

Hydrology

The nearest source of surface water is the Kafubu River. The Kafubu River has a considerable catchment extending to the DRC border and measures approximately 539km2. The average mean annual runoff (MAR) has been estimated at 85mm or 45,815ML/yr. The Kafubu Dam, located 3.5km from the farms Eastern boundary, is a major source of water for the City of Ndola. Kafubu farm has two (02) existing boreholes located at the old main office building and the existing farm house. The boreholes are currently only used for domestic water supply to the house and the office building by the care takers of the farm. According to the samples obtained and analyzed by the UNZA environmental Laboratory, the water contains high levels of feacal and total coliforms making it unfit for human usage. The water is natural ground water and is untreated thus contains high levels of ferrous (Fe^{2+}).

Soils

The project site is located in an area of intermediate to mafic metamorphosed sedimentary geology. These metamorphic rocks give rise to red, well drained soils throughout the landscape, except in low lying wetland locations. In upland and mid-slope positions, the soils are generally deep, red and orange sandy loams and sandy clay loams in the surface, overlying similar red coarse grained sandy clays and clays. Soil depth generally exceeds 100 cm. In some locations however, the soil profile has a layer of laterite gravels in the subsoil even though the soil depth still exceeds 100cm. Five soil types were identified and mapped in this reconnaissance soil survey. These are moderately deep to deep yellowish red to orange Sandy Loams, Deep red Sandy Clay Loams and Sandy Clays over Red Clays, Deep pale yellow loamy sands over yellow sandy, Wetland Margin Sandy Soils and Wetland Areas.

Noise and vibration

Kafubu farm is located off the industrial set up of the Ndola Central business district. The area is a designated farming area with a number of farms surrounding the project site. The farm area has a number of settlements surrounding the site. Noise levels measured in the project area are within acceptable audible levels consistent with an agricultural setting without heavy machinery and industrial activity. The social activity level of the area is concentrated near Kasongo Primary School and housing units within the farm area.

Fauna

The high level of anthropogenic agricultural activities in the area has led to negative alterations of wildlife habitats. The habitat signs that were observed and interviews with the local people, show a variety of snakes, insects, hares and bush rats exist. Others include lizards, chameleons and moles. Interviews and interactions the local people reveal that they have observed the presence of Black Rat *(Rattus rattus),* Cane Rat *(Thryonomys swinderianus)*, rabbits and bush Squirrel *(Paraxereus cepapi)*. Insect life includes a variety of species of dragonfly, wasp, bees, crickets, grasshoppers, termites, mosquitoes, ants, red ants, lady bugs, Caterpillars, butterflies and moths.

Flora

The project area is dominantly Munga woodland dominated by *Acacia sieberana* and co-dominated by *Toona cilyata* (exotic).Vegetation observed during the study showed some retrogression process occurring in the area around the land used for cultivating crops although it also showed some of the vegetation re-emerging as shrubs due to non- farming activity and allowing the land to be idle.

Archeological and cultural environment

The nearest cultural sites are the Mofu mahogany tree located 3.5Km from Kafubu Farm in Chichele national forest along the Ndola-Kitwe highway. The Chichele Mofu tree is approximately 500 meters from the Dag Hammarskjold Memorial Site turn off. The tree is over 200 years old and was declared a National Monument on 21st March 1976 to commemorate Zambia's participation in the World Forestry.

Project impacts

The impacts associated with the Kafubu project are both positive and negative. Positive impacts relate to employment creation, increased revenue for local people and authorities, supplier involvement through the out-grower schemes and enhanced use of land which has been idle for close to ten years. Negative impacts will result from environmental pollution of ground water, air, soil and generation of noise during construction and operation phases of the project. The operation will result into the generation of solid waste and hazardous waste in form of used oil, used batteries, filters and used chemical containers. Other negative socio-economic impacts include increase in crime, HIV/AIDS and pressure on existing infrastructure.

To mitigate against ground and surface water pollution, the company will minimize the indiscriminate use of chemicals. No aerial spraying of chemicals will be undertaken to avoid air pollution. During construction, dust suppression will be undertaken to avoid dust exposure to local residents and workers. Solid waste will be collected and dumped to a ZEMA licensed dumpsite and hazardous waste will be disposed of in line with hazardous waste regulations.

Effective environmental and social management plans will be implemented through fund allocation of US$ 50,330 for the lifecycle of the project.

Production capacity

The following yields are estimated at full production capacity in the cropping operations.

Cultivated Area(Ha)	Planted crop	Estimated Yield (Mt/Ha)	Total Yield (Mt)
Summer crop (rain fed)			
1260	Soya Beans	3.0	3780
540	Maize	7.0	3780
Winter crop (irrigated)			
1080	Soya Beans	3.5	3780
720	Wheat	7.5	5400

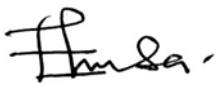
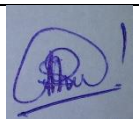
The animal husbandry and poultry operations will house 200 beef and 50 dairy animals. The project will also have 240,000 point of lay birds.

Schedule and life time of the project

The Kafubu Farm project and all its components will be undertaken through the life of the land tenure (99year period). The implementation schedule is approximated to take 3 to 5 years from the time of approval and subsequent preparation and construction activities. The project success will also depend on the construction of various support structures on the farm for ease of project implementation and operations.

EIA study team

The table below highlights an inter-disciplinary team of well qualified and seasoned consultants that conducted the EIA study and preparation of an Environmental Impact Statement (EIS). The table below presents names of the EIA team and their responsibilities. The curriculum Vitae of the EIA team members are attached in the appendices.

Name	Qualification	Responsibility	Signature
Agabu Shane		Team leader, EIA advisor, Public Consultation, Impact Characterisation, Impact Identification and analysis, Drawing Up the EMP	
Lewis Tumbama	BSW(Social Work)/Development Economics/Studies (UNZA)	Socio-economic expert: Social economic baseline study, Social Impacts characterisation, identification, evaluation and analysis, draw up the Social management Plan and or RAP if need be.	
Seveliano Phiri	BEng. Agricultural Engineering (UNZA) and a Master of Science in Water Resources Engineering.	Agricultural and Water Resources Expert: Project Description, Ground Water Quality and Quantity Assessment, Hydrology and drawdown	

Kabwe Dickson	Bsc. Ecology (UNZA) and a certificate in Environmental Management (London, UK).	Ecologist: Fauna and Flora baseline	
Mwansa Mubanga	Bachelor of Engineering in Environmental Engineering (CBU) and Msc. Project Mgt-UNILUS.	Public Consultations, Noise and Air Quality, Decommissioning and Closure Plan	

In the event that farm operations cease, GoldenLay Limited will implement the decommissioning and closure plan as outlined in the detailed sections of the document. GoldenLay Limited therefore will implement the project in line with the provisions of the relevant laws and the support of the Kafubu farm community and the surrounding area.

Project recommendations

In line with the EIA process, the public consultative meetings and the discussions with the local communities indicates that the socio-economic benefits of the project to the communities in the project area of influence outweigh the "no-development" options and also the negative impacts that the project may bring. The project is therefore being recommended for implementation assuming the incorporation of the recommended mitigating measures and implementation of the Impact Mitigation Plan and Environmental Monitoring Plan.

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Mohamed Bushary
Managing Director
GoldenLay Limited

NON-TECHNICAL SUMMARY

GoldenLay Limited was established and incorporated in the republic of Zambia in 2007. The company is involved in the production of table eggs at its main farm at Baluba in Ndola. The company has been involved in the agriculture sector since 2007 and also involved in the farming of crops in the Mpongwe area. The company acquired Kafubu Farm No.9424 *(formerly Kafubu Dairy farm)* from Mr. Ernest Mutambo in 2012. The farm has been in existence since 1968 but had been under-utilized in the last ten years.

In line with its expansion program, GoldenLay limited intends to develop and revamp Kafubu Farm for the growing of Soya Beans, Maize and Wheat. The company will also invest in the rearing of chickens for production of eggs (layers), rearing of beef and dairy animals. Kafubu farm is located 16Km from Ndola town, mid- way between Ndola and Luanshya. The farm is 2.5Km off the Ndola-Kitwe high way.

Kafubu farm has a total area of 2962 hectares of which 1800 will be used for the growing of the three crops. The crops will be grown both during the rainy season and the dry season. Crops grown in the dry season will be irrigated using six (6) centre pivots. The project will be implemented using four different phases; preparation, construction, operation and closure. Each phase will be undertaken in line with the provisions of relevant regulations of the country.

GoldenLay Limited intends to invest **US$ 9,000,000** for the full operation of the farm. This money will be spent over a period of two years to attain full implementation. The company has an investment licence obtained from Zambia Investment Centre for investment in Zambia.

Positive impacts related to the project include employment creation, increased revenue for local people and authorities, supplier involvement through the out-grower schemes and enhanced use of land which has been idle for close to ten years. Negative impacts will result from environmental pollution of water, air, soil and generation of noise during construction and operation phases of the project.

Other negative impacts include public safety and occupational health risks during construction and operation phases. Generation of hazardous waste *(used oil, batteries, filters, electronic waste and empty chemical containers)*, domestic solid waste and liquid effluent. Negative socio-economic impacts include increase in crime, HIV/AIDS and pressure on existing infrastructure such as schools and clinics in the area due to increased population seeking prospective employment by the developer. Effective environmental and social management plans will be implemented through fund allocation of **US$ 50,330** for the lifecycle of the project.

IMIBOMBELE YA BA GOLDENLAY PA KAFUBU FARM MUKWIPIFYA

A kampani ka ba GoldenLay Limited ka pangilwe no ku lembeshiwa ku ba buteko mu mwaka wa 2007 mu calo cesu ica Zambia . Aka kampani kaitumpa mu mulimo wa kuteka inkoko shilya shifumya ama ndanda. Ililine iifamu lya bela ku ncende ya Baluba mu Ndola. Ukulingana nama pange yaba GoldenLay Limited uku kusha imibombele yabo mukuteka inkoko na ubulimi, balishitika ifamu nalimbi ilya bela mumu sebo ukalamba uwakufuma ku Ndola ukuya ku Kitwe. Ili famu ilya le itwa Kafubu Dairy Farm akale lya kwata intanfu ukufika kuli ba 2962 Hectares. Abali abene akale ba Ernest Mutambo balesungapo in'gombe shilya shi fumya umukaka elyo nu kulima amataba. Ba GoldenLay Limited bashitile ili famu kuli ba Mutambo mu mwaka wa 2012.

Ba GoldenLay Limited balekabila uku bomfya yonse incende ya Kafubu farm ukuteka inkoko isha ma ndanda, ukuteka in'ombe isha nama elyo nesha mukaka. Kabili baka bomfya imbi incende kuci pendo ca 1800hectares ukulima soya beans, amataba elyo na wheat. Mukuobomba uyu mulimo wa kulima, bakula bomfya ifishimbi fya kwitililako amenshi mulusuba lilya ngatakuli imfula. Kabili bakulalima na mu mfula minwe mukuti ba sombole ifingi.

Munshita yakunuma mu myaka ya 10 years ili famu talyabonfeshiwe ukulin'gana no bukulu bwa mpanga.Ubunonshi bwa chalo ca Zambia bwali ubwashintilila pa mukuba ngenshila imo fye iyakuleta ubukumo muchalo panshita itali, lelomumyakaiyapitaisano.

Icalo ca Zambia nayamba ukulolekesha panshila shimbi ishingatungilila icalo ishili nga ukupitila mubulimi, mukutamba ifilengwa nalesa elyo namu malaiti nama futa yafwilisha mumibombele.

Mumitontonkanishishe yabuteko bwa Zambia, mukwampana pamo naba shimakwebo abaibombela,Ubulimi ebo baleitaabati"iciputulwa cikalaleta ulupiya ukukonka pa ciputulwa icakwimba umukuba"

Pamulandu wafyo ubulimi bulekula, ubuteko bwa calo ca Zambia bwalipanga ifilayo ukutila balekabila ukutungilila ubulimi pakutila bukapyane Umukuba pamulandu wakutila umutengo wamukuba uleyafyepanshi elyo umukuba ngawapwa teti ubwekeshiwepo.

Mumyakaiyapita Soya beans tailesangwa pamulandu wakutila utwampani utupanga amafuta yakwipikila natufula mu Zambia .Nipamulandu waici ba GoldenLay Limited balishita impanga na ibala lya Kafubu Farm mu Ndola ku citungu ca migodi pakutila baleilimina na ukusombola Soya Beans, Amataba elyo nengamo.nokubikapo ukusunga inkoko shama ndanda ne fitekwa(ing'ombe sha nama elyo no mukaka).

Ba GoldenLay Limited bali abaipangasha ukuposa ulupiya lwa **US $ 9,000,000** muli uyumulimo uwakukushaimibombele ya Kafubu Farm ku ncende ya Kafubu. Kabili aka kampani kalipeelwa icitupa mu 2007 ukufuma kuli ba Zambia Development Agency (ZDA).

Ba GoldenLay Limited balibomba iyi milimo yabulimi, iyili ngo kwiminika ifishimbi fyafwilisha ubulimi bwamulusuba. Balibombapo mubulimi munchende sha Mpongwe mu mfumu ba Kalunkumya mu calo ca Kanyenda elyo napa kampani kakalamba mu ncende yaba Baluba.
Balinokukula inganda iyikalamba umwakwikala,amayanda yababomfi,ifimbusu no mwakusambila.
Fimbi ifikulwa fikaba mwakusungila umuti wakubomfya,umwakulungisisha ifibombelo elyo necilindi umwakuya ubusali.
Ba GoldenLay Limited bakabika ifintu ifingi ifyakwafwilisha imibombele ukubikilapofye nafimashini fyakubwesha amalaiti.

Mukukonka na amapange yakulima mulusuba, ba GoldenLay Limited balinokupanga icakusungilamo amenshi icikalamba 10,000m^3 ayo ayakalabomfiwa mukutapilisha.

Ifikafwaikwa mubulimi nimbuto sha Soya,amataba,amale nengano.Fimbi muti watushishi no musaluelonamafutayamyotokanafimashini,amenshi no mufundo.

Ilyo imibombele ikashikimana,mwibala mukalasombolwa Soya,amataba,amale nengano ukilingana nefitantikwe panshi:

Uyu mulimo nga watampa ukuleta ifintu fimo ifyakubwesesha panshi elyo mukatumbuka nefisuma ifyabuyantanshi. Ifyo ifibi ifikafumano filinokuwamikishiwa ukulingana nolupapulo lwamafunde yacalo ca Zambia.Ifisuma fikafuma muliuyu mulimo fili no kuyemfya(ukuwamya) inikalile yamu Kafubu elyo na mu Ndola. Ba GoldenLay bali no posa indalama kuci pendo ca **US$ 50,330** ukumona ukuti fyonse ifibi muli uyu mulimo fya cingilishiwa kabili no kucefyanya uku onaula amenshi, umushili, umwela elyo na imikalile ya abantu muncende muntu bale bombela uyu mulimo wa ku leta ubuya ntanshi mu Ndola.

Imitantiko yakubombelamo ishi milimo ikakonka na ifikomo ifyo babikako abalolekesha pa fya bumi bwa mwela, amenshi na incende ya mu calo ca Zambia (Zambia Environmental Management Agency) elyo na bambi abashala. Iyi milimo ikaleta ubuyantanshi kubantu ba mu Kafubu ukubikapo fye na isha ncito.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASL	-	Above Sea Level
TORs	-	Terms of Reference
EPB	-	Environmental Project Brief
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EMP	-	Environmental Management Plan
SMP	-	Social Management Plan
ZEMA	-	Zambia Environmental Management Agency
EMA	-	Environmental Management Act
UNZA	-	The University of Zambia
Mt	-	Metric tonnes
IAP	-	Interested and affected parties
N/A	-	Not applicable
Ha	-	Hectares
RHC	-	Rural Health Centre
ZESCO	-	Zambia Electricity Supply Company
NEAP	-	National Environmental Action Plan
NCS	-	National Conservation Strategy
GRZ	-	Government of the Republic of Zambia
GLL	-	GoldenLay Limited
ECZ	-	Environmental Council of Zambia
ESG	-	Environmental and Social Governance
EPPCA	-	Environmental Protection and Pollution Control Act
SI	-	Statutory Instrument
ZAWA	-	Zambia World Life Authority
ZADL	-	Zambia Agriculture Development Limited
CRB	-	Community Resource Board
CBU	-	Copperbelt University
GMA	-	Game Management Area
WRMA	-	Water Resources Management Act
CBD	-	Convention on Biological Diversity
FAO	-	Food and Agricultural Organisation
HIV	-	Human Immune Virus
AIDS	-	Acquired Immune Deficiency Syndrome
FRA	-	Food Reserve Agency

Names and Signatures of participating team members:

(Greenline Environmental Solutions Limited)

We the undersigned, declare that the information contained in this report is true and correct to the best of our knowledge.

Name: AGABU SHANE Signature..

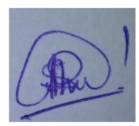
(Team leader-Environmental expert)

Name TUMBAMA LEWIS Signature  ....

(Socio-Economic Expert)

Name: MUBANGA MWANSA Signature...

(Project coordinator-Environmental expert)

Name: SEVELIANO PHIRI Signature: 

(Agriculture/water resources expert)

Name: KABWE DICKSON Signature..

(Ecologist/Air quality expert)

1.0 INTRODUCTION

The Kafubu farm project located 16Km from Ndola Central Business District and 2.5Km off the Ndola-Kitwe dual carriage way is a wholly owned subsidiary of GoldenLay Limited located on plot Number 3031 Baluba area in Luanshya. Kafubu farm formerly Kafubu Dairy Farm was acquired in 2012 from Mr. Ernest Mutamboh who obtained the farm through the privatization process of 1996.

Golden Lay Limited was established and incorporated in the Republic of Zambia as a company limited by shares in 2007. The company produces 11000 trays of eggs per day from its poultry operations at Baluba. It is the largest supplier of eggs on the Copperbelt and in Zambia. It also exports to countries like Congo DRC and Zimbabwe when possible. The company has wide experience in the cropping, poultry and in the table egg business.

Undertaking of the Kafubu Farm Project was necessitated by the increased demand for stock feed production raw materials especially maize and soya beans. This is attributed to the increase in edible oil refineries and stock feed manufactures in Zambia. Further, in line with the development and growth of Golden Lay Limited, the proponent acquired Kafubu Farm which was used as a dairy farm prior to privatisation in 1996 and up to the time of purchase. Golden Lay Limited acquired the farm for purposes of poultry, cropping and cattle rearing operations.

The proposed project will incorporate installation of 6 centre pivots, construction of staff housing, toilets and showers. Other infrastructure to be constructed will be a chemical storage area, machinery workshop and a septic tank & soak away system. Golden Lay Limited will source power from the existing Zesco power lines within the farm. Water for winter cropping operations will be stored in a 10,000m^3 capacity dam that will be abstracted from ten (10) boreholes that will be drilled on the farm.

In line with the company's sustainability policy, Kafubu will be developed with a strategic environmental management plan that will be implemented throughout the lifecycle of the farm.

1.1 Background of the project

In the last five years, GoldenLay Limited has undergone increased expansion coupled with high demand in its table eggs across the country. Due to this expansion, GoldenLay Limited identified Kafubu Dairy Farm as a potential site for the implementation of its expansion program given the fact that the farm had not been fully utilised to its potential in the last ten years. The Kafubu Farm project was also necessitated by the increased demand for Soya beans, Maize and Wheat which form a significant portion of raw material requirements for feed production for its poultry operations.

The proposed project site, Kafubu Farm formerly Kafubu Dairy Farm was established in the late 1960s by the Zambian government and was managed through the Zambia Agricultural Development Limited (ZADL). The farm was later privatised and sold to Mr. Ernest Mutamboh through competitive tendering in December 1996.

In 2012, Mr. Mutambo sold "Kafubu Dairy Farm" to GoldenLay limited. The increase in demand for raw materials for feed production at GoldenLay attributed to the increase in production of eggs and the growth of its poultry business made way for the company to purchase the farm in order to help meet the demand for their products (eggs) by increasing the raw material production.

Further, due to the increase in the number of edible oil refineries in Zambia and the region, acquisition of raw materials for feed manufacture such as Soya beans, Maize and Wheat has become extremely competitive and expensive thus GoldenLay limited decided to invest in the project to plant and harvest its own raw materials in order to sustain its business.
Kafubu farm project will further help to supplement the Zambian beef industry through the rearing and keeping of livestock (beef cattle) which are in short supply.
The above aligned projects are in line with the efforts of the Zambian government to shift the main economic earner from mining to agriculture through the contribution of private sector investments of this nature.

1.2 Summary description of the project including project rationale

The Kafubu Farm project will be undertaken as three fold project to incorporate Livestock rearing (dairy animal rearing, milking and beef cattle ranching), Poultry operations (breeding, rearing of layer birds to produce table eggs) and cropping operations.
Livestock rearing will involve rearing of 200 beef animals for sale to other commercial farmers and 50 Dairy animals. Beef animals will be first be raised in the free-range grazing area until they attain sufficient weight (at least 250Kg) and fully vaccinated. The animals on attaining sufficient weight will be relocated to the feedlot for supplementary feeding and medication in readiness for sale when they reach a commercially viable weight when sold. The dairy animals will have an estimated milk production rate of 25 litres per milking session with an average of two sessions per animal per day. This will result in a total production of 2500Litres per day. The milk will be temporarily stored in the two holding tanks to be set up at the milking parlour at temperatures of 3 to 5 ^{o}C prior to transfer and sale to the commercial market. Alternatively, the milk can be pumped direct from a milk receiving vessel to a refrigerated bulk milk tank or via a pre-cooler to an insulated milk storage tank on site.
The poultry operation at the farm will be undertaken in eight (08) layer houses. Two (02) of the houses will be used for rearing of locally procured day old chicks until they reach point of lay (pullets) at sixteen weeks. The other six (06) houses will be used as layer houses for collection of table eggs.
GoldenLay Limited will also undertake the cultivation, planting and harvesting of Soya Beans, Wheat and Maize. Cropping operations will be undertaken both using rainfall (summer cropping) and irrigation (winter cropping). Winter cropping will be undertaken using ground water to be obtained from the ten (10) boreholes that will be drilled on the farm. Irrigation water will be

stored in a 10, 000m^3 capacity reservoir and irrigation conducted using six (06) centre pivots to be erected. The cultivation system will have a window period between crops utilizing a crop rotation mechanism. The cropping operations will cover a total of 1800Ha of previously used arable land. The harvested crops will be used as raw material in the production of stock feed at GoldenLay for the table eggs poultry operations and also for the cattle.

1.3 Objectives of the project

The overall company objective of the Kafubu farm project is to increase the production of table eggs to meet the current market demand. This will be achieved through the expansion of the farming operations at the Kafubu farm.

Other objectives of the project will be:

- To be self-sufficient in the production of in-house raw materials for the manufacture of feed. This will entail the cultivation of Soya Beans, Maize and Wheat on the farm.
- Revamp animal husbandry operations through introduction of dairy and beef cattle on the farm to restore the original operations undertaken by the previous owners and supplement the beef and dairy market on the Copperbelt.

The main objective of the Environmental Impact Assessment is to examine impacts on ecological units and ecological processes of the project area including impacts on physical, biological, socio-economic and cultural environment and to provide mitigation measures for identified impacts.

1.4 Brief description of the Location

Kafubu Farm (formerly Kafubu Dairy Farm) is located in Ndola District of the Copperbelt province and approximately 16Km from the Ndola Central Business District. The farm is 2.5Km off the Ndola-Kitwe dual carriage way on the western side in the Kitwe direction. The farm No. 9424 is 2,964 Ha in extent and is on title No. 22607 with a 99 year lease from the Zambian government. Kafubu farm lies between 1285m and 1241m AMSL and consists of gentle slopes with broad interfluves which are mostly drained by small streams in a West, South Westerly direction.

The farm is bordered by Battledore Farm (Cool Bananas) on the eastern boundary and Kasongo Primary School on the western side. The northern boundary has Simpito's farm near beacons C and D while on the southern end is Miriam's farm located between beacons B and C.

Figure 1.0 Location Map of Kafubu Farm

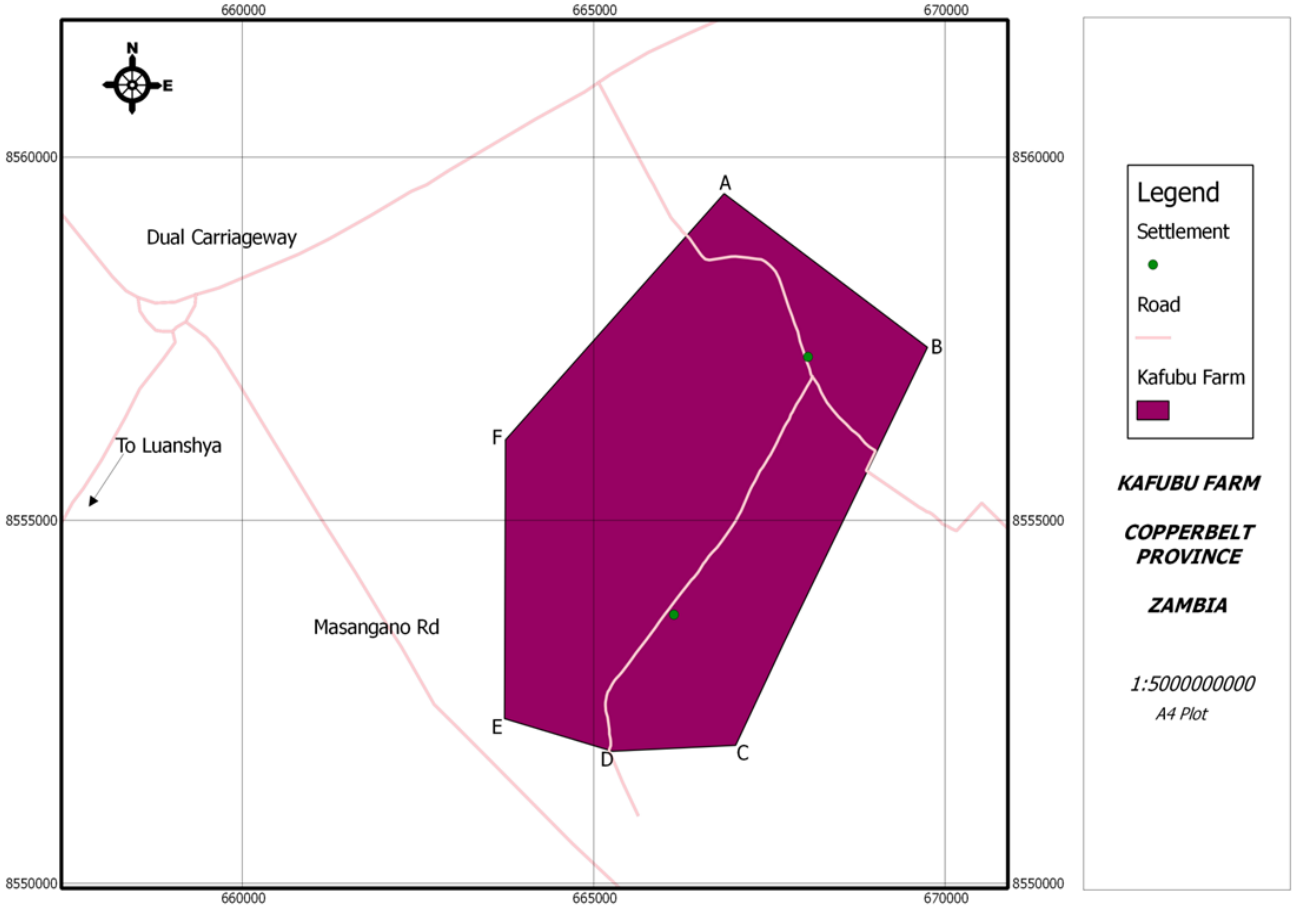


Figure 2.0: Map showing boundaries of Kafubu farm.

1.4 Particulars of Directors

NAME	POSITION	NATIONALITY
Mohammed Bushary	Managing Director	Sri-Lankan
Fletcher Michael Broad	Operations Director	Australian
Peter Macsporran	Non- Executive Director	Zimbabwean
Paul Wythe	Non- Executive Director	British

1.5 Percentage of shareholding by each shareholder

NAME	NATIONALITY	% SHAREHOLDING
GoldenLay Agri Limited	N/A	99
Fletcher Michael Broad	Australian	1

1.6 The developer's physical address and contact person.

Proponent: GoldenLay Limited

Contact Person: Mr. Mohamed Bushary

Designation: Managing Director
Telephone Number: +260 212 515 044
Mobile: +260 977 719 540
E-Mail: mohamed.bushary@goldenlay.co.zm
Postal Address: P.O. Box 90749
Physical Address: Plot No.3037, Baluba Road, Luanshya.

1.7 Track Record/Previous Experience of Enterprise Elsewhere

GoldenLay limited, established and incorporated in Zambia in 2007 has wide experience in the agricultural sector as regards cropping, livestock rearing and poultry farming. The company is the largest producer of table eggs in Zambia at 11000 eggs a day with an export market via the DRC.

The directors of GoldenLay also own other operations that are involved in the cropping and livestock rearing in Mpongwe and Baluba areas of the Copperbelt. One notable venture is the Kanyenda Farming limited in Mpongwe District.

1.8 Total Project Cost/Investment

The total project investment budgeted for the revamping, development, implementation and operation of the Kafubu farm project by GoldenLay limited is Nine Million United States Dollars

(US $ 9,000,000). The project proponent has a valid investment licence obtained from the Zambia Investment Centre in 2006. The Kafubu farm project will be implemented in accordance with the cost estimates given in the table below.

Table 1: Breakdown of proposed investment

ITEM DESCRIPTION	No./QTY	RATE/UNIT COST($)	ESTIMATED COST($)	SUPPLIER/ COMMENT
1. IRRIGATION				
A. Centre Pivot	6	75,000	450,000	Pivot 360 (PTY) ltd
B. Irrigation lines	12	7,000	84,000	Amiran ltd
C. Reservoir lining	1	25,000	25,000	Amiran ltd
D. Pumps/Fittings	6	4,200	25,200	KZN Irrigation
E. Electricity/ transformers	3	65,000	195,000	ZESCO LTD
F. Borehole Drilling	10	25,000	250,000	Gallant Drilling
G. Borehole Flashing *	2	4,000	8,000	Gallant Drilling
Subtotal A			**1,037,200**	
2. CONSTRUCTION & REHABILITATION				
A. Housing Units*	1	50,000	50,000	GoldenLay limited
B. Workshop	1	50,000	50,000	GoldenLay limited
C. Chemical Store	1	40,000	10,000	GoldenLay limited
D. Sewerage Facility*	2	8,000	8,000	GoldenLay limited
E. Fuel(diesel)	10,000L	1.6	16,000	GoldenLay limited
F. labour cost	-	-	12,000	GoldenLay limited
G. Fuel tank & pump station	1	6,000	6,000	GoldenLay limited
H. Gravel Haul roads	22Km	1000/Km	22,000	Zambia National Service
I. Cattle Feedlot	5625m^2	-	10,000	GoldenLay limited
J. Reservoir excavation	10,000m^3	-	12,500	GoldenLay limited
K. Feed store	-		6,000	GoldenLay limited
L. Boundary wire fence	22km		19,000	GoldenLay limited
M. Layer houses	6	750,000	4,500,000	Facco, Italy
N. Rearing houses	2	750,000	1,500,000	Facco, Italy
O. Dairy cow parlor	1		10,000	GoldenLay limited
Subtotal B			**6,231,500**	
3. EQUIPMENT & MACHINERY				
A. Planter	1	85,000	85,000	Kanyenda farming
C. Grader	1	25,000	5,000	hired

D. Excavator	1	50,000	50,000	JCCL
E. Boom Sprayer	1	30,000	20,000	owned
F. Tractors	2	55,000	110,000	owned
G. On site Equipment repair & service	-	1,000	10,000	
H. Egg laying equipment	6	150,000	900,000	Facco, Italy
I. Combine harvester	1	120,000	120,000	JCCL
4. OPERATING COSTS				
Poultry	8 houses		25,000	
Cropping	1800Ha		65,000	
Cattle ranching	450Ha		45,000	
5. ENV. & SOCIAL MONITORING		50,000	50,000	Throughout project lifecycle
6. CONTIGENCY			246,300	Resettlements, licenses etc.
Subtotal C			**1,485,000**	
GRAND TOTAL(US $)			***9,000,000***	

1.9 Proposed Project Implementation Date

GoldenLay Limited will implement the Kafubu Farm Project upon satisfaction of all requirements from the various regulatory authorities in December, 2013. Project implementation takes into account the issuance of decision letter by ZEMA.

1.10 Approach and methodology of the study

This EIA study was undertaken through desk review of the relevant literature and specialized study of the various components of the project i.e. water, air, soil, noise, ecology, flora, fauna, climate and geology. Other studies included socio-economic and cultural related studies.

Desk study of the project included review of available background information about the project proponent, the project operation and its nature, environmental and legislation information. Literature review concerning the project site, collection of secondary data and analysis of survey plans was also undertaken coupled with stakeholder meetings (project scoping and disclosure meeting) and interviews.

1.10.1 Data Collection methodology

Air Quality

Collection of ambient air quality measurements, the Accuro dragger pump was used to capture quantitative levels of gases and dust emissions. Historical data was also reviewed.

A field survey on the project site was conducted to determine the Potential Areas of Concerns (PACs) for Air quality and Dust sampling points.

Ground and surface water quality

For ground water quality and hydrology of the area, ground water samples were collected from the borehole used by the caretaker at the farm near the manager's house. The sample water was analyzed by UNZA environmental laboratory. Ground water flow regimes & rates and quantities will be studied by the Water Resource Expert. The farm has no surface water bodies for determination of surface water quality.

Noise measurement

The noise level meter *(toptronic T325-IEC651 type II*) was used to measure noise levels within and around the proposed project site to determine the noise levels and the noise buffer zone within Kafubu farm.

Geology

Available historical data and information on the geology of the Kafubu area was reviewed and studied and interpreted accordingly.

Soil

Soil studies were conducted by the consulting firm Soils Incorporated (pvt) limited. Prior to the field visit to site, satellite imagery of the farm was obtained and examined to gain a preliminary overview of the soils that were likely to occur in the area as well as to determine if there are any major fatal flaw limitations to arable farming or irrigation such as rugged topography or the existence of extensive areas of wetland. Soil examination was carried out in the middle of the rainy season. These soils were examined by auger borings to a depth of 120cm unless stopped by rock or impenetrable gravels. The succession of horizons in each auger was studied and used to assess the suitability of the soils for arable farming and irrigation.

Ecology

An ecological study was conducted on the site (Kafubu farm) and surrounding areas. This was done through physical inspections to determine available flora and fauna.

A floristic Survey was conducted to determine the flora type and population by making transects in the proposed site area to cover 30% of the area. This was done in order to collect:

(i) Population of trees still available given that the land was a brownfield and anthropogenically disturbed.

(ii) Density and determine the shrub cover of the vegetation in the proposed project site area.

The Fauna assessment was to determine population and availability of the animal species including rear and endangered species. These fauna species were captured by different methods for identification such as insect pit-fall traps, and Lamp traps. Flora and fauna assessment also included desk study of relevant information, habitat characterization, interviews with local people and actual findings in the proposed project site area. Vegetation structure, composition due to historical land use practices was used to determine and identify endangered, non-endangered and invasive species.

Social-Economic data

Questionnaires were administered by enumerators and led by the social consultant. Household surveys were conducted, together with meetings with key informants who included the District Commissioner, Goldenlay Management, the area Counsellor and community. A total of 134 households were interviewed.

Data collected was entered and analysed using the Statistical Package for Social Science (SPSS) version 20, STATA and Microsoft excel, 2007. The 134 questionnaires were entered into the data SPSS spread sheet before exporting to STATA for weight calculation using the STATA weight facility. Excel was to for generating graphs and sampling calculation and determination purposes.

2.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

GoldenLay limited will implement the Kafubu Farm project in accordance with the various regulations, policies and legislation of Zambia and other international conventions to ensure compliance thereof. This section briefly describes laws, regulations, treaties and or conventions that have relevance and bearing on the proposed project.

2.1 History of the Environmental Regulatory Framework in Zambia

The Government of the Republic of Zambia (GRZ) adopted the National Conservation Strategy (NCS) in 1985. This was due to the need for balancing environmental requirements, economic activities and social needs. The NCS was upgraded to the National Environmental Action Plan (NEAP) in 1992 with the same aim of fostering sustainable economic and environmental development. The NCS and NEAP are the foundation pillars of environmental laws in Zambia.

The NCS facilitated development of the Environmental Protection and Pollution Control Act (EPPCA) in 1990 which also facilitated formulation of the Environmental Council of Zambia (ECZ) in 1992. The EPPCA was repealed in 2011 into the Environmental Management Act No. 12 of April 2011, which is the current supreme environmental management law. Consequently, the name of the mother environmental regulatory body changed from Environmental Council of Zambia (ECZ) to Zambia Environmental Management Agency (ZEMA).

2.2 The Environmental Management Act, No. 12 of 2011

This Act was immediately preceded by the Environmental Protection and Pollution Control Act No. 12 of 1990. Provisions of the Environmental Management Act require that all new projects begin with an Environmental Impact Assessment (EIA) and thereafter, licensing, auditing and compliance inspections follow.

Under the Environmental Management Act No. 12 of 2011, there are no regulations yet. However, applicable regulations under the EPPCA are described below.

a) **Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, SI No. 28 of 1997**. These Regulations provides the main framework under which EIAs are conducted, submitted to ZEMA and considered for either approval or rejection.
   These regulations are relevant as a guide to GoldenLay Limited as to what is supposed to be done at every stage of the EIA process. The requirements of conducting an EIA are all stipulated under these regulations and the developer shall ensure compliance at every stage. The EIA regulations also gives a guide line as to how much review fee will be paid to ZEMA for the purpose of reviewing the EIS for the proposed project and that development shall not be undertaken by a developer without an approval letter from ZEMA.

***Relevance*:** Being an agricultural project with new developments, it falls under a project category requiring the preparation of an EIA.
Compliance there of: This EIA is being prepared in compliance with the above legal provisions.

b) **Air Pollution Control (Licensing and Emissions Standards) Regulations of 1996 (SI No. 141)**. These Regulations provide air quality standards and guidelines for mitigating air pollutants. The guidelines are for ambient air and point source emissions.
Relevance: The construction and rehabilitation and operation phases of the project will generate dust and will finally end in ambient air and cause dust fallout within and outside the proposed project site. The air pollution control regulations will help the developer to put up appropriate measures to curb this dust generation. Also the air control regulations prohibit open air burning *(section 15)*.
***Compliance there of*:** For this reason, the developer will ensure no open air burning is practiced at the farm. No open air burning will be extended to farming activities at operational phase. The biomass that will be generated after harvest will be ploughed back into the soil to enhance soil fertility.

c) **Water Pollution Control (Effluent and Waste Water) Regulations, 1993 (SI No. 72)**. These Regulations provide for control of water pollution by providing standards for managing water pollutants and effluent discharge. The standards stipulated under these Regulations are for industrial effluent. The Regulations also provide requirements for licensing all effluent discharge points and they have a provision for monitoring criteria in terms of analytical methods.

Relevance: The relevance of water pollution regulation to this project is that chemicals, fertilisers and hazardous waste might pollute both ground and surface water.
Compliance there of: The GoldenLay Limited should take cognizance of the need to prevent pollution of the environment. The proposed assessment is aimed at establishing whether or not pollution of ground and surface water will occur so as to remedy the situation.

d) **Waste Management (Licensing of Transporters of Waste and Waste Disposal Sites) Regulations, 1993 (SI No. 71)**. Under these Regulations, activities relating to waste management such as waste generation, collection, storage and disposal are regulated.
GoldenLay Limited will dispose of the waste generated on the farm using ZEMA licensed transporters at a designated dumpsite within Ndola town as it located 8Km from the farm site along the Ndola-Kitwe highway.

Relevance: The regulations are relevant in that the proposed project will generate solid waste whose transportation and disposal requires licensing.

Compliance there of: All solid waste should thus take cognizance of the need to prevent contravening the requirements of this regulation.

e) **Hazardous Waste Management Regulations, 2001 (SI No. 125)**. These Regulations make provisions for management of hazardous wastes such as used oil, used fluorescent tubes and used oil filters. The Regulations provides for management activities such as generation, storage, transportation, treatment, recycling, importation, exportation and disposal.
Relevance: The Act is relevant because the project will generate hazardous waste in form of used batteries, chemical containers, Oil-filters and used oil.
Compliance there of: GoldenLay limited will adhere to the provisions of this regulation by ensuring that all hazardous waste is disposed of accordingly.

f) **Pesticides and Toxic Substances** Statutory Instrument No. 20 of 1994 Pesticides and Toxic Substances Regulations – provides for licensing of importation, transportation, distribution and storage of pesticides and toxic substances.
Relevance: The regulation is relevant because the proposed project will use Pesticides, herbicides and fungicides in controlling pests and weeds. There will be a possibility of contaminating the soil and or ground water from the use of these chemicals.
Compliance there of: GoldenLay Limited will follow the guidelines according to this regulation in the use and application of these chemicals.

g) **Ozone Depletion Substances Regulation of 2000**
These regulations state provisions for the transpiration, use and storage of ozone depletion substances in the environment.
Relevance: The regulation is important to the project in regulating activities and/or equipment that might contribute to ozone depletion at the farm will be conducted, transported, used and stored in accordance to these regulations.

The provisions of the EMA will be adhered to by GoldenLay Limited and is currently being used for the preparation of the Environmental Impact Assessment for the Kafubu farm project.

2.3 The National Heritage Conservation commission Act

The National Heritage Conservation commission Act CAP 173 of 1989 stipulates preservation and protection of ancient cultural and natural heritage resources and objects of aesthetic, historical and archaeological value. In this Act, "Ancient Heritage is defined as being among other things, any structure, settlement previously inhabited, land mark, burial place or any other item designated by the commission which is known or believed to have been erected, constructed or used before 1st January 1924. The Act also provides for the formation of the National Heritage and Conservation Commission which is the responsible institution.

Relevance: This act is relevant since the clearing of vegetation, construction of the farm infrastructure may damage heritage sites if there are any.

Compliance there of: This act will guide the GoldenLay Limited on what to do in case such sites are found on the proposed project site on how to protect the site.

2.4 The Forest Act Cap 199 of 1973

The Forest Act of 1999 has not yet been enforced hence the 1973 Forest Act is still active. The legislation provides for establishment, gazetting and de-gazetting of forests. It also provides for monitoring, management and regulation of forest areas and forest products, nationwide, and particularly in National and Local Forests.

This Act provides for protection of Six (6) tree species in Zambia whether in a protected area or outside. These tree species are:

a) Afzelia quanzensis (Pod Mahogany);
b) Baikiaea plurijuga (Teak);
c) Entandrophragma caudatum (Mountain Mahogany);
d) *Faurea saligna* (Beech wood);
e) *Khaya nyasica* (Red Mahogany); and
f) Pterocarpus angolensis (African Teak).

Relevance: The area under consideration for the development of Kafubu farm is a brownfield that has been disturbed by the previous anthropogenic (farming) activities that were undertaken by Kafubu Dairy Farm prior to acquisition by GoldenLay limited.

Compliance there of: The developer will endeavour to act within the provisions of this law in the implementation of the project to protect forest resources.

2.5 The Zambia Wildlife Act No. 12 of 1998

The Zambia Wildlife Act No. 12 of 1998 provides for establishment of the Zambia Wildlife Authority (ZAWA) and provides the enabling legislation for the sustainable management of wildlife resources in Zambia. The Act also provides for regulation of all wildlife activities such as hunting, poaching and keeping of wild animals. The local management of wildlife resources and habitats is partly delegated to Community Resource Boards (CRBs) in designated Game Management Areas (GMAs). The CRBs in turn are given commission for the income generated from GMAs.

Relevance: Although the proposed project site does not fall in a GMA, the ZAWA Act is relevant in that the area is habitant to animal and bird spices which may or may not be endangered.

Relevance there of: GoldenLay Limited will follow the requirements of this Act in order to conserve the animal and bird life within the vicinity of the farm.

2.6 The Fisheries Act, No. 22 of 2011

The Act provides for the appointment of the Director of Fisheries and fisheries officers and provides for their powers and functions. It promotes sustainable development of fisheries and a precautionary approach in fisheries management, conservation, utilization and development. It establishes fisheries management areas and fisheries management committees and provides for the regulation of commercial fishing and aquaculture. It establishes the Fisheries and Aquaculture Development Fund. It has replaced the Fisheries Act, 1974.

The implementing institution for this Act is the Ministry of Fisheries and Livestock. The Act regulates all fishing activities in Zambia undertaken in any kind of aquatic ecosystem. This includes lakes, rivers and streams. It also regulates activities that may interfere with fisheries.

Relevance: Although there are no streams and or rivers within and in the vicinity of the proposed project site, contamination of surface water runoff may eventually contaminate surface water after travelling for kilometres and eventually affect aquatic organisms. ***Compliance there of:*** GoldenLay Limited will follow the guidelines in this Act to achieve sustainable development and protect water resources.

2.7 Employment Act Cap 268

This Act provides conditions under which employees should work in Zambia. The Act covers both temporary and permanent employees. Generally, this Act talks about employee protection and social security requirements. Major provisions include:

a) Minimum contractual age;
b) Establishment of employment contracts;
c) Settlement of disputes arising from such contracts of employment;
d) The appointment of Labor Officers and other staff for the administration of the Act; and
e) Certain conditions of employment such as ordinary leave, sick leave, maternity, redundancy and welfare of employees.

Relevance: This act is relevant in the regulation of the employment of people of correct age and prevention of child labour. It is also relevant in the settlement of disputes in the work place. Further, the Act will serve as guide to equal and formidable employment conditions.

Compliance there of: GoldenLay Limited will comply with this act by employing the required age, establishing contracts, conditions of service and settling disputes in accordance with this act.

2.8 Workers Compensation Act No. 10 of 1999

This is a social security Act which has provisions for employee compensation in case of injury or death of an employee whilst at work. It is a requirement under this Act that all employers register their employees with the Workers Compensation Fund and make periodic subscriptions for compensation of their employees.

Relevance: The Act is relevant to the project in that GoldenLay Limited will employ people that need to be rewarded in accordance to the Act.

Compliance there of: GoldenLay Limited as an employer will remit employee subscriptions to the Workers Compensation Fund and will reward compensation to its workers in accordance with this act.

2.9 The Water Resources Management Act of 2011

The Water Resources Management Act (WRMA) of 2011 regulates the use of surface and ground water for any of the following purposes; environmental, training and research, municipal, agriculture, industrial, hydro-electric, mining, navigation and any other activity that may be specified by the water resources management board.

Activities under theses purposes may include but not limited to the following;

a) Use water for purposes specified under section sixty, other than for domestic purposes specified under section seventy of the Water Resource Management Act No. 21 of 2011;
b) Construct, acquire any water works, impound, supply or distribute water from any water or borehole to any other person;
c) De-water any mine, quarry or water works;
d) Drain any swamp, marsh, dambo, wetland, re-charge area or other land;
e) Construct or acquire any water works for the purpose of draining into, conserving or utilizing, in any manner whatsoever, water from a water resource;
f) Construct water works necessary to restore the course of a water resource that has changed its course;
g) Harvest of any rainwater by means of a dam, weir or barrage that is on a water resource;
h) Conduct any operation that would interfere with the bank or course of a watercourse;
i) Sink, deepen or alter any borehole for any purpose in a water shortage area; or
j) Carry any activity in relation to a water resource as may be prescribed.

Relevance: The Act is very relevant because of the abstraction of ground water through boreholes on the farm. The Act will regulate how GoldenLay limited will utilise the ground water resources; protect both surface and ground water from contamination

Compliance there of: providing evidence of mitigation against adverse environmental impacts on the water resources in the EMP. Being a new act, Kafubu Farm will extensively consult with the newly established Integrated Water Resources Management Board to make sure all the requirements are met and the environment and water resources are protected.

2.10 The Water Supply and Sanitation Act No. 28 of 1997

The Water Supply and Sanitation Act provides for the regulation and standards applied in the provision of public water and sanitation services. It also provides for permitting of water supply and sanitation service provision. Water supply and sanitation at the farm will follow the guidelines and standards as stipulated in this act. The farm house and the workers compound will

be supplied with potable water from boreholes and sanitation will employ septic soak way arrangement. Water quality of the portable water will be monitored as required by the water supply and sanitation act to make sure quality water is supplied to the workers and livestock.

Relevance: Sanitation of the project area will depend on the management of sewer waste.

Compliance there of: GoldenLay Limited will at all cost follow the guidelines and requirements of this act to make sure that the health of the workers and the communities around the farm are safe guarded. All potable water will be treated to ensure no outbreak of waterborne diseases on the farm.

2.11 Public Health Act Cap 295 of 1978

This Act provides for prevention and suppression of public health hazards. It regulates all matters and activities that are connected to outbreak of diseases. Local Authorities, in this case Ndola City Council is the custodian of the Public Health Act. Provisions of the Act are implemented by Councils through licensing and inspections. Activities such as sanitation, health and safety that border on public health at the farm will be dealt with in accordance with this act.

The Public Health Act is important to the project in that the farm will produce raw materials (Wheat, Soya beans and Maize), beef and dairy animals and Eggs that will be consumed by the public.

Relevance: GoldenLay limited will produce food that will be consumed by the public thus the Act will provide guidance in the production and handling of such products to safe guard the consuming public.

Compliance there of: The company will produce food in accordance with the provisions of the Act by ensuring wholesomeness of the food and not likely to result into disease.

2.12 Lands Act Cap 29 of 1995

The Lands Act controls all matters pertaining to the management/use of land and land tenure systems. The process of acquiring the farming land title exhausts part of the applicable land acquisition laws. Kafubu Farm formerly Kafubu Dairy Farm was once a government owned operation that was privatised and sold to Ernest Mutambo. The farm land was acquired from Mr. Ernest Mutambo by GoldenLay Limited in 2012. The 2,964 Ha land is on a 99 year lease title from the Zambia government.

Relevance: The Act is relevant because the land falls under the state.

Compliance there of: GoldenLay will utilise the land in accordance with the intended purpose and provisions of this Act. The developer has so far complied with this act and it will strive to comply with any provisions under this act.

2.13 The Local Government Act

The Local Government Act CAP 474 of 1991 provides for a system of local government administration in Zambia at city, municipality and district Council levels. Each local governance level has delegated statutory functions with respect to development planning. The Act also

allows Councils to implement environmental protection and natural resources management functions which include prevention of pollution of water supplies and has some control in undertaking of mining operations.

Relevance: The act is relevant as issues of environmental protection and natural resource management will be affected by this developmental project. GoldenLay Limited will follow the provisions of this act.

Compliance there of: Goldenlay will recognize the powers of the local authorities in the area of operation and adhere to the provisions of this Act in the implementation of the project.

2.14 The Petroleum Act Cap 439 and the Energy Regulation Act Cap 436

The Petroleum Act provides for control of conveyance and storage of petroleum products such as diesel and petrol. The Act provides further provides for control measures regarding production, transportation, handling, distribution, re-sale and use of energy.

The Energy Regulation Act of 1995 makes provision with respect to the production and distribution of energy in Zambia and establishment of the Energy Regulation Board (ERB) for purposes of control and licensing of energy undertakings. In accordance with this Act, ERB shall, in conjunction with other Government agencies, formulate measures to minimize the environmental impacts of transportation, storage and use of fuels and enforce such measures by attachment of appropriate conditions to licences held by such undertakings.

Relevance: It is relevant because there will be a fuel storage tank at the farm and also the machinery to be used in the fields will all be propelled by diesel.

Compliance there of: Ensuring that the Fuel storage facilities are operated in line with the Act.GoldenLay will handle all petroleum related products on the farm in accordance with the Act. The developer will also follow the requirements of this act when transporting, storing and using petroleum products.

2.15 Animal Health Act Cap No. 27 of 2010

An Act to provide for the appointment of the Director responsible for veterinary services and other staff and define their powers and functions; provide for the prevention and control of animal diseases; provide for the quarantine of animals; regulate the importation and exportation of animals, animal products, animal by-products, articles and animal feed; establish the Animal Disease Control Fund; repeal and replace the Stock Diseases Act, 1961; and provide for matters connected with, or incidental to, the foregoing.

Relevance: The Act is relevant since the Kafubu Farm project will involve movement, breeding and rearing of animals and poultry.

Compliance there of: GoldenLay Limited will follow the provisions of this Act in management of animals and poultry on the farm.

2.16 Food and Drugs Act Cap 303

An Act to protect the public against health hazards and fraud in the sale and use of food, drugs, cosmetics and medical devices; and to provide for matters incidental thereto or connected therewith.

Relevance: The project will involve the production and sale of directly edible food (eggs, beef, milk and food related raw materials in soya beans, maize and wheat).

Compliance there of: GoldenLay Limited will follow the provisions of this act in the production of the food items and all necessary regulations pertaining to production facilities that ensure edible and safe food.

2.17 The Noxious Weeds Act, Cap 231

The Noxious Weeds act gives provisions for the regulation of weeds declared noxious in an area or agricultural lands. The relevance of this act is that GoldenLay Limited will not import, distribute, convey and or sale any noxious weed or any part thereof or of any seed with which the seed of any particular noxious weeds has become mixed with as provided in the act.

Relevance: The Act is relevant to avoid the introduction of noxious weeds in the agriculture area since the farm will be involved in cropping activities.

Compliance there of: GoldenLay Limited will remove any noxious weeds as identified and instructed by an authorizing officer acting legally and in accordance with this act.

2.18 The Plant, Pests and Diseases Act Cap 233

The plant, pests and diseases act cap 233 has provisions for eradication and prevention of spread of pests, control of importation of growing media, injurious organisms, invertebrates and plants, cured tobacco and miscellaneous.

Relevance: In the farming process, pests will appear as attracted by the crops to be planted and the animals to be kept. The possibility of disease outbreak may be there within the farm.

Compliance there of: GoldenLay limited will take all necessary measures within the provisions of this act to eradicate and prevent the spread of pests and disease within and outside the proposed project site. Importation of any growing media, injurious organisms, invertebrates and plants will be controlled in accordance with the provisions of this act.

2.19 Plant Variety and Seeds Act (Amended by Act 21 of 1995)

The plant, pests and diseases act gives provisions on administration, registration of seed importation and cleaning, seed certification, inspection of seeds, prescribed seeds, import and export of seed, offences related to seeds and miscellaneous issues regarding seeds.

Relevance: the Act is relevant in that the project will involve planting of various types crops and seed varieties that give maximum yields and are resistant to disease.

Compliance there of: GoldenLay Limited will only plant seed that has been certified by authorised agencies in Zambia. Only prescribed seeds inspected by authorities officers acting

legally will be planted at the farm. In an event that Kafubu Farm may require to import seeds, it shall be done in accordance with this act. There will be no exportation of seed from the farm.

2.20 Agriculture (Fertilizers and Feed) Act 13 of 1994

The act provides for the regulation and control of the manufacture, processing, importation and sale of agricultural fertilisers and farm feed. It also provides for minimum standards of effectiveness and purity of such fertilisers and feed.

Relevance: The Act is relevant because the project will involve the use of fertilizers for the growing of crops and also use of feed for its animals and poultry operations on the farm.

Compliance there of: GoldenLay limited will strictly follow the requirements and provisions in this act. It shall make sure that the purity of fertilisers and feed conform to stipulated standards. It shall import and or locally buy fertilisers from recommended and registered fertilisers and feed dealers/ companies. The company will feed its animals and chickens with feed produced in line with the provisions of this Act.

2.21 Bio-Safety Act

An Act to regulate the research, development, application, import, export, transit, contained use, release or placing on the market of any genetically modified organism whether intended for use as a pharmaceutical, food, feed or processing, or a product of a genetically modified organism; ensure that any activity involving the use of any genetically modified organism or a product of a genetically modified organism prevents any socio-economic impact or harm to human and animal health, or any damage to the environment, and provide for matters connected with or incidental to the foregoing.

Relevance: It is relevant because the project will require stiff measures on bio-safety to control diseases on the farm.

Compliance there of: Compliance with the provisions of the Act with regards to operating according to the requirements of the Bio-safety act.

2.22 International Conventions

Zambia is a signatory to a number of international conventions. Conventions of significance to the proposed Kafubu Farm project are briefly described below.

a) **Ramser Convention: -** The general objective of the Ramser Convention is to curtail the loss of wetlands and to promote wise use of all wetlands. The convention addresses one of the most important issues in Southern Africa, namely the conservation of water supplies and use of the natural and the human environments in an intergenerational equitable manner.

b) **African Convention on the Conservation of Nature and Natural Resources (Algiers,1968), (Maputo, 2003):-** The objective of the convention is to encourage individual and joint actions for the conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind. This must be done

from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.

c) **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):-** The objective of this agreement is to ensure that international trade of wild flora and fauna does not endanger their existence. The convention is customized through the Zambia Wild Life Act No. 12 of 1998 and the implementing body is Zambia Wildlife Authority.

d) **Kyoto Protocol to the United Nations Framework Convention on Climate Change: -** The aim is to further reduce greenhouse gases by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries.

e) **Convention on Biological Diversity (CBD):-** The major aim of the CBD is to effect international cooperation in the conservation of biological diversity and to promote sustainable use of living natural resources worldwide. It also aims at bringing about sharing of the benefits arising from utilization of natural resources. A number of plans in this convention fall under the Department of Agriculture, Forestry, Fisheries and ZAWA.

f) **Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal: -** The objective is to control import and export of hazardous wastes. It also aims at ensuring that any trans-boundary movement and disposal of hazardous waste, when allowed, is strictly controlled and takes place in an environmentally sound and responsible manner.

g) **Convention on Migratory Species and the African –Eurasian Water Bird Agreement: -** Like other migratory species, water birds cross several international borders during their migration, facing a wide range of threats. Without international cooperation, conservation efforts of one country can be meaningless if these birds are not protected in another country.

h) **The United Nations Framework Convention on Climate Change (UNFCCC):-** It was signed by Zambia in 1992. The main objective is to achieve stabilization of greenhouse gas concentrations in the atmosphere. Zambia recognizes that the largest source of one of the main greenhouse gases, carbon dioxide, is from burning wood fuel and the use of coal and oil.

   GoldenLay Limited will take all precautions to make sure that the contributions to greenhouse gases from the farming and poultry operations are minimal. The closure phase will involve re-forestation.

Relevance: the international conventions are important as they entail that national developments should be done with due consideration to these conventions and protocols and as such the proponent is obliged to abide by these national commitments.

3.0 PROJECT DESCRIPTION

3.1 Project location

Kafubu Farm *(formerly Kafubu Dairy Farm)* is located in Ndola District of the Copperbelt Province and 16Km from the Ndola CBD. The farm is approximately 2.5Km off the Ndola-Kitwe dual carriage way on the western side in the Kitwe direction. The farm No. 9424 is 2,964 Ha in extent and is on title No. 22607 with a 99 year lease from the Zambian government. Kafubu farm lies between 1285m and 1241m AMSL and consists of gentle slopes with broad interfluves which are mostly drained by small streams in a West, South Westerly direction.

The farm is bordered by Battledore Farm (Cool Bananas) on the eastern boundary and Kasongo Primary School on the western side. The northern boundary has Simpito's farm near beacons C and D while on the southern end is Miriam's farm located between beacons B and C.
The coordinates describing the boundaries of the farm are indicated in the table below.

Table 2: Coordinates for Kafubu farms. *(Source: Land Surveyor's Report, Ndola District)*

SIDES Metres		ANGLES OF DIRECTION	COORDINATES SYSTEM (local-metres)		
				Y	X
		CONSTANT		**-0.00**	**+1440000.00**
A- B	3591.33	305° 48‘ 41"	A	50098.68	615.36
B - C	6135.53	26° 12‘ 19"	B	47186.29	2716.71
C- D	1743.96	86°05‘ 37"	C	49895.67	8221.61
D –E	1561.16	105° 53‘ 51"	D	51635.58	8340.42
E- F	3870.70	179° 25‘ 05"	E	53137.04	7912.79
F- A	4606.07	221° 55‘ 35"	F	53176.35	4042.29

3.2 Nature of the Project

The proposed development of Kafubu Farm will incorporate three forms of agricultural activities. These will include:

(a) Arable agriculture (rain-fed and irrigated cropping) operations.

The proposed Kafubu Farm project will involve as a primary purpose, the growing of Soya beans, Wheat and Maize. The crops will be grown both through rain fed agriculture and irrigation by the use of centre pivots (winter cropping). The harvested crops will be used as raw material for the production of feed for the poultry (broilers and layers) operations at GoldenLay limited. The feed manufactured at Goldenlay will used for feeding of the chickens. This will also suffice as nutritional supplement for the dairy and beef animals that will be reared on Kafubu farm.

A total of 1800 Ha of land will be utilized for this purpose on a crop rotational basis from maize to wheat and soya beans. During summer cropping (rain fed), 30% maize and 70% Soya beans will be planted while in winter (irrigated farming) 60% soya beans and 40% wheat will be planted.

Cropping operation raw materials

The following raw materials and equipment will be required for the cropping operations to be conducted at Kafubu Farm;

Table 3: Raw material requirements for farming

Raw materials/Equipment	Application	Storage Area	Responsible person
Wheat, Maize & Soya beans seed	Crop seeds for planting	Chemical store	Farm manager, Store keeper
Pesticides, herbicides	Crop protection, pest control	Chemical store	Farm manager, Store keeper
Fertilizer	Soil nutrition	Chemical store	Farm manager, Store keeper
Diesel fuel, oil, lubricants	Energy source for farm Machinery	Fuel storage tank, Lubricant/oil store	Workshop manager
Water	Irrigation of crops, Domestic use	Rainfall, boreholes	Farm manager, irrigation engineer
Agricultural lime	Soil PH stabilization	Chemical store	Farm manager, Store keeper
Tractors, Planters, weeders.	Ploughing and seed planting	Machinery workshop	Workshop manager
Boom sprayer	Pest, weed control	Machinery workshop	Farm manager
Combine harvester	Produce harvesting	Machinery workshop	Farm manager

During winter cropping, irrigation will be undertaken by way of six (6) centre pivots. The pivots will have coverage of 60Ha each and will utilise water sourced from the ten boreholes that will be drilled on the farm and stored in the water reservoir.

3.4 CROPS

The crops to be grown on Kafubu farm will be Soya beans, Wheat and Maize. These will be grown on crop rotation basis both using rainfall and artificial irrigation by way of centre pivots. The cropping operation will also employ sustainable agricultural practices through effective pest and weed control management systems.

3.4.1 SOYABEANS *(Glycine max)*

Soya beans will be grown both using rain fed *(summer cropping)* and irrigated *(winter cropping)* operations. Being an excellent crop rotation crop with cereal crops, Soyabeans will be grown in rotation with wheat or maize in the winter cropping period. This rotation system will incorporate a 21-day window period for pre-planting management of pests and weeds. GoldenLay also estimates yield increases of up 25%, to maize crop by using the Maize/Soyabeans rotation on Kafubu farm.

Varieties

The following soya beans varieties will be considered for planting on the farm. The actual variety to be planted will depend on the weather forecasts and water resource availability. Descriptions of each variety, estimated yields and days of maturity of the seed are highlighted in the table below.

Table 3.1: Varieties of Soyabeans

Seed variety	Days to shattering	Maturity(days)	Yield potential
SC Sirocco	20	130	2500
SC Scribe	7	110	2500
SC Solitaire	18	115	2000
Santa Rosa	10	120	1500

Source: Seedco Zambia, 2013.

The proposed varieties are high yield types which will be planted in proportions of 300,000 standing trees per hectare. In order to attain this proportion, planting will be composed of 350,000 to 400,000 high quality seed per hectare. In order to achieve this, the recommended row spacing of 75cm (applicable for mechanical weeding) will be implemented.

The planting period for most of these varieties will be mid-November to mid-December for rain fed cropping operations.

Climate and Soil requirements

The soils study conducted on Kafubu area in general reveal that the soil is suitable for the cultivation of soya beans. The climatic conditions of the area favour the high yielding varieties highlighted in the table above. Kafubu farm soils are deep and well drained with adequate nutrient potential to support soya beans. The optimum growing temperature in the area range between 20 and 25^{o}C. The recommended soil pH of between 5.5 and 5.7 *($CaCl_2$ scale)* will be maintained. The acidity of the soil will be controlled through liming the fields prior to planting.

During the pre-planting period, most of the weeds will be destroyed through ploughing and application of pre-emergency herbicides. Prior to planting, a seed dressing herbicide and an inoculam *(bradyrizhoduim)* will be applied to protect the seed and enhance germination.

Table 3.2: Herbicides application

Weed classification	Chemical(herbicide)	Application rates/Ha
Annual weed	Treflan 45(trifluralin)	1.0-2.0 litres
	Dual (metalachlor)	1.5-2.5 litres
	Bradiryzhoduim	2.0 litres
Broad leaved weeds	Afalon (linuron	2.0 -3.0 Kg
	Basagram 48 (bentazon)	1.5-4.0 litres

Fertilizer

Pre-planting application of basal fertilizer, Gypsum or single super phosphate fertilizer at the rate of 200 to 300Kg per hectare will be undertaken in the fields. Given that Soyabeans are efficient at utilising residual fertility. This rate will guarantee optimum fertilisation for growth. Manure obtained from the poultry houses and cattle paddocks will also be utilised on the fields as part of the composting plan on the farm. The practice of crop rotation system with maize and wheat will enhance fertilization and high yields for the crops by way of providing residual fertilization from the previous crop planted.

Crop Protection

Pests

Soya beans will be susceptible to cutworms and semi-looper caterpillers during the flowering and seed fill period of growth. These pests mostly attack the leaves and pods of the plants and may result into 20 to 30 % foliage loss if unmanaged. These will be controlled using recommended pesticides at optimum application rates as per guide below.

Table 3.3: Pest control

Pest	Chemical control	Application rate/Ha
Cutworm (Agrotis spp)	Dursban(chlorpyrifos) 4E	0.8 litres
Looper caterpillar	Thiodan(endosulfan) 50 W.P	2.0 Kg
Stink Bug (Nezara sp)	Fastac 10% EC	175ml

Diseases

The varieties of soya beans to be planted on the farm offer very high resistance to diseases prevalent in Zambia. However, they will be susceptible to diseases such as frog eye leaf spot *(cercospora sejina)*, rust disease *(pharkopsora pachyrizhi)* and dark-reddish brown blotches caused by a fungus *(Pyrenochaeta glycine)*. They will appear on the lower leaves and spread up the plant progressively. Management and/ or prevention of such will include planting at the recommended periods of mid-November and mid-December. Further, control by way of spraying with fungicides will be employed as a disease control measure. The following specific fungicides will be applied for a particular disease identified; Carbendazim and flusilazole will be used for the control frog eye leaf spot and rust diseases at the rate of 350 to 450mL/Ha. Triadimenol

(Shavit) at the rate of 500mL/Ha for control of reddish- brown blotches. Spraying of the chemicals three times per three weeks after flowering will be effective for disease control.

Harvest

Soya beans will be grown on a commercial scale and harvesting will be achieved through the use of combined harvesters. The seed varieties to be planted are high yield varieties that will be effectively harvested using combined harvester in order to maximise yield and avoid seed destruction. Although varieties have been selected for resistance to shattering, this still remains a major cause for yield loss. Harvesting will commence immediately the crop is mature and dry enough. The degree of seed loss during harvesting will depend of the efficiency of the machine and operator, evenness of the land, height of the pods off the ground and the moisture content of the seed.

Yield

The following yields are estimated for the proposed varieties to be planted. Summer (rain-fed) and winter cropping will yield an estimated 3,780 Mt each by utilising 1,260 and 1080 Ha respectively.

3.4.2 MAIZE (*Zea mays)*

Maize cultivation on Kafubu farm will be restricted to summer cropping operations (rain –fed).

Climate and soil requirements

The climatic conditions for the growth of maize at Kafubu farm are ideal for the varieties that will be planted. The rainfall pattern in the area is suitable for maize and exceeds 500mm of seasonal rainfall which is adequate for growth.

The soils in the project area are ideal for maize growth. The soils are well drained with optimum pH levels *(see soils report in appendix)*.

Varieties

Early to medium maturing maize seed varieties will be planted in order to effectively adhere to the crop rotation regime proposed for the soya beans, maize and wheat. Early maturing varieties range from 120 to 140 days from planting to maturity, while medium maturing range from 141 to 155 days. The varieties have been chosen based on their yield potential, season length and disease resistance. The following varieties will be considered at Kafubu farm; Early maturing varieties: SC513, SC517, SC525 and SC 533 and medium maturing varieties; SC621, SC 627, SC633 and SC 608.

Planting

580 Ha of arable land will be prepared for planting during summer cropping. Seed planting will be done when the soils are sufficiently moist immediately after planting. Depth of planting will generally be about 5 cm but this will vary with soil moisture status. Rows of 75-90 cm with intra row spacing of 20-30 cm will be used for planting in order to maximise plant population. Plant population will be between 36,000 and 40,000 per hectare.

Table 3.4: Row spacing for maize

Row space cm	Plants/ha '000	Row space cm	Plants/ha '000	Row Space cm	Plants/ha
70 x 20	66,6	80 x20	62,5	90 x20	55,5
75 x 25	53,3	80 x25	50,0	90 x 25	44,4
75 x 30	44,4	80 x 30	42,6	90 x 30	37,0

Weeds

Weeding will be conducted by way of herbicides. These will be applied as pre-emergency control, on-emergency weed control (in the first 6 weeks after planting) and late control after flowering. The following weeds are anticipated to emerge as the maize is planted.

Table 3.5: Weed control application

Weeds	**Herbicides**	**Stage of application**	**Rate/ha***
Annual grasses but not Mulungwe (*Rotboella exalhata)*	Lasso (Alachlor) 48 EC Dual (Metolachlor) 72 EC	Pre-emergence Pre emergence	3.5 – 5.0 lt 1.5 – 2.5 lt
Most annual weeds but not Mulungwe	Gesaprim (Atrazine 50 FW Gesastop (Simazine) 80 Bladex (Cyanazine 50 WP	Pre emergence Pre emergence Pre emergence	3.2 – 5.0 lt 2.0 – 3.5 kg 2.0 – 4.0 lt
As Atrazine but with improved grass control and for dry conditions	Basagram (Bentozon) 48 EC	Post emergence	2.0 – 5.0 lt
Broad leaf weed, and yellow nutsedge	Shellamine 8 EC (2, 4 – d Amine)	Pre or Post emergence	2.0 – 3.5 lt
Annual grasses suppresses nutsedge	Eradicane 70 EC (E.P.T.C. + Safener)	Pre plant incorporated	3.0 – 6.0 lt
Perennial grasses and most annual weeds	SCAT (Glyphosate)	Post emergence	5 – 6 lt
Broad leaf weeds and nut grass	Blazine	Post emergence	3.0 – 4.0 lt

Fertilizer

Basal and top dressing fertilizers will be used in order to increase yield potential of the maize varieties to be planted. In order to enhance the response of the maize to the fertilizer, ash and manure will be applied. Basal fertilizer will be applied before or on planting while top dressing will be applied after 4 to 6 weeks after planting. Application of the fertilizer will be as follows; Basal at 300-400 Kg/Ha and top dressing at 250-300 Kg/Ha.

Crop Protection

Pests

The maize varieties are susceptible to pests such as maize stalk borers, leaf hoppers, earworm, cutworms and termites. These are more destructive to the early and medium maturing maize varieties. The pests will be managed through spraying with pesticides at recommended rates guided by the seed supplier. The table below highlights some of the anticipated pests likely to attack the proposed maize varieties to be planted at Kafubu farm and the recommended control measures.

Table 3.6 Common maize pests

Pest	Chemical	Dosage
Maize root rot	Carbofuran 10g	200g/100 metre row
Cut worm	Deltamethrine 0.5 EC,Accis 2.5 % EC Samaron 600 SL	100 ml/ha,56 – 60 ml/100 lt H2O 100 ml/100 lt water
Termites	Chlorpyrifos	200 ml in 100 l water
Fat Hohn	Carbofuran 10g	200 g/100 m row or 1 g/station if hand planted
Stalk borer	Endosulfan 35 EC,Monocrotophos Deltamethrin 2.5 EC	700 ml/Ha,0.75 – 1 lt/Ha 200 ml/ha
Larger grain borer	Actellic Super	50 g/90 kg shelled maize

Diseases

The early and medium maturing seed are prone to diseases such as leaf blight, maize streak virus, rusts, cob rots and grey leaf spot. The most effective control measure to be employed on the farm will be the use fungicides, planting of resistant maize varieties and crop rotation with soya beans and wheat.

Yield

Summer cropping operations are estimated to yield 3780Mt of maize. Average commercial yield of the seed is estimated at 6.5 tonnes per hectare with a total land usage of 540 hectares.

3.4.3 IRRIGATED WHEAT (*Triticum aestivum*)

The Wheat crop to be cultivated on the farm will be done during winter cropping. Irrigated wheat will be rotated with soyabeans and maize as a means of pest and disease control. Considering that the disease spectrum of irrigated wheat is different from that of rain fed wheat, GoldenLay will restrict itself to winter (irrigated) wheat.

Climatic and Soil Requirements

The climatic conditions of the area in cool dry season are optimum for the growth of the wheat variety to be planted. The soil nutrient contents, composition and drainage at Kafubu farm are ideal for winter wheat.

Varieties

The ideal seed that will be planted will be the short statured, disease resistant and well adapted to winter production. The preferred varieties include loerie, Canary Emu S. Other varieties that will be considered are SC Smart, SC Stallion (red seeded variety), SC Shield and SC Induna. The descriptions of the preferred varieties are outlined in the table below.

Table 3.7: Wheat varieties

Variety	**Days to**		**Height**	**Disease reaction**			**Yield potential Base=100**
	Flower	Harvest	cm	Leaf rust	Stem rust	Powdery Mildew	110
Loerie	80	120-130	94	R	R	MR	110
Canary*	79	120-130	98	R	R	MS	106
Emu 'S'	79	120-130	90	MS	S	MR	100

Seed planting rate and treatment

Approximately 100 kg/Ha certified seed (with minimum germination rate of 90%) will be sown at the rate of 220 seeds per square metre. This will guarantee high yields. GoldenLay will plant certified seed treated with a contact fungicide/insecticide mixture. Planting will be done from Mid- April to June just after the rain season. The varieties selected have 110 to 150 days maturity period.

Fertilisation of the crop will be in the form of Basal application of a compound fertilizer as pre-emergency and top dressing fertilizer will be applied 14 to 35 days after emergency. The practical application is shown in the table below.

Table 3.8: Fertilizer application rate

Fertility Status	N	P_2O_5	K_2O	S
		Kilograms per Hectare		
Low	140-160	80-120	40-60	20 min
Medium	110-130	50-70	20-30	20 min
High	80-100	20-40	0	15 min

Pests and diseases

The anticipated Insect pests for the winter wheat varieties are Aphids and bollworms. The wheat will be susceptible to these two pests from flowering onwards. These will be controlled using pesticides. The wheat varieties will be prone to leaf rust *(Puccinia recondit*a) and powdery mildew (*Erysiphe graminis*). These diseases will be managed through use of fungicide sprays on the crop at recommended rates.

Yield

The varieties to be planted are high yielding varieties with capacity of 7.5 tonnes per hectare. The total winter crop yield for wheat estimated is 5400Mt.

Farming process technology

In order to maximize the production of maize, wheat and soya beans on the proposed project site, GoldenLay Limited will utilise mechanised methods of farming by use of various equipment and machinery as indicated in the table above. The typical farming methodology to be employed is given in the flow diagram below.

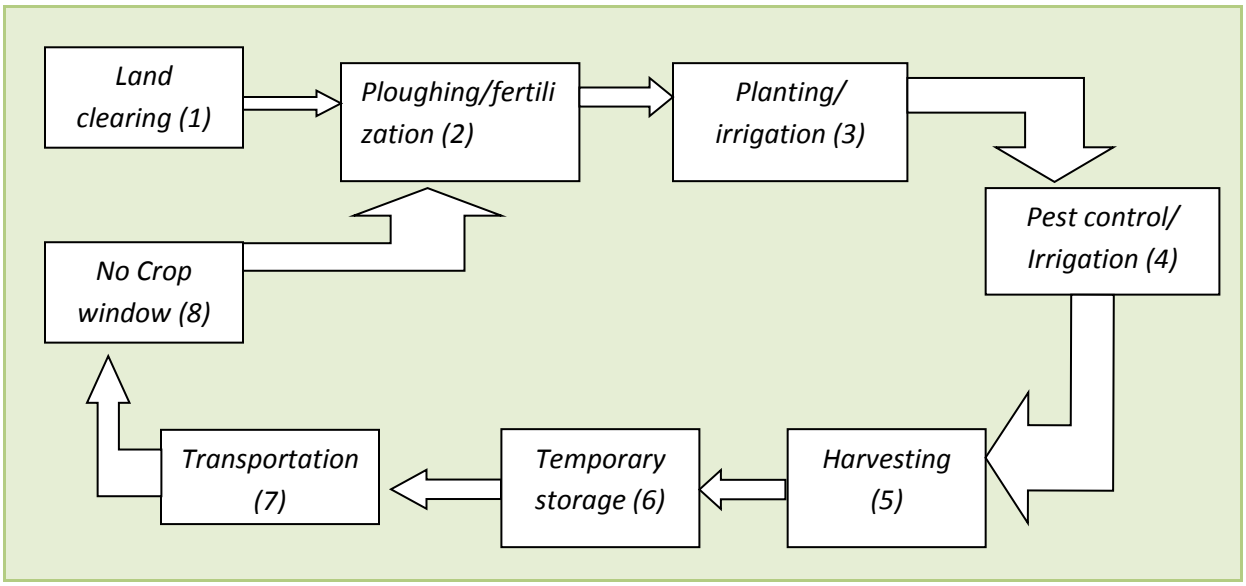


Figure 4: Farming process flow diagram

The proposed farming methodology will apply to both rain fed and irrigated cropping systems. Each process stage will have inputs and out puts as part of the entire process flow.

Products and by products

The main products of the cropping operations are maize, wheat and soya beans. Anticipated by products of the farming process will be maize stocks and straw from harvesting period. The said by products will be used as raw material for feeding the beef and dairy cattle to be reared at the farm.

Production capacity

The estimated production capacities of the proposed crops on the farm are as given in the table below. The actual yields may vary depending on the seed varieties planted and the climatic conditions of the area which may be beyond the control of GoldenLay Limited at the time of planting, growth and harvesting.

Table 3.9: Individual Crop Yield estimates

Cultivated Area(Ha)	Planted crop	Estimated Yield (Mt/Ha)	Total Yield (Mt)
Summer crop (rain fed)			
1260	Soya Beans	3.0	3780
540	Maize	7.0	3780
Winter crop (irrigated)			
1080	Soya Beans	3.5	3780
720	Wheat	7.5	5400

(b) Livestock farming (beef & dairy cattle)

The farm will also incorporate livestock (beef and dairy cattle). Two hundred (200) reproductive age beef animals and fifty (50) dairy animals will be introduced on the farm. These animals will be reared through free range grazing methods and the use of the feedlot in order to maintain their nutrition through the feed to be produced at GoldenLay. The animals will be for commercial (sale) purposes to the ready beef and dairy markets in Zambia.

Livestock farming raw materials

The following raw materials will be utilized during the operation;

- Farm straw (soya beans, maize and wheat straw),
- Processed animal feed,
- Feed supplements and vitamins,
- Vaccines and medication.

Rearing process

Beef animals (heifers and steers) will be reared through free range grazing (ranching) in the first three quarters of the lifecycle and then introduced to feed lot and lairage when nearing age for selling and possible slaughter by the buyers. The animals will be vaccinated against all possible diseases using deep tanks and other vaccination methods on site as follows:

- De-worming: 3 times in a year for ranch animals (21 days before rain season, 21 days after rainy season and at mid-year).
- De-worming once for feedlot animals on entry into feedlot.
- Booster vaccine at 4weeks for ranch animals.
- Vaccination against Anthrax, Clostridium pathogens, lumpy skin, pasturella and botulism.

Animals will be kept under free range grazing until they attain weight of 300Kg to enter into feedlot. They will be kept on a feedlot program to for 90-120 days until weight of 420Kg. animals are expected to gain weigh at the rate of 1.3 to 1.5kg per day.

Dairy animals will also be allowed free controlled grazing using paddock methods and will be vaccinated against various diseases periodically. Supplementary feeding will be carried out for the dairy animals to increase their milk production capacities.

Veterinary tests will be conducted on the animals in accordance with the Animal Health Act to ensure adherence and safety of the end products resulting from the animals.

Products and by-products

The main products from the animals will be beef and milk respectively. Beef animals will not be slaughtered on site but will be sold as live animals to the ready beef market while milking will be conducted on site and sold to ready customers such as Parmalat and others through contract agreements. By products of the livestock operations will be animal manure that will be used in crop fields within the farm.

Production capacities

The project once fully implemented will have the capacity for production of 200 beef animals ready for sale and subsequent slaughter by the customers.

The estimated milk production capacity of the dairy animals is 50Litres per animal per day consisting of two milking sessions of 25 litres each. Milking sessions will be conducted in the morning and evenings. This will translate to a total capacity of 2500 litres of milk per day.

(c) Poultry farming (egg layers)

The farm will also incorporate poultry houses for layers that will house 40,000 point of lay birds each in eight (8) houses. These houses will be constructed within the farm at designated distances from the cropping operations. The birds will be fed with feed produced at Goldenlay. Of the eight poultry houses, six (6) will be used for layers while two (2) will be used for rearing the birds. Each poultry house will be 12m by 100m in dimension. The poultry operation will therefore have the capacity to accommodate 240,000 point of lay birds at a time and 80,000 as rearing pullets.

The production of table eggs at the farm will be conducted through an automated process system called Facco egg laying system.

Egg production and processing

Hatching and Placement

Goldenlay Limited will purchase their layer stock (day-old chicks) from the egg-type hatchery in Baluba area and also from Ross breeders in Ndola. These chicks will be delivered to Kafubu farm within a day of hatching after vaccination. On arrival, chicks will be placed either placed in typical layer pens or reared in a pullet house.

During the first week, pullet chicks are usually beak trimmed. Pullets reared on the floor will remain there for approximately 10 to 15 weeks and then moved to a layer facility. The chicks from chick placement through approximately 16 weeks of life will be fed according to body weight gain and/or age.

Feeding

Feeding for the birds will be regulated automatically by the *Facco ®* control unit for release of feed and water. The feed will be offered to the birds via the chain system. The chain system will transport feed into the metal feeder at precise times during the day. Generally, 5 cm of feeder space will be allocated per pullet and 6.4 cm or more for each adult laying hen. Young birds will be fed a high protein diet (20%) during the first few weeks of life. This level will continuously decrease until it reaches approximately 12 to 15 % proteins during egg production.

Egg Collection

The *Facco*® poultry houses incorporate automated systems for egg collection. The hens will lay eggs onto an angled wire floor which rolls the egg toward the front of the cage (floor angle is generally eight to ten degrees) onto a nylon belt. The conveyor belt will transport eggs out of the house either to the egg processing/sorting facility then to storage cooler. The eggs from these two facilities will be removed based on hourly demand; most of the eggs will be within a few hours post-lay. The pictures below give a pictorial view of the rearing, egg laying and collection systems to be implemented.

(a) Egg laying

(b) Egg collection on conveyor

Varoius diseases will affect the poultry operation to be undertaken on Kafubu farm. Disease control will be a critical part of ensuirng smooth operation of the facility. Vaccination programs will be instituted that will ensure protection of the birds. When a batch of layers vacates the layer house, they will be stripped of all organic matter and sanitized before introducing another batch. The window period will be maintained at 14days. The recommended vaccination programs are highlighted in the following table.

Table 3.10: Vaccination schedule for layers.

Vaccination time	Type of vaccine
Day old	Marek's
12	Infectious Bursal
20	Infectious Bursal
25	Bronchitis, New Castle, Infectious Bursal (Typical Brand name Combo Vec. 30)
30	Bronchitis, New Castle, Infectious Bursal (Typical Brand name Combo Vec. 30)
49	Bronchitis, New Castle, Infectious Bursal (Typical Brand name Combo Vec. 30)
10	Fowl Pox and Laryngotracheitis (commonly referred to as LT)
12	Combo Vac 30
13	Avian Encephalomyelitis (commonly referred to as AE)
16	New Castle

The *Facco* ® houses have automated temperature control systems that will be used to maintain optimum temperature for the birds throughout their lifecycle.

The birds will be fed in accordance to the feeding guidelines appropriate to the technology being proposed and will be as indicated below.

Table 3.11: General feeding guidelines for layers.

Nutrient	*Starter 0-6 weeks*	*Grower 6-8 weeks*	*Developer 8-15 weeks*	*Pre-Layer 15-18 weeks*	*Layer*
Protein %	20.0	18.0	16.0	14.5	15.0
Met. Energy, Kcal./lb.	1325-1375	1350-1400	1375-1425	1350-1400	1300-1450

Schedule and life time of the project

The Kafubu Farm project and all its components will be undertaken through the life of the land tenure (99year period). The implementation schedule is approximated to take 3 to 5 years from the time of approval and subsequent preparation and construction activities. The project success will also depend on the construction of various support structures on the farm for ease of project implementation and operations.

3.5 Main project activities

GoldenLay limited will implement the Kafubu farm project through four (4) different project phases; site preparation, construction, operation and decommissioning & closure phases.

3.5.1 Site preparation phase

The preparation phase prior to the commencement of this project will include but not limited to the following activities:

- Identification of the infrastructure on the farm that will need rehabilitation and upgrade. Estimation of the Bill of Quantities for the rehabilitation and new construction works to be conducted on site.
- Obtaining relevant authorization and documentation from regulatory bodies including ZEMA and Ndola City Council and other relevant stakeholders that will be affected by the project implementation.
- Acquisition and delivery of construction material and farm machinery to site.
- Hiring of onsite local labour for the construction phase.
- Acquisition and delivery of construction raw materials to site.
- Communication with relevant stakeholders on project commencement.

3.5.2 Construction phase

The following activities will be undertaken during the construction and rehabilitation phase of the project:

- Site clearing to facilitate rehabilitation and construction of operations offices, machinery workshop, fuel facility and oil storage room.
- Construction of 6 poultry layer (point of lay) houses and 2 breeding houses.
- Fencing off total distance of 22Km of the area to demarcate the farm boundaries and avoid animal and human trespass into the farm area.

- Levelling of the construction area to facilitate civil works and digging of foundations for buildings.
- Rehabilitation of the existing workers houses and construction of new ones if necessary.
- Re-commissioning of the existing sewage management facility.
- Construction and /or upgrade of the fuel storage tank and a lubricant store.
- Construction of a chemical storage area including fertiliser storage shed.
- Construction of the mini machinery workshop.
- Construction of a used oil storage area incorporating a sump and oil/water interceptor.
- Siting and sinking of irrigation/ Domestic water supply boreholes.
- Revamping of the existing surface water storage tank at the farm office block.
- Access roads and drainage along the main road to alleviate historical flooding problems.
- Security facilities including check points and fencing off access areas around the farm.
- Clearing of vegetation on the previously used arable land.
- Installation of poles and power lines within the farm for extension of power to the relevant structures.
- Installation of centre pivots for winter cropping activities.
- Clearing of vegetation and stamping to prepare the land for farming.
- Maintenance of grazing land to prepare for cattle grazing.
- Construction of feedlot, lairage, deep tanks and feeding facilities for the cattle.
- Construction of HDPE lined dairy animal effluent treatment ponds

3.5.3 Operation phase

During the operation phase, three main activities will be undertaken by GoldenLay on Kafubu farm. Land allocation will be done in accordance with the requirements of each activity for an effective farming operation. Activities to be undertaken and land allocated for each are summarized in the table below.

Table 3.12: Land allocation and activity for Kafubu farm

Proposed Activity	Land allocation (Ha)	Detail description
Cropping operations	1800	Summer cropping *(30% maize, 70% soya beans)*. Winter cropping *(60% soya beans, 40% wheat)*.
Poultry operations*	250	6 layer houses (dimensions: 12m X 100m, capacity 40,000 birds each). 2 breeder houses (dimensions: 12m X 100m, capacity 40,000 birds each).
Cattle ranching *	450	200 initial beef and 50 dairy animals to be introduced. Construction of lairage, feedlot, holding pens, deep tanks, dairy cow parlour and free grazing land.
Housing and office operations	120	Includes existing housing units, new construction and rehabilitation of

		dilapidated infrastructure.
Resettlement	200	Resettlement of people occupying certain portion of the farm in accordance with conditions of land purchase agreement.
Other infrastructure	144	Roads, fencing, farm clearance, Zesco power lines, distances between operations etc.

NB:* to incorporate future expansion.

Once operational, the farm will implement an effective Environmental Management Plan (EMP) to mitigate the short and long term impacts of the project on the environment and the social economic standing of the area and the surrounding communities.

Poultry operations

- Introduction of chicken (layers) breeding stock in poultry houses.
- Breeding of the stock.
- Delivery of feed and medication for the birds.
- Feeding of the birds to reach point of lay and administering of all necessary medication.
- Collection and grading of the eggs from layer houses and transport to GoldenLay Limited for sorting and sale.

Cropping operations

- Ploughing and preparation of the fields for summer (rain fed) and winter (irrigated) cropping.
- Delivery and storage of farming Inputs (seed, fertilizer and agro chemicals).
- Pumping of water from the water source to storage reservoir.
- Planting and growing of Soya Bean, Maize and Wheat
- Harvesting of Soya Bean, Maize and Wheat
- Temporary Storage of Soya Bean, Wheat and Maize at the Farm
- Transportation of Soya beans, Wheat and Maize to Goldenlay.

Cattle rearing operations

- Introduction of cattle breeding stock.
- Delivery of feed and medication for the cattle.
- Grazing of cattle, feedlot and lairage management.
- Introduction of dairy animals using the existing dairy facilities.

General operations

- Obtaining of all environmental licences relating to the operation of the farm.
- Generation and management of domestic waste and hazardous waste.
- Fuel storage and use of lubricant on machinery.

- Disease control and surveillance for poultry, beef and dairy animals and cropping.

Waste generation

During the construction and operational phases of the project, various types and classes of waste will be generated by the farm. This will include as detailed below:

- Solid waste (empty containers & chemical packaging)
- Liquid effluent (sewer waste).
- Hazardous waste (obsolete and expired chemicals, used batteries, used oil, filters, fluorescent tubes, & electronic waste).
- Domestic household & office waste.
- Animal waste

Disease prevention and control

Kafubu Farm will be quarantined from spreading of diseases to both cattle and poultry by way of restricting access to the farm. Further, disease surveillance programs will be implemented with the local veterinary office in Ndola. Foot and vehicle baths will also be constructed on site

3.5.4 Decommissioning and Closure Phase Activities

- Notification of the closure and decommissioning of the farm and ceasing of farming activities.
- Demolition of the farm house, workers houses, poultry houses, feedlot and all other related farm infrastructure.
- General Cleaning, grading and levelling of areas demolished.
- Enhancement of Soil fertility in the areas graded and levelled.
- Enhancement of Soil fertility on land used for growing crops.
- Removal of the above ground fuel storage tank for alternative use.
- Rehabilitating all contaminated sites such as the workshop area and the surrounding for the fuel storage facility.
- Un-installation/ Removal of the Centre Pivots
- Removal of Pumps and burying of boreholes
- Installation of necessary warning signs around the pit and dump sites.
- Re-vegetation of the areas which had buildings and any other infrastructure.
- Re-vegetation of the land used for growing of crops
- Post closure sampling and analysis of borehole water (some boreholes will be left for this purpose) and soil.

4.0 PROJECT ALTERNATIVES

4.1 Project site alternatives

The land considered for the Kafubu Farm project is under a 99 year lease from the Zambian government. The land was acquired from Mr.Mutambo who used to practice cropping and diary operations. The total area covered by the title deed is 2964 Ha. The farm was previously used for crop farming and dairy cattle operations by ZADL and Mr. Mutambo. Upon assessment of the area in terms of farming viability and environmental suitability, consideration was made for this site as the most suitable site for the project since it was a brownfield with disturbed farm land from previous farming activities.

4.2 Labour intensive Vs. Mechanised farming methods

Non-use of machinery during stumping, tillage, planting, weeding and harvesting will be considered as an alternative to the mechanised farming method proposed by GoldenLay. In order to achieve the desired crop and livestock yields, mechanised farming was considered the suitable options for this project as non-use of machinery will not yield the estimated crops desired considering the size of the land under development. This option was considered during the EIA study given the extent of the land to be cultivated. Assessments were conducted to determine the feasibility of cultivating 1800 Ha of land without the use of machinery to yield the desired quantities of the harvest thus the use of machinery for cropping operations was the ultimate option.

The rearing of birds, beef and dairy animal alternative methods were considered in terms of enabling animals to grow on traditional methods (grazing dependent) or using applicable and acceptable feeding methods in order to meet production targets especially for the production of eggs from point lay hens (pullets). To yield the desired quantities of eggs and sufficient milk production, the use acceptable non- traditional methods of rearing animals was the most feasible.

4.3 Waste Management alternatives (own dump site Vs. Council dump site)

Considerations were made by the developer to manage solid waste by way of either transporting it to a designated dumpsite operated by Ndola City Council or operation of a dumpsite within the farm land considering the distance to the council dumpsite. Solid waste generated at the farm will be managed by the installation of waste bins/skips. These will be stationed at the farm houses and other sources of solid waste for collection of waste. The developer will then obtain licences for transportation and operation of dumpsite respectively.

Sewage from the farm house and workers complex will be channelled through a septic tank then to a soak away. The system will incorporate inspection manholes for monitoring the sewage management system.

The following waste management options will be considered depending on the type of waste and how feasible the option might be. The best options will be adopted.

1. Incineration
2. Encapsulation
3. Bioremediation
4. Settling/ Sedimentation
5. Septic tank - Soak Away System (effluent)
6. Decomposition
7. Landfill and/or dumpsite
8. Composting (organic waste)
9. Effluent treatment ponds for dairy animal effluent

4.4 Rain fed vs. irrigation with borehole water

To maximise the land usage by the developer, considerations will be made to incorporate winter cropping (irrigated farming) in addition to the summer (rain fed farming) cropping. Both methods of irrigation will contribute to the desired crop yields for both winter and summer cropping operations. During summer operations, the rain will allow for the replenishment or recharge of ground water in order to maintain the water table of the underground water aquifer.

4.5 Conservation vs. Conventional farming

Conservation farming was considered for cultivation of maize, wheat and maize in the 1800 Ha farm land. Conservation farming's capability of meeting the crop yield targets in comparison to conversional farming methods using inorganic fertilizers was less. The cost benefit analysis and suitability of the method for growing Soya beans, Maize and Wheat on a large scale would best be conducted using conventional methods that utilise fertilizer and other chemical applications.

The poultry operations will be implemented using an automated egg collection system through *Facco®* poultry houses from Italy.

4.6 Animal Mortality Management Alternatives

All mortalities of birds, beef and dairy animals on the farm will be managed in a manner that will prevent the spread of disease and infection to the rest of the livestock on the farm. All mortalities will be incinerated on site in the incinerator to be constructed on the farm. Incineration is considered the most effective method of destruction for animal mortalities especially those involving death resulting from disease outbreak. Incineration will also apply to all eggs that are considered unfit or unwholesome for consumption after production.

4.7 Product and/or service alternatives

The main products that will be produced on the farm will be Soya Beans, Maize and Wheat from the cropping component of the project. These crops form part of the raw materials for the production of animal feed. Other alternative crops may be sorghum, millet and barley. Soya beans, Maize and Wheat contain the highest protein and starch content for consideration as the primary source of raw material for feed manufacture.

In the animal husbandry component, Eggs will be the main product from the poultry operations, beef and dairy animals from the animal husbandry section. There are no alternative animals to produce eggs other than chickens and also no animals to produce beef and dairy milk.

4.8 Raw materials alternatives

In terms of construction, Poultry houses, office blocks, accommodation and other site structures will be made from concrete blocks, clay bricks, hydra form bricks or a combination of them. The developer will prefer concrete blocks for most of the works. This is attributed to the durability of the blocks.

The table below gives a summary of the raw materials to be used, alternative raw materials and why alternatives will be rejected.

Raw material	Alternative	Reasons for rejection
Concrete blocks	Clay bricks	Lack of durability
Cement	Sand only	No strong construction properties when used alone
Machinery (mechanisation)	Manual labour	Not feasible given project extent
Soya beans, maize & wheat	Already made feed	Expensive and unreliable supply

4.9 Design alternatives

The lay-out design of the farm corresponds with the plan that existed when the farm was under the ownership of the prevoius occupants. The design will incorporate poultry houses, milking parlour for dairy animals, cow sheds for beef cattle and the inclusion of office and administration blocks.

The design will also include a systematic way of managing liquid, solid and gaseous waste. These will be in form of septic tanks,solid waste dumpsite and incinerator respectively. In terms of disease control, the site will have liquid-chemical vehicle baths and foot baths at the entry points into the farm for the enhancement of bio-safety.

4.10 Analysis of alternatives

The alternatives considered for the implementation of the project are numerous and have been analysed to determine how feasible they are in terms of helping to achieve the project objectives.

An alternative site for the project was not found as the current site being an already existing farm gave greater advantage for the continuation of the agricultural project. Farming technology for project will be restricted to mechanization due to the commercial nature of the project and the estimated yields required for raw materials.

4.11 List of alternatives

Below is a list of alternatives in order of preference. The best alternatives will be adopted for implementation.

1. *Site alternative*- this is important as without an appropriate site, the project will not be implemented.
2. *Design alternative*- the farm layout will determine the efficiency of productivity and will also dictate the operations of the farm.
3. *Raw material alternative*-raw materials capable of supplying sufficient nutrients for feed production will be considered for cultivation. These being Soya Beans, Maize and Wheat.
4. *Irrigation alternative*- the farm will utilise rainfall for summer cropping and borehole water for winter cropping operations.
5. *Mortality management*- all mortalities resulting from the poultry and animal operations will be incinerated upon certification from the Veterinary department. This option is the best in terms of disease control and management.

5.0 ENVIRONMENTAL BASELINE STUDY

5.1 Climate

Kafubu Farm is located in Ndola District which lies on an altitude of 1269m ASL. Generally, Ndola experiences a sub-tropical climate that is strongly seasonal, with three distinct seasons. Climatic conditions are characteristic of the second agro-ecological region of Zambia with a pronounced dry and rainy season. The rainy season start in November ending in April with a total annual rain fall ranging from 1000 to 1300 mm. The climatic information as obtained from the FAO CROPWAT Met Station shows the average rainfall for Ndola is 1232.8mm per annum of which 766mm per annum is effective rainfall. The average runoff for the total Kafue River Basin is 64mm/year.

Rainfall Chart

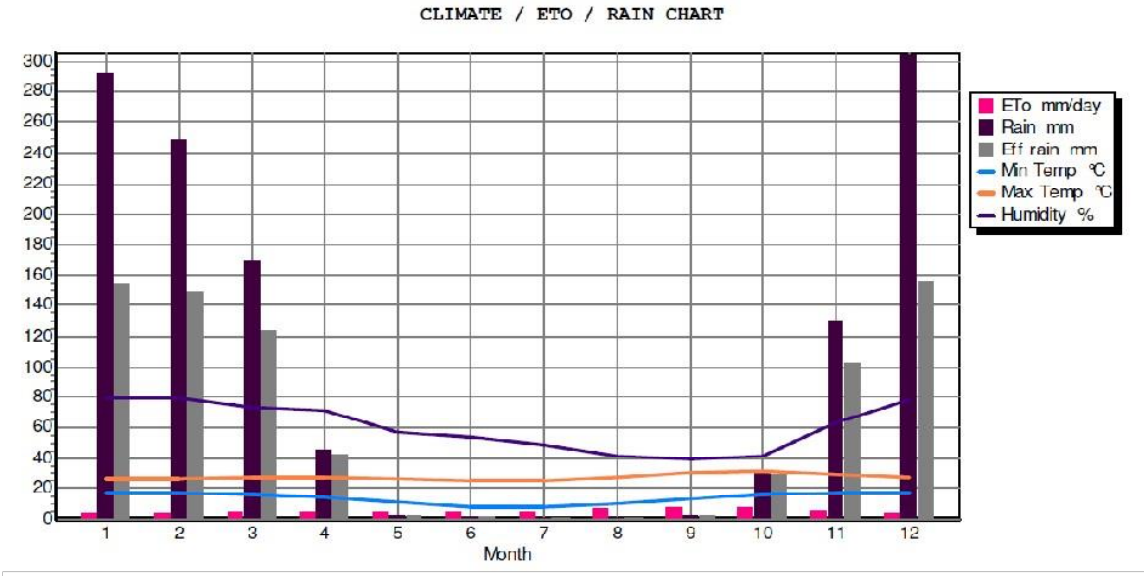


Figure 5: Annual rainfall chart for Ndola.

Majority of the rainfall is distributed over a single rainy season lasting approximately 6 months, with December and January typically being the wettest months. The dry season is divided into the cool dry season (May – July) with temperatures ranging between 8ºC and 21ºC and the hot dry season (August – October) with temperatures ranging between 21ºC- 32ºC . The rainy (hot wet) season is generally warm with temperatures ranging between 16ºC to 24ºC. Summary climatic conditions of the area are given in the tables below.

Table4: Geological and Agro-ecological location of Kafubu Farm-Ndola

PROVINCE	AGRO-ECOLOGICAL ZONE	PLUVIOMETRY
Copperbelt	II {Medium rain fall zone}	1000mm and above per annum

Pluviometer = Total rainfall regardless of distribution

Table 5: Seasons and Associated Temperatures

SEASON	MONTHS	Min Temperature{ºC}	Maxi Temperature{ºC}
Cool dry season	May to July	8	21
Hot dry season	August to October	21	32
Hot wet season	November to April	16	24

Table 6a: Average Precipitation (84 Year Period)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
cm	28.6	24.3	17.8	3.7	0.4	0	0	0	0.2	2.5	13	27.8

(Source: www.weatherbase.com)

In the Copperbelt province in general and Ndola in particular In Ndola, the wind direction is from northeast to west. Analysis of wind data from the Ndola International Airport reveal that maximum wind speed is 3.2 m/s in the July/August and the minimum wind speed 1.2m/s in December/January.

5.1.1 Relative Humidity

The relative humidity of the project area is typical of the Ndola climatic conditions. The annual relative humidity of the area is 65%, while the average monthly relative humidity ranges from 40.9% in September to 83% in February. The table below shows the summary of relative humidity of the project area.

Table 6b: Relative humidity

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Relative humidity %	82.5	83	79.7	73.4	65.9	61.1	54.6	46.6	40.9	47.3	64.9	80.4

(Source: meteorological dept. Ndola, 2012)

5.1.2 Sunshine availability

The project area experiences approximately 12 days of frost recorded annually and sunshine ranges between 11 hours per day from May to August, and down to 4 hours per day in February.

5.2 Air quality

Kafubu farm and the surrounding areas have baseline data on the air quality and dust. The area has no industrial activity and is a designated farming area anthropogenically disturbed by years of farming activities specifically by ZADL and the immediate past owner Mr. Mutambo. The project site is surrounded by establishments of agricultural nature such as Battledore and

Simpito's farms. On analysis of the area, it was concluded that the air quality is generally good owing to the lack of industrial activity likely to cause air pollution. In view of having baseline data and a primary requirement for assessing the impacts on the air, the consultant conducted air and dust sampling around the project site area to ascertain the quality of the air prior to project commencement.

Air quality assessment was conducted over a 48hour period during day time when agricultural/construction activity is expected to be at its maximum. Sampling methodology involved sampling from three different locations starting from mid-morning to sunset. Prior to sampling, the pump was hand held placed at a sampling position of 1.2m above ground level. Sampling was done according to the specifications of strokes on the tubes per specific gas. The main ambient gas emissions considered during the survey were as follows:

- Carbon monoxide (CO),
- Sulphur dioxide (SO_2) and
- Nitrous Compounds (NOx).

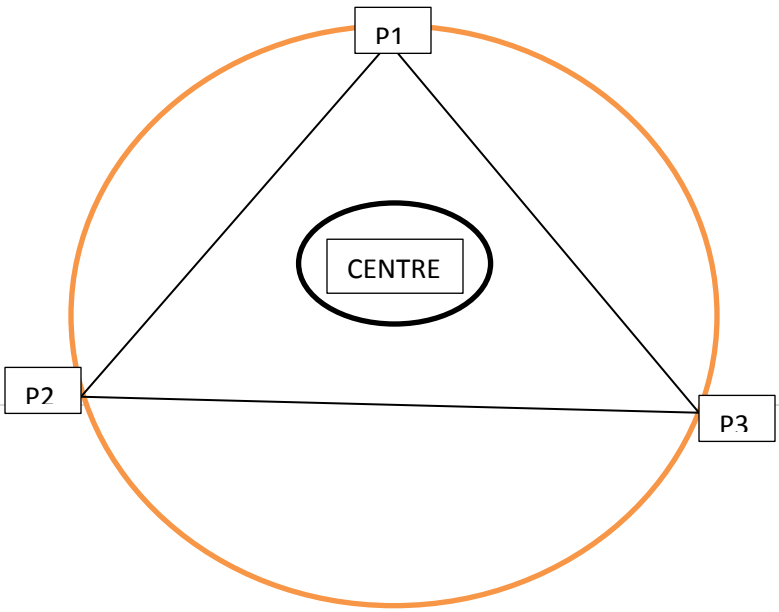
The sampling of air was done from four (04) locations. The table below shows the sampling sites.

Table 7: Sampling points and coordinates for air.

Sampling Point	Location	Coordinates
1	Main farm house	S38°08.132′, E028°53.300′
2	Beacon C boundary	S13°28.32′, E027°54.512′
3	Chipoya's farm	S13°09.827′, E027°52.393′
4	Kasongo Primary School	S38°04.295′, E028°51.204′

One (1) reading of each gas component was taken after 10 minutes interval for duration of 60 minutes at each sampling point and recorded. The test for each gas component was carried out six times and an average reading was recorded at every site in a triangulated manner.

Triangulation: To capture representative data, reduce the degree of error and increase precision, data was collected in a triangulation manner as shown below.



5.2.1 Air quality results and analysis

The main farm house area near the office building recorded minor concentrations of Carbon Monoxide (CO) and Sulphur dioxide (SO_2) in the ambient air. These emissions were within the Zambian Maximum Acceptable Concentration.

Carbon Monoxide (CO) was also detected near the boundary to battledore farm. The emissions were due to bush fires in the nearby bush beyond the boundary of Kafubu Farm. The emissions detected were within the Zambian Maximum Acceptable Concentration.

The northern part of farm at Kasongo Primary School recorded traces of Sulphur dioxide (SO_2) and Carbon Monoxide (CO). The concentrations were consistent due to residential activities such as charcoal burning in the nearby bush. The emissions detected were within the Zambian Maximum Acceptable Concentration. The Gas emissions detected in the ambient air around the sampling points may be attributed from the little activities within the farm area (e.g. Vehicles passing in the main road leading to farms in the periphery of Kafubu Farm).

Dust concentration levels emitted at three sites were very minimal and were within the Zambian Maximum Acceptable Concentration. The levels of dust were slightly higher near the main road as the vehicles passing were raising significant amounts of dust. This was evidenced by the amount of dust settling on the vegetation near the gravel main road.

Table 8: Emission measurement results at main farm house

Session Day 1	**Duration Of Sampling (Min)**	**SO_2 (µg/m³)**	**NO_2 (µg/m³)**	**CO (mg/m³)**
Morning	60	2.2	Not Detected	3.6
Afternoon	60	Not Detected	Not Detected	4.1
Evening	60	2.1	Not Detected	2.5
Session Day 2	**Duration Of Sampling (Min)**	**SO_2 (µg/m³)**	**NO_2 (µg/m³)**	**CO (mg/m³)**
Morning	60	Not Detected	Not Detected	2.9
Afternoon	60	Not Detected	Not Detected	3.4
Evening	60	1.0	Not Detected	Not Detected

Table 9: Emission Measurement Results at Kasongo Primary

Session Day 1	**Duration Of Sampling (Min)**	**SO_2 (µg/m³)**	**NO_2 (µg/m³)**	**CO (mg/m³)**
Morning	60	Not Detected	Not Detected	2.6
Afternoon	60	2.1	Not Detected	3.1
Evening	60	Not Detected	Not Detected	Not Detected

Session Day 2	Duration Of Sampling (Min)	SO_2 (µg/m³)	NO_2 (µg/m³)	CO (mg/m³)
Morning	60	Not Detected	Not Detected	Not Detected
Afternoon	60	Not Detected	Not Detected	2.5
Evening	60	Not Detected	Not Detected	Not Detected

Table 10: Emission measurement results at Beacon C boundary

Session Day 1	Duration Of Sampling (Min)	SO_2 (µg/m³)	NO_2 (µg/m³)	CO (mg/m³)
Morning	60	1.8	Not Detected	Not Detected
Afternoon	60	Not Detected	Not Detected	1.8
Evening	60	0.98	Not Detected	2.5
Session Day 2	**Duration Of Sampling (Min)**	**SO_2 (µg/m³)**	**NO_2 (µg/m³)**	**CO (mg/m³)**
Morning	60	Not Detected	Not Detected	2.2
Afternoon	60	1.1	Not Detected	Not Detected
Evening	60	Not Detected	Not Detected	3.6

Table 11: Emission Measurement Results at Chipoya's farm

Session Day 1	Duration Of Sampling (Min)	SO_2 (µg/m³)	NO_2 (µg/m³)	CO (mg/m³)
Morning	60	1.8	Not Detected	Not Detected
Afternoon	60	Not Detected	Not Detected	1.8
Evening	60	0.98	Not Detected	2.5
Session Day 2	**Duration Of Sampling (Min)**	**SO_2 (µg/m³)**	**NO_2 (µg/m³)**	**CO (mg/m³)**
Morning	60	Not Detected	Not Detected	3.2
Afternoon	60	Not Detected	Not Detected	Not Detected
Evening	60	Not Detected	Not Detected	5.6

5.2.2 DUST

Dust sampling was conducted around four Potential Areas of Concerns identified at Kafubu Farm for 48 hours.

A personal area sampler for dust measurement which was placed at specified locations (sample points) and was made to run for a specified duration after which it was removed to obtain the readings. The pump was switched off, filter was dissembled from the cyclone/filter assembly, weighed and the weight was recorded.

***Plate 1** shows the Dragger pump sampler at one of the site.*

The sampling of dust was done from three locations as shown in the table below.

Table 12: Sampling points and coordinates for dust.

Sampling Point	Location	Coordinates
1	Main farm house	S38º08.132´, E028º53.300´
2	Beacon C boundary	S13º28.32´, E027º54.512´
3	Chipoya's farm	S13º09.827´, E027º52.393´
4	Kasongo Primary School	S38º04.295´, E028º51.204´

The difference in weight of the filter was collected and the velocity flow rate- time relationship was used to calculate the dust concentration. The dust concentration taken can then be extrapolated to 24hrs or months in order to make comparisons with the national standards.

5.2.3 Dust Sampling results and Analysis

All the potential areas of concerns sampled within and outside the project site emitted dust levels which were acceptable and within the Zambian guidelines limit.

Table 13: Dust Measurement Results at three sites within the project site

PAC	DAY	Duration of Sampling (MIN)	Dust Level (µg)	Dust Concentration(µg/m^3)	Respirable Dust (24hours) (µg/m^3)
Sampling Point(P1)	**1**	120	0.00105	0.00088	0.0126
	2	120	0.00095	0.00575	0.1145

Sampling Point(P2)	**1**	120	0.0001	0.00045	0.001
	2	105	0.0002	0.00060	0.0024
Sampling Point(P3)	**1**	120	0.00075	0.00048	0.010
	2	120	0.00051	0.00045	0.0053

Key

Sampling point P1= located at the main farm house.
Sampling point P2= Kasongo primary School.
Sampling point P3= Beacon C boundary.

Dust concentration levels emitted at the three sites was very minimal and was within the Zambian Maximum Acceptable Concentration.

5.3 Geology

The geology of Ndola has previously been described by Moore (1968). Although structurally simple, the geology of Ndola area is characterized by numerous rock-types. It is mainly underlain by deep weathered sedimentary rocks of the Katanga Super group, which can be further subdivided into the Kundelungu Series, but also by the Mwashia Group and the Roan and Mine Groups. The characteristic features include the calcareous mudstone and siltstone along the Zambia-Congo DR border from the southeast to the northwest in Misundu area.

Furthermore, the geology of the area as taken from the Geological map of Copperbelt (Northern Rhodesia, Scale1:500,000,Geology survey of Zambia dated 1961) compiled by J.A Bancroft shows that the Kafubu area has sedimentary sequence comprising conglomerate and Aeolian sandstones succeeded by argillates, dolostones and arenites.

Generally, the area is characterised by the Katanga super group. The overlaying upper roan formation is predominantly dolomites-argillite sequence overlain by carbonaceous shales, argillite and minor carbonate rocks of the mwashia formation. A tillite unit the 'grand conglomerate' forms the top of the mwashia formation. Units belonging to the mines group are found in the Ndola area.

The Kundelungu group of rocks is found to be overlaying the mines group and consists of thick sequence dominated by dolomitic lime stones.

5.4 Hydrology

5.4.1 Surface water quality

The nearest source of surface water is the Kafubu River. The Kafubu River has a considerable catchment extending to the DRC border and measures approximately 539km^2. The average mean annual runoff (MAR) has been estimated at 85mm or 45,815ML/yr. The Kafubu Dam, located 3.5km from the farm's eastern boundary, is a major source of water for the City of Ndola. This dam is managed by the Kafubu Water and Sewerage Company which supplies water to Ndola and the Municipality of Luanshya and Masaiti District (population in the service

area is estimated at 628,825). Kafubu Dam is estimated to have a static storage capacity of 12,000ML.

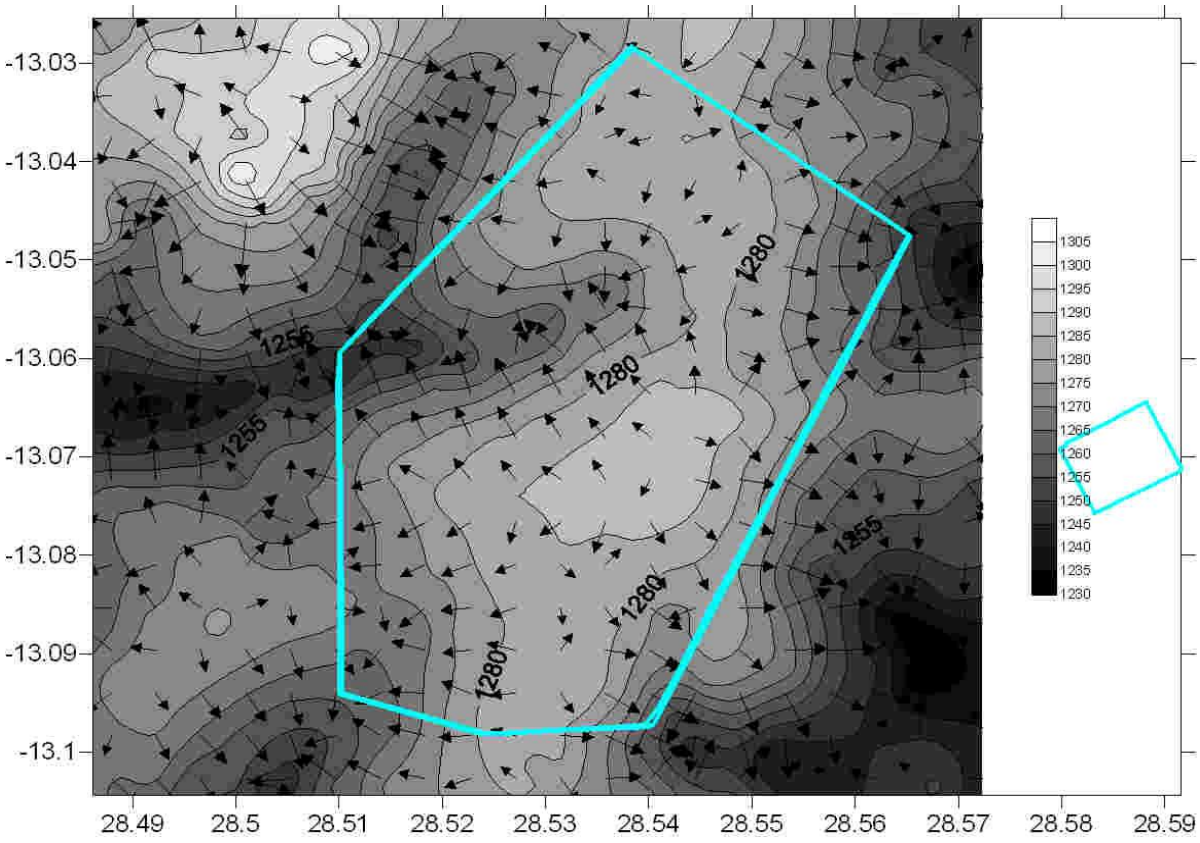


Figure 6: The direction of surface runoff on Kafubu Farm

Table 14: Surface Water Quality of the Kafubu River ***(Source: African Mining Consultants).***

Water Quality Parameter	**Kafubu River Water Quality**	**Zambian Drinking Water Quality Standard**
pH (Unit)	7.24	6.5 – 8.5
EC (uS/cm)	420	1,500
TDS (mg/l)	228	500
TSS (mg/l)	<3.5	-
SO_4	<2.8	500
Fluorides (mg/l)	0.36 1.5	1.5
Boron (mg/l)	<1 5.0	5.0
Cu (mg/l)	0.07	1.0
Total Coliforms (/100 ml)	TNTC	0
Feacal Coliforms (/100 ml/l)	TNTC	0
As (mg/l)	0.01	0.05
Se (mg/l)	0.01	0.01

Hg (Mg/l)	0.001	0.001
Pb (mg/l)	0.20	0.05
Ni (mg/l)	0.03	-
Mg (mg/l)	8.29	150
Fe (mg/l)	1.01	1.0
Cr (mg/l)	0.16	0.05
Cd (mg/l)	<0.01	0.005
Ca (mg/l)	66.2	200
Be (mg/l)	<0.1	-
V (mg/l)	<0.1	-
Zn (mg/l)	0.31	-
Ba (mg/l)	0.22	1.0
Co (mg/l)	0.07	1.0
Al (mg/l)	<0.31	0.2
PO_4	<0.3	5.0
Cl (mg/l)	12.1	250
CN (mg/l)	<0.05	0.2

5.4.2 Groundwater quality

Kafubu farm has two (02) existing boreholes located at the old main office building and the existing farm house. The boreholes are currently only used for domestic water supply to the house and the office building by the care takers of the farm. According to the samples obtained and analysed by the UNZA environmental Laboratory, the water contains high levels of feacal and total coliforms making it unfit for human usage. The water is natural ground water and is untreated thus contains high levels of ferrous (Fe^{2+}). This results in increased turbidity of the water.

Plates 2 &3: Shallow well & Borehole near the main farm house and office-Kafubu

Other sources of ground water within Kafubu farm are shallow wells located at Chipoya's place on the periphery of the farm and two other shallow wells located near the old residential

establishments on the eastern part of the farm. This settlement is part of the infrastructure acquired by GoldenLay on purchase of the Kafubu Farm. Analysis of this water indicate a similar regime of high feacal and total coliforms as well as other mineral elements as indicated in the laboratory report in the figure below.

SCHOOL OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT
ENVIRONMENTAL ENGINEERING LABORATORY

P.O Box 32379, Lusaka
Direct Telefax: 260-1-290962

PHYSICAL/CHEMICAL EXAMINATION OF WATER

Reference : A13163
Attn : Greenline Environmental Solutions Ltd
Lusaka.
Sampled by : Client GoldenLay Limited
Sampling date : 03.06.2013
Report date : 11.06.2013

Laboratory Results

Sample Number:	131326	131327	131328	131329	
Parameter	**K1 Kafubu farm BH**	**K2 Kafubu farm BH**	**K3 Chipoya 1 place well**	**K4 Diary farm well**	WHO Guideline (Maximum Permissible value for drinking water)
pH	6.54	6.64	6.40	6.36	6.5- 8.5
Turbidity (NTU)	0.66	2.60	3.17	11.09	5.0
Conductivity (mMhos/cm)	59	30	43	44	1500
Total Dissolved Solids (mg/l)	29	15	21	22	1000
Total Suspended Solids (mg/l)	<1.0	<1.0	<1.0	2.1	-
Total hardness (as mg $CaCO_3$/l)	20	14	18	12	500
Calcium hardness (as mg $CaCO_3$/l)	14	10	11	10	500
Alkalinity (as mg $CaCO_3$/l)	18	11	15	10	500
Iron (mg/l)	<0.01	<0.01	0.02	0.52	0.30
Ammonia (as NH_4-Nmg/l)	<0.01	<0.01	<0.01	<0.01	1.50
Sulphates (mg/l)	<0.01	<0.01	0.23	1.54	250
Chlorides (mg/l)	8.0	7.0	8.0	10.0	250
Nitrites (as NO_2-Nmg/l)	<0.001	<0.001	<0.001	<0.001	0.100
Nitrates (as NO_3-Nmg/l)	<0.01	<0.01	<0.01	<0.01	10.0
Acidity (as mg $CaCO_3$/l)	Nil	Nil	Nil	Nil	500
Total phosphates (mg/l)	<0.01	<0.01	<0.01	<0.01	5.0
Magnesium (mg/l)	1.44	0.96	1.68	0.48	-
Calcium (mg/l)	5.6	4.0	4.4	4.0	200
Fluorides (mg/l)	0.02	0.03	0.02	0.02	1.50
Potassium (mg/l)	1.68	1.48	1.67	2.11	-
Sodium (mg/l)	5.28	4.62	5.25	6.60	200
Manganese (mg/l)	<0.01	<0.01	<0.01	<0.01	0.50
Lead (mg/l)	<0.01	<0.01	<0.01	<0.01	0.01
Residual chlorine (mg/l)	Nil	Nil	Nil	Nil	0.2-0.5
Bacteriological Results					
Total coliforms (#/100ml)	0	25	88	92	0
Feacal coliforms (#/100ml)	0	10	70	81	0

Tests carried out in conformity with " Standard Methods for the Examination of water and Wastewater APHA, 1998".

5.4.3 Drainage

There are 2 possible sources of surface water, the Kafubu River to the East and an on-farm on the western boundary of the farm with its source near the Kasongo Siding.

Kafubu River

The Kafubu River has a considerable catchment which extends to the DRC border and measures approximately 539 km^2. The average mean annual runoff (MAR) has been estimated at 85 mm or 45,815ML/yr. The Kafubu Dam, located 3.5 km from the farm's eastern boundary, is a major source of water for the City of Ndola. This dam is managed by the Kafubu Water and Sewerage Company which supplies water to Ndola and the Municipality of Luanshya and Masaiti Districts (population in the service area is estimated at 628,825).

Kafubu Dam is estimated to have a static storage capacity of 12,000ML. Ndola has a population of approximately 450,000 (CSO 2010) of which half the population receives water pumped from the Kafubu River. The urban/industrial annual up take is estimated to be 12,000ML to 16,000ML per year. Ndola's population has nearly doubled since 1990 (240,000 people, - CSO, 1990) and will continue to place greater demand on the Kafubu River. Bore hole systems have been placed in the vicinity of Kafubu dam and near to the City limits to improve water quality and supply.

It is highly probable that irrigation extraction from Kafubu dam for a large scale operation could be met with resistance from the Kafubu Water and Sewerage Company.

The inserted photograph shows an outlet flow from Kafubu Dam at approximately 1cumec. Contrary to initial aspirations, the chances of utilizing this outflow for irrigation would also be limited. This outflow is critical to the urban and primary requirements of the Municipality of Luanshya.

Kasongo Siding Stream – Potential Dam Site

As shown in the figure, a potential dam site exists for a farm dam structure with a wall height of 10 m to 12 m. The dam site is on the small stream which has its source near the Kasongo Siding.

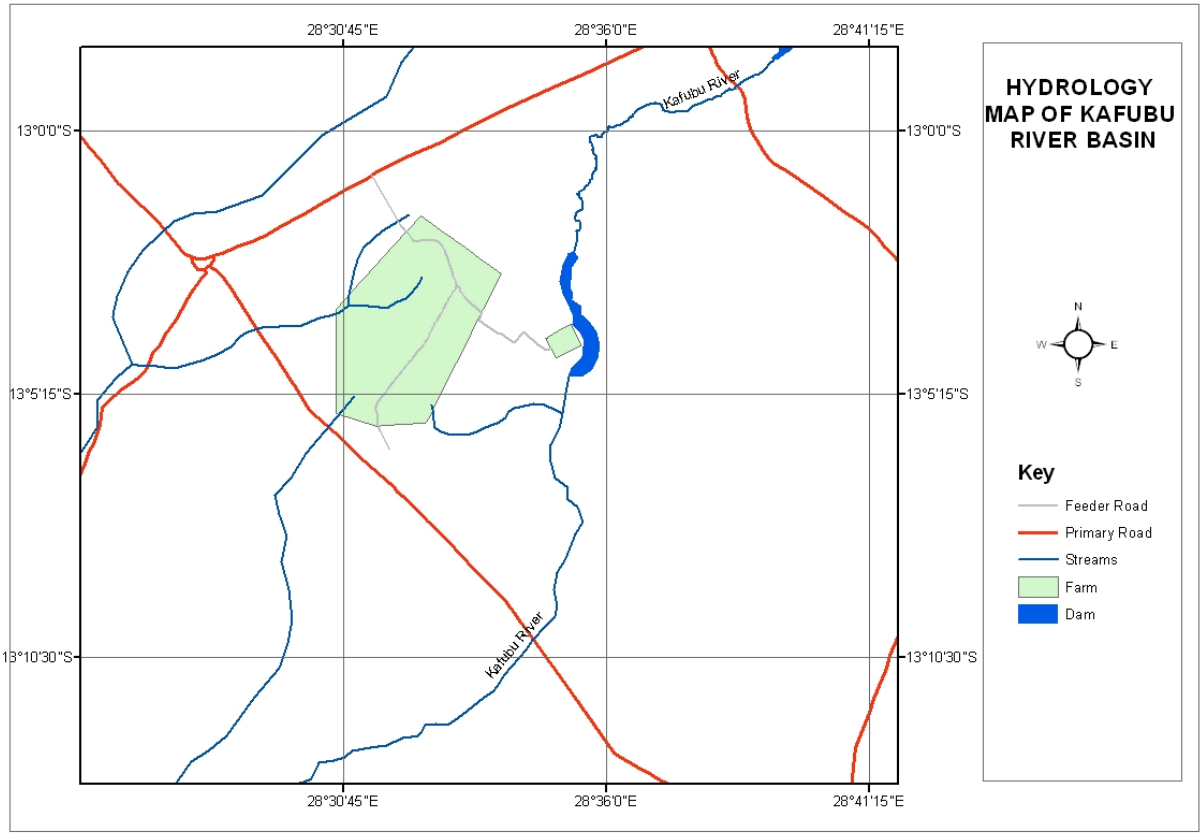


Figure 7: Drainage map of Kafubu Project Area

5.5 Hydrogeology

Groundwater in the study area occurs in secondary developed features such as weathered zones, joints, fractures, faults or solution features within consolidated hard rocks. The weathered zones usually form shallow aquifers which are shallower than 30 m in depth. Fracture zones have been developed under weathered zones and usually extend to around 30 m – 40 m in depth and often extend to more than 90 m. The thickness and permeability of aquifers are closely related to the original rock type. The aquifers on the Copperbelt can generally be divided into two:

(i)Highly productive aquifers: The upper Roan dolomite and the Kundelungu limestone are included in this category. These are often very productive and are well distributed on the Copperbelt and other provinces in Zambia.

(ii)Locally productive aquifers: The lower Roan Quartzite, Muva sediments, granites and undifferential Kundelungu formations are included in this category as locally productive.

There is evidence of large transverse fissure systems and the limestone is generally karstic in nature-drilling having shown the presence of sub-surface caverns. Perched water table conditions have been shown to exist at a few locations in the overburden which varies greatly in permeability over the area. Recharge of the aquifer appears to be controlled by direct infiltration in areas of bare rock and shallow soils, and by horizontal recharge where the overburden is thicker. The area

is expected to have good groundwater potential due to the synclinal structure associated with good recharge in the area.

The rainfall regime has remained reasonably uniform over a long period of time and provides sufficient recharge potential for the aquifer although seasonal groundwater level fluctuations may occur as the result of the spatial variability of the rainfall.

The groundwater in the area is used for both agricultural and domestic purposes. Rain fed agriculture is predominantly used on maize crop. Importantly, groundwater is critical for recharging the Kafubu Stream and the surrounding streams. Thus, there is active interaction between groundwater and surface water sources in the area.

Generally, groundwater levels go down between June and November (the dry season) and rise between December and April during the rainy season. This is supported by the seasonal behaviour of the dambos and surface water bodies in the area. The rise in groundwater levels between December and April is as a result of increased percolation.

5.5.1 Topography

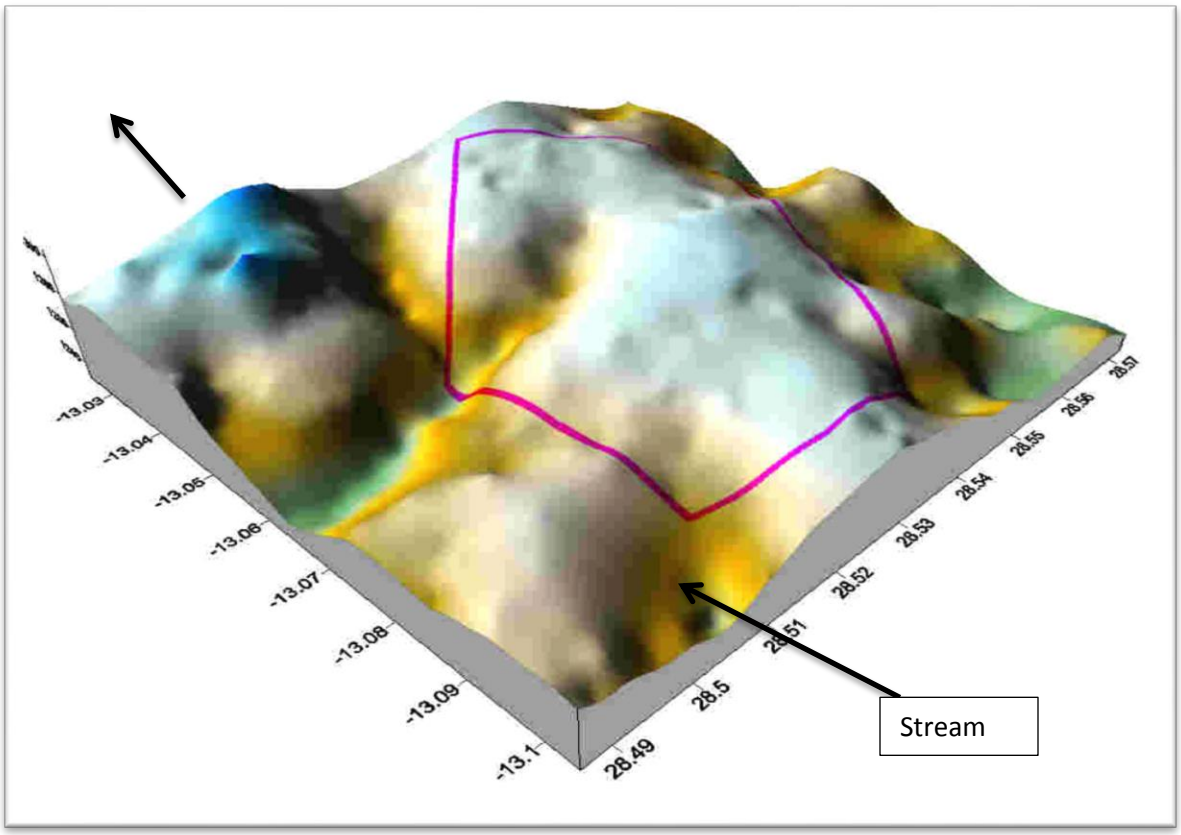
The Copperbelt regional topography comprises of a plateau that slopes gently from 1,370m in the north-west to 1,130m ASL in the south east. The province has the Kafue River as the main river basin that drains the Copperbelt in a wide arc from north to south.

The principal tributary rivers of the Kafue River are Lufwanyama, Luswishi, Kafubu, Mwambashi and Kafulafuta.

The Ndola local topography slopes gently at an average altitude of 1,200masl with isolated hilly outcrops such as Dola and Kaloko Hills.

The general terrain of the site is generally gently sloping with a bi-directional slope averaging between 1% - 1.5% and towards the North-Eastern direction (slopping in the direction of the Kafubu River).

According to the 3D map (figure 8), Kafubu Farm lies on a plateau-like feature occurring between approximately 1230 to 1305 meters above mean sea level. The land is predominantly flat to gently undulating, broken down with shallow valleys that serve as drainage channels for streams.



5.5 Soils

The Kafubu farm soils were examined along all available access routes. There have been little farm activity on Kafubu farm in the past decade and as a result, there has been little farm track maintenance. Along these traverses, soils were examined by auger borings to a depth of 120cm unless stopped by rock or impenetrable gravels. The succession of horizons in each auger was studied and used to assess the suitability of the soils for arable farming and irrigation. In addition to the augers, nine pits were dug in representative locations to characterize the different soil types occurring on the farm and these pits were subjected to detailed descriptions.

Soil samples were collected for laboratory analysis from these 9 soil pits and submitted to the laboratories of the Chemistry and Soil Research Institute, Harare, Zimbabwe and University of Zambia, for analysis for a variety of soil textural and chemical characterization parameters.

5.7.1 General description of the Soils

The project site is located in an area of intermediate to mafic metamorphosed sedimentary geology. These metamorphic rocks give rise to red, well drained soils throughout the landscape, except in low lying wetland locations. In upland and mid-slope positions, the soils are generally deep, red and orange sandy loams and sandy clay loams in the surface, overlying similar red coarse grained sandy clays and clays. Soil depth generally exceeds 100 cm. In some locations

however, the soil profile has a layer of laterite gravels in the subsoil even though the soil depth still exceeds 100cm.
Surface outcrops of laterite were encountered on the farm but these were found to generally be in the form of narrow dykes that are not expected to amount to a significantly large area of the land. However, the exact extent of these laterite outcrops and areas where the laterite significantly limits soil depth, rendering the soil unsuitable for irrigation or arable farming can only be determined through detailed soil surveys.

Soil types at Kafubu farm site

Five soil types were identified and mapped in this reconnaissance soil survey. Summary descriptions of these are given below as well as an assessment of their suitability for irrigated sugarcane *(refer to detailed soil report in appendix)*.

Type 1: Deep red Sandy Clay Loams and Sandy Clays over Red Clays
These are the most common soils on the project site and they consist of deep, over 150cm, red coarse grained sandy loams and sometimes sandy clay loams in the surface, which in turn overlie similar red sandy clay loams to clays to a depth exceeding 150cm. They are formed from a mafic gneissic rock and are well drained throughout the profile.
Their good texture and resultant high water holding capacity, as well as their excellent drainage properties render them highly suitable for irrigated sugarcane.

The location of these soil blocks is shown on the soil map below. In the field some occasional narrow banks of laterite were found occurring in these soils. However, these bands of laterite were narrow, less than 20 meters wide and therefore unlikely to detract heavily from the suitability of these soils for arable farming.

Type 2: Moderately Deep to deep yellowish red to orange Sandy Loams and Sandy Clay Loams over Sandy Clay Loams and Clays
These soils are similar to type 1 soils, occurring in mid-slope and crest of interfluve positions in the landscape. They may have been formed from a less mafic type of parent rock, hence their less red colour.
The soils consist of moderately deep to deep, dark brown sandy loams in the surface, overlying yellowish red and orange brown sandy clay loams in the subsoil. These soils are well drained and do not exhibit any signs of impeded drainage.

Type 3: Deep pale yellow loamy sands over yellow sandy
Type 3 soils appear to be derived from granitic gneiss or some sandstone in lower mid-slope positions towards the local drainage lines. These soils consist of deep dark brown to black sandy

loams in the surface, overlying yellow sandy loams and sandy clay loams in the subsoil. They are well drained, exhibiting no signs of layers of impeded drainage in the subsoil.

Type 4: Wetland Margin Sandy Soils

These soils are found on the margins of the wetlands of the farm. They consist of moderately shallow to deep black loamy sands in the surface over white sands to depths of about 80cm.Below that depth the soils become white sandy loams and sandy clay loams.

The white sandy horizon that extends from 20cm to about 80cm is very distinctive and sought by locals for use as pit sand for construction. Thus large trenches left behind by previous mining of this sand are evident on the edges of the wetlands on the farm.

These soils are not suitable for arable farming, nor are they suitable for irrigation on account of their sandy texture and their occurrence on the edge of wetlands.

Type 5 :Wetland Areas

Type 5 refers to all areas of wetlands on the farm. Thus, it is not, strictly, a soil type but a reference to all areas that are permanently wet. They are not suitable for any arable farming or for irrigation. They are best left natural and undisturbed.

The soils on Kafubu farm are mostly irrigable and suitable for winter cropping as well as summer cropping operations under rainfall. The table below shows the actual hectares of identified soil types in accordance with the assessment conducted.

Table 15: Summary of Kafubu farm Soil types

Suitability for Arable Farming	**Suitable**		**Not Suitable**		**Total**
	Hectarage	**% of farm**	**Hectarage**	**% of farm**	
Soil Type 1	333	11.3			333
Soil Type 2	1675	56.6			1675
Soil Type 3	546	18.5			546
Soil Type 4			181	6.1	181
Soil Type 5			138	4.7	138
Totals	**2638ha**	**89.2%**	**319**	**10.8%**	**2957ha**

The assessment shows that the Kafubu farm area is suitable for agricultural purposes particularly for the cultivation of Soya beans, maize and wheat. It can be concluded therefore that at reconnaissance scale, nearly 90% of the farm is arable.

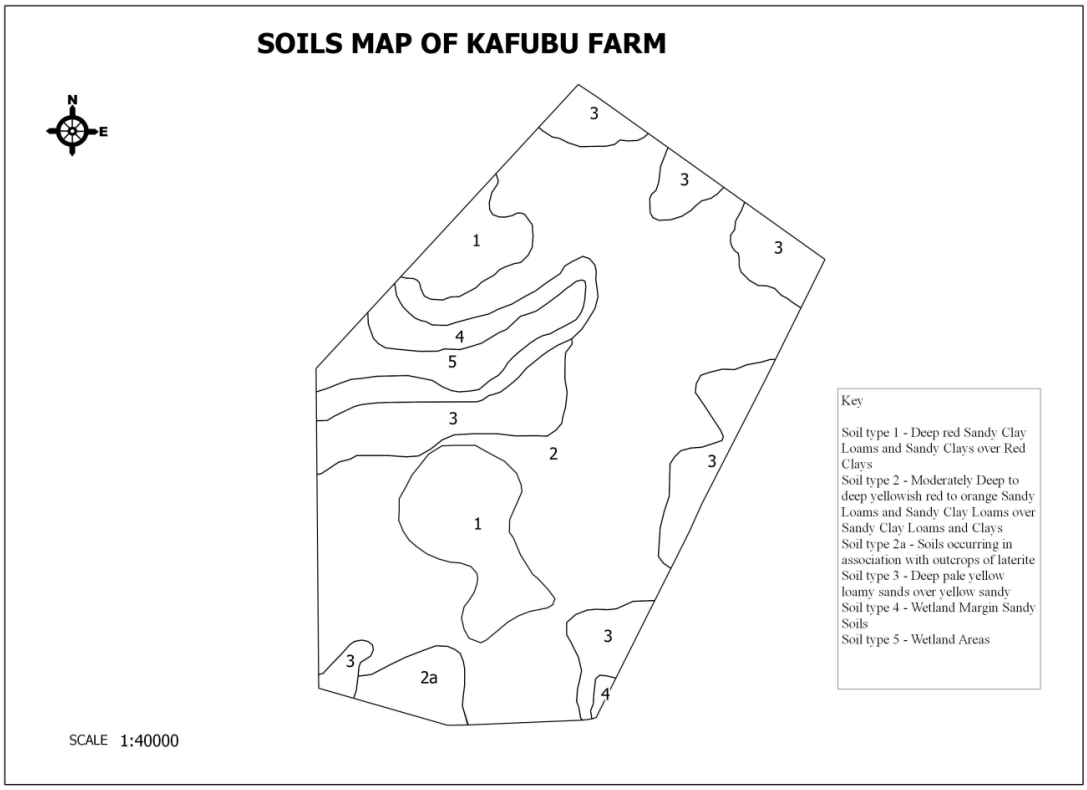


Figure 8: Soil map of Kafubu farm

5.6 Land use and land tenure

Land tenure in Zambia is governed by State and Customary ownership. There are two Land tenure systems found in Ndola District: (1) Leased land tenure system and (2) Traditional land tenure system.

The Local Authorities through the Commissioner of Lands allocate land to applicants for development on leaseholds basis. The Local Authorities recommend applications for residential, commercial and agricultural plots. Kafubu Farm is on a lease hold basis from the Zambian government.

The entire 2964 Ha of land making up Kafubu farm was fully utilised by the previous owners for agricultural purposes which included Dairy cattle rearing, milking operations, cattle grazing and cropping operations. The previous owner (Mr. Mutambo) acquired the farm in 1996 who later sold it to GoldenLay. The land is on a 99 year title lease hold in the name of GoldenLay Limited. The farming operations will be conducted through the lease period and consideration for renewal will be made when it expires.

Land use in the project area is predominantly agriculture. Kafubu Farm (formerly Kafubu dairy farm) is a commercial farm surrounded by sparsely populated communities practicing subsistence farming. Common crops grown by small and medium scale farmers include maize, sweet potatoes, and groundnuts. Currently, the land is not being utilised for agricultural

operations and any other development. The area was securely fenced off on acquisition and awaiting EIA approval for the implementation of the project to commence.

5.8.1 Visual Features

A visual assessment of the regional and local landscape characteristics of the proposed farm was conducted.

The region currently supports mainly dry land or rain fed agriculture. Irrigation farming is being practiced on some commercial farms with river frontage. The largest commercial farm in the region is Cool Bananas. This farm practices irrigation farming.

The Project area is located on a gently sloping plain. Within the proposed project area, the land elevation ranges from about 1230 m to 1305 m above mean sea level, with a slope ranging from 0.5 – 1.5%.

The visual aspect of the catchment of the project area is presented using a satellite image in Figure 9.

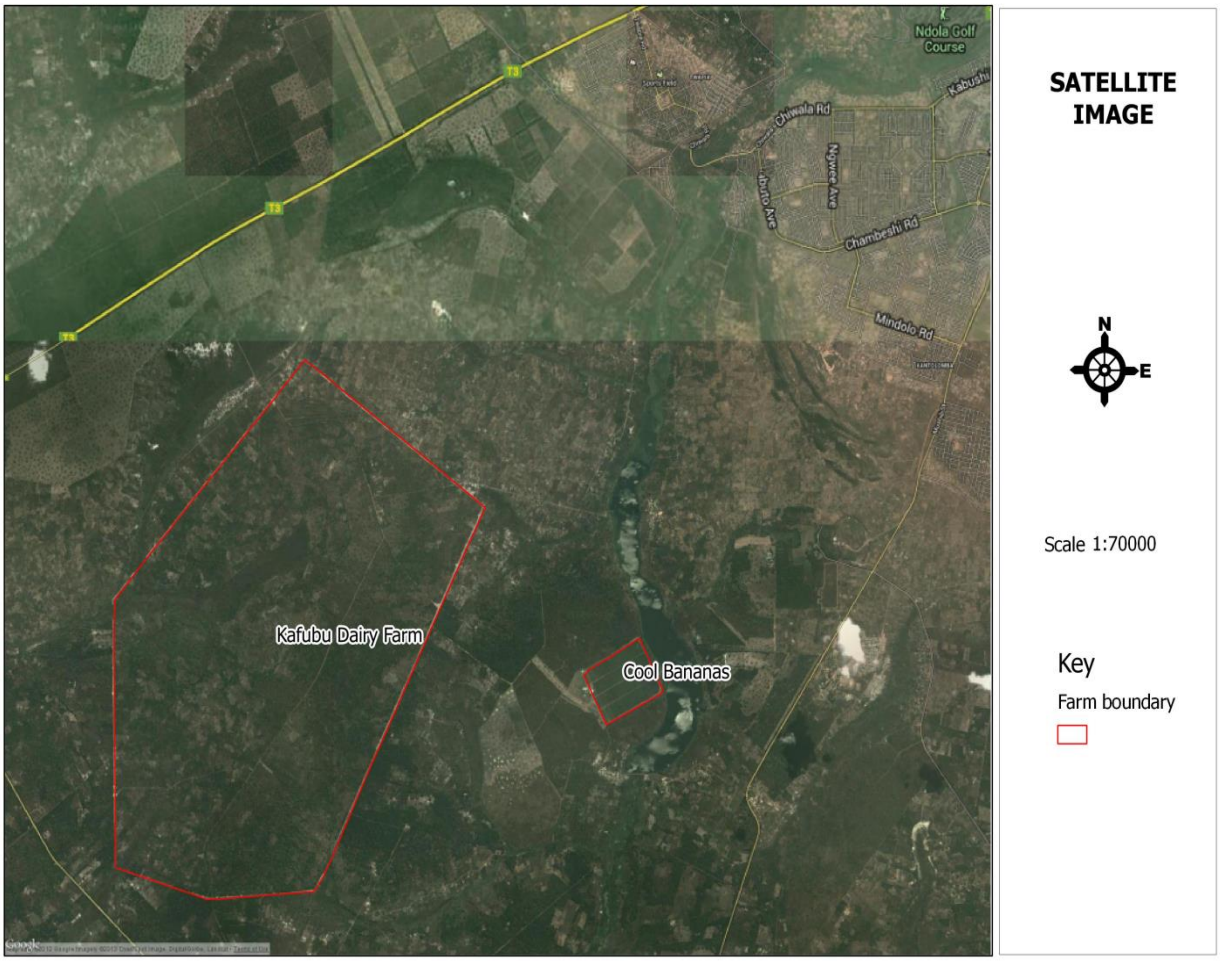


Figure 9: Satellite image for Kafubu farming area

5.7 Built Environment

Kafubu Dairy Farm had during its operation times consisted of 2,964 Ha of land on title which has since been acquired by GoldenLay Limited. The farm has existing infrastructure that was used prior to acquisition. The farm infrastructure is as outlined below:

The farm encompasses 1,800 Ha of arable disturbed land that was used for grazing and cropping activities under the occupancy of Mr. Mutamboh and Zambia Agriculture Development Limited (ZADL). The farm also has a number of housing units that were used by workers, office block, machinery and equipment yard.

The farm also has small poultry houses that were used for poultry farming. Other structures include, milking parlour, cattle lairage, banana plantation, electricity power lines, and 2.5 Km water irrigation line from the Kafubu dam and various access roads within the farm land.

The farm also has about 47 households that according to the previous land owner are illegally occupying part of the 2,964 Ha of land. The occupants have been informed of the change of ownership and the new owner's plans of developing the land.

Plates 4 & 5: Showing old dilapidated infrastructure Kafubu farm.

Existing infrastructure on acquisition of Kafubu Farm are summarised in the table below:

Table 16: Kafubu farm acquired infrastructure

Item No.	Infrastructure Description	Status
1	Main farm house	Dilapidated
2	Carport and store	Dilapidated
3	Assistant manager's house	Dilapidated
4	Deputy assistant manager's house	Dilapidated
5	Dairy foreman's house	Occupied
6	Office block, cooler room and workshop	Dysfunctional
7	Detached carport	Dysfunctional
8	Farm tuck-shop	Dilapidated
9	Machine milking parlour	Dilapidated
10	Hand milking parlour	Dilapidated
11	Poultry house	Dilapidated
12	Stock feed store	Dilapidated
13	Dairy manager's house	Dilapidated
14	Farm worker's quarters	Occupied
15	Boreholes and water tanks	Only 2 existing
16	Underground fuel tank and pump station	Dysfunctional
17	Water lines	Dysfunctional in some areas
18	11KV ZESCO power line	Active but needs revamping

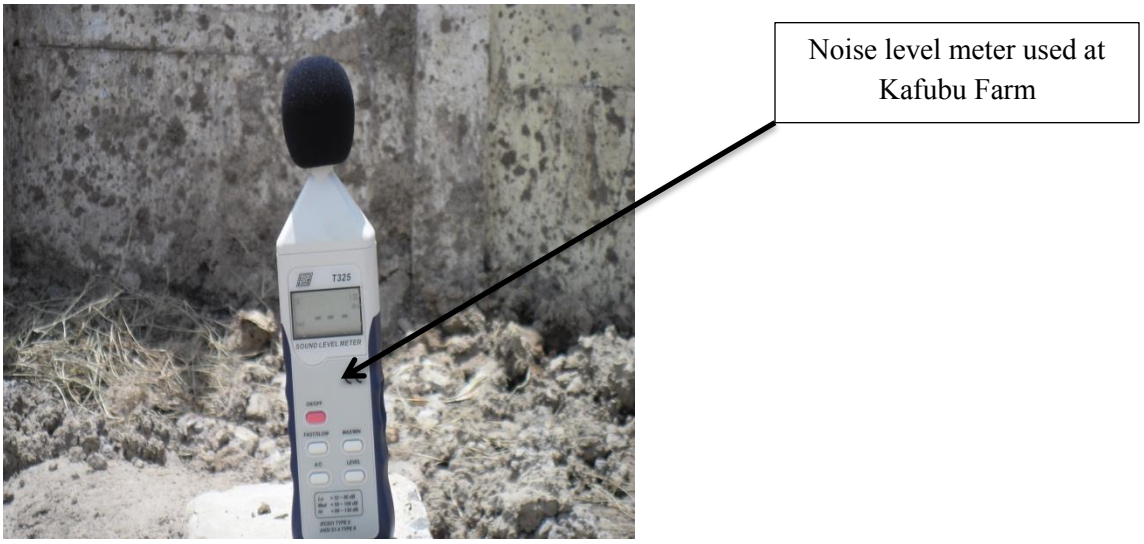
Kafubu farm is bordered by Battledore Farm (Cool Bananas) on the eastern boundary. Battledore farm is predominantly involved in the cultivation and sale of bananas using rain-fed and drip irrigation systems. Kasongo Primary School is located on the western side of Kafubu farm. The school is government owned and has learning grades from 1 to 7 following the Zambian primary

curriculum. The northern boundary has Simpito's farm near beacons C and D while on the southern end is Miriam's farm located between beacons B and C. The Simpito's and Miriam's farms are subsistence farms mainly involved in cultivation of maize and small scale soya beans. Other establishments in the project area are small scale peasant/seasonal farmers surrounding Kafubu farm.

5.8 Noise and vibration

Kafubu farm is located off the industrial set up of the Ndola Central business district. The area is a designated farming area with a number of farms surrounding the project site. The farm area has a number of settlements surrounding the site. Noise levels measured in the project area are within acceptable audible levels consistent with an agricultural setting without heavy machinery and industrial activity.

The social activity level of the area is concentrated near Kasongo Primary School and housing units within the farm area.



Ambient noise levels were deduced from the measurements conducted on site using noise level meter at different measurement time of the day in line with the key socio-economic activities of the farm area. Levels measured are presented in the table of results discussed below.

Noise level readings were used to characterize the noise environment at each location or site and to distinguish the various noise levels associated with each point.

Table 17: Noise level results at Kafubu farm.

Sample site	Site description	Days sampled	R 1 (dB)	R 2 (dB)	Average (dB)	Duration (min)
Site 1	Beacon A	**2**	38.5	38.0	38.25	45
Site 2	Main farm house area	**2**	34.0	33.4	33.70	45
Site 3	Beacon C	**2**	36.2	35.9	36.1	45
Site 4	Kasongo P. School	**2**	48.5	44.6	46.6	45

IFC noise standards key:

D=Disruptive :> 85 dB; I=Institutional levels: 55dB; C=commercial levels: 70 dB;
I_2 =Industrial: 80dB

There are no mining, heavy or light industrial activities in the project area. Therefore the results of the noise assessment are typical of a rural agricultural setting. In the Kafubu farming area, land was used for agricultural purpose, thus noise levels were noticed to be within the allowable limits as stipulated by the International Finance Corporation (IFC) performance standards.

The highest average noise level reading obtained was 46.6 dB at Kasongo Primary School. The levels are attributed to the high population in the area and standard agricultural, semi processing and social activities of the area. The highest noise level recorded are below the disruptive (85 dB) noise level standard of the International Finance Corporation (IFC) which was the benchmark used in the study. No ground vibration was noticed or observed during the sampling period.

5.9 Fauna

Fauna habitats within Kafubu farm generally consist of disturbed and highly modified units reflecting changes in vegetation structure and composition due to historical land use practices, associated with the commercial farming activities that were undertaken by ZADL and Mr.Mutambo during their periods of operations. The high level of anthropogenic agricultural activities in the area has led to negative alterations of wildlife habitats.

Generally, Ndola district has grown and industrialized to a level where it cannot support large mammals and reptiles naturally. The study revealed that all the large animals such as Elephant, Zebra, Black Rhinoceros, Eland, Sable and Roan Antelope do not exist in the project area. This could have resulted from agriculture activities coupled with settlements and deforestation by charcoal burners within the farm area and surrounding bushes.

The main habitat type in the study area comprises variable rank grassland with scattered emergent trees. However, from the habitat signs that were observed and interviews with the local people, a variety of snakes, insects, hares and bush rats exist. Others include lizards, chameleons and moles. Interviews and interactions the local people reveal that they have observed the

presence of Black Rat *(Rattus rattus),* Cane Rat *(Thryonomys swinderianus)*, rabbits and bush Squirrel *(Paraxereus cepapi)*. Insect life includes a variety of species of dragonfly, wasp, bees, crickets, grasshoppers, termites, mosquitoes, ants, red ants, lady bugs, Caterpillars, butterflies and moths.


Plate 6 and 7: Disturbed fauna habitat within Kafubu farm.

The collection of aquatic fauna data was based on interviews from local people, literature review and aquatic site survey.

The nearest main watercourse in the project area is the Kafubu River. It is located 3.5km from the farms eastern boundary and is the major source of water for the City of Ndola and surrounding areas. The river provides habitat resources for locally occurring fish species, as well as potentially functioning as a nursery area for larger species present in more developed systems. There are a few fauna species in the project area. This is attributed to the anthropogenic disturbance of the aquatic ecosystem. Some of species are *agama sp*. (common lizard), *Grithidea rhizophorarum* (water snail) and *Raftia pachyptila* (tube worms).

There are no declared rare or endangered species in the project area. Kafubu farm has no Game Management Area (GMA) that harbors rare or endangered species.

5.10 Flora

Field reconnaissance survey and desktop studies were conducted within Kafubu farm to determine the flora composition and tree population of the farm given the fact that the area is a disturbed piece of land owing to the previous agricultural and animal rearing activities that were undertaken by the past owners of the farm.

The Copperbelt Province and surrounding region is mostly composed of Miombo woodland. Miombo *(Brachystegia)* is a genus of trees comprising a large number of species. Miombo woodland is classified in the tropical and subtropical grasslands, savannas, and shrub lands. The

Miombo woodland is usually distinguished by its three dominant species, the *Brachystegias*, *Julbernadias* and *Isoberlinias*. Other common tree species include *Uapaca, Pterocarpus, Piliostigma, Pseudolachnostylis*, *Acacia* and *Combretum*. In most cases, variations occur in small patches forming pure stands of say Uapaca kirkiana, and also termitalia Miombo do exist side by side with dominant woodlands.


Plates 8 & 9: local flora within Kafubu Farm (2013)

Vegetation identification was done by examining tree shape, size and foliage colour. As for species identification the following were considered Leaf composition, leaf type, leaf variation and plasticity, branch shape and stems.

The species diversity, abundance, population and evenness of the trees within the proposed project area was conducted by using transects (Quadrants) technique.
Three (3) transect plots of 20metres by 20metres were created to help in determining species diversity, abundance, population and evenness of the trees within the proposed farm site area. The identified tree species and population estimates are indicated in the table below.

Table 18: Tree species of the project area.

Species	**Plot 1** (S38º08.132´,E028º53.300´)	**Plot 2** (S13º09.827´,E027º52.393´)	**Plot 3** (S13º28.32´,E027º54.512´)	**Total**
Brachystegia spiciformis	2	0	1	3
Brachystegia longifolia	0	1	0	1
Parinari curatellifolia	3	1	2	6
Pericopsis angolensis	0	1	1	2
Albizia antunesiana (Mukoso)	1	0	1	2
Swartzia madagascariensis	2	1	2	5

Plates 10 &11: Tree measurement during flora reconnaissance survey (July, 2013).

The study revealed that the vegetation around the project area is dominantly very poor and open Munga woodland dominated by *Acacia sieberana* and co-dominated by *Toona cilyata* (exotic).Vegetation observed during the study showed some retrogression process occurring in the area around the land used for cultivating crops although it also showed some of the vegetation re-emerging as shrubs due to non- farming activity and allowing the land to be idle. This was also attributed to the fact that most of the Miombo trees were cut down for charcoal use and agriculture activities. The tree heights at the project site varied between 2.1-14metres and grasses were 0.1-1.5metres. Tree species with the highest natural regeneration potential was *Acacia* which recorded an average natural regeneration potential of five stems per 100 m^2. Some of the tree species identified in the project area include as highlighted below.

- *Brachystegia spiciformis* (Musase)
- *Brachystegia longifolia* (Musamba)
- *Parinari curatellifolia* (Mupundu)
- *Pericopsis angolensis* (Mubanga)
- *Albizia antunesiana* (Mukoso)
- *Swartzia madagascariensis* (Ndale)

Grass species identified in the area consist *Eragrostis viscose* (Sticky love Grass); *Setaria* (Bristle Grass), *Digitaria* (Finger Grass), *Monocymbium ceresiiforme* (Boat Grass), *Loudetia simplex* (Common Russet Grass), *Hyperhenea Imperata* (Thatching grass) and *Themeda triandra* (Rooigrass).

No aquatic species were recorded during the survey as the farm does not have any streams, rivers or dambos within its boundaries and also that the survey was conducted in the dry season when all likely seasonal dambo areas would have dried up.

Kafubu farm does not have any rare or endangered flora species that are likely to be extinct due to the implementation of the project.

Table 19: Species diversity estimated figures

Plot Number	Number of Trees	Proportional abundance	Dominance
1	19	1.94	9.0
2	21	1.21	6.77
3	18	1.84	6.95
All Plots	**118**	**7.36**	**33.92**

5.11 Birds

Kafubu Farm has a disturbed fauna habitat due to anthropogenic human activities including tree cutting, charcoal burning and cultivation in most areas of the farm. These activities have led to most of the birds to migrate to far areas that exhibit reduced human activities and settlements. However, interviews of the local inhabitants, area measurements per square metre and field observations reveal species as indicated in the table below.

Table 20: List of bird species frequently observed in the project area.

No.	*Scientific Name*	Common Name
1	*Coracias caudata*	Lilac-breasted Roller
2	*Bucorvas leadbeateri*	Ground Hornbill
3	*Lybius torquatus*	Back-collard Barbet
4	*Pogoniulus chrysoconus*	Yellow-fronted Tinker
5	*Thripia namaquus*	Bearded Woodpecker
6	*Turdoides jardineii*	Arrow-marked Babbler
7	*Phyllastrephus terrestris*	Terrestrial Bulbul
8	*Cossypha heuglin*	Heuglin's Robin
9	*Sylvia borni*	Garden Warbler
10	*Cisticola juncidis*	Fan-tailed Cisticola

The bird species observed in the project area are not endangered by the anthropogenic activities to warranty their extinction. However, historical record *(Jeffery et al, 1998)* reveals that some species in Ndola have been threatened with extinction. The species are as indicated below:

Table 21: Endangered species in Ndola ***(source: Jeffery et al-1998)***

No.	*Scientific Name*	Common Name
1	*Egretta vinaceigula*	Slaty Egret
2	*Falco naumanni*	Lesser Kestrel
3	*Grus carunculata*	Wattled Crane
4	*Hirundo atrocaerulea*	Blue Swallow
5	*Phoenicopterus ruber*	Greater Flamingo
6	*Phoenicopterus minor*	Lesser Flamingo

5.12 Archaeological and cultural environment

Kafubu Farm is located 16Km from Ndola CBD and about 2.5Km off the Ndola –Kitwe dual carriage way. The project site has no cultural or heritage sites likely to be negatively impacted by the project undertaking.

The nearest cultural sites are the Mofu mahogany tree located 3.5Km from Kafubu Farm in Chichele national forest along the Ndola-Kitwe highway. The Chichele Mofu tree is approximately 500 meters from the Dag Hammarskjold Memorial Site turn off. The tree is over 200 years old and was declared a National Monument on 21st March 1976 to commemorate Zambia's participation in the World Forestry.

It symbolizes the need to conserve trees and use them wisely. Unfortunately, the tree recently fell under harsh rainfall conditions and is fenced off for protection.

The Dag Hammarskjold Crash Site is located 13 km west of the City of Ndola and 6Km from Kafubu farm. That was the area where the United Nations Secretary – General Dag Hammarskjold and 15 others including the crew died in a plane crash. The late Secretary-General was on a mission to meet the Congolese President Moise Tshombe in Ndola on 18th September 1961. The meeting was an attempt to resolve the conflict in the Katanga region and have peace in the area. The identified sites will not be affected by the project undertaking at Kafubu Farm.

5.13 Socio-economic set up of the project area

The scope of works for the social environment baseline study for the Project included desk study and site investigation of the following:

- Ndola District Overview,
- Farming area community structure,
- Social-economic Characteristics,

Ndola lies between latitudes 120^{o} and 160^{o} South of the Equator and between 250^{o} and 300^{o} East. It is one of the 10 districts found in the Copperbelt and shares its borders with three districts namely Masaiti, Luanshya and Kitwe. It also shares an international boundary with the Democratic Republic of Congo (DRC) to the north. The city is the Provincial Headquarters of the other Districts of the Copperbelt Province namely, Chililabombwe, Mufulira, Chingola, Kalulushi, Kitwe, Luanshya, Chambishi, Mpongwe, Lufwanyama and Masaiti.

In terms of land cover, the City of Ndola is the third largest city in Zambia, covering some 110, 300 hectares with a population of about 374,757 *(2010 census-CSO)*.

The study team also found that an insignificant number of households practice subsistence farming within the farm area and surrounding villages with maize being the major crop grown. This is mainly for household consumption. Some households are involved in the growing of vegetables such as rape, cabbage and tomatoes.

Most of the local people in the area surrounding the project site are small scale peasant farmers practising seasonal farming of crops such as cassava, ground nuts and sorghum.
During the existence of Kafubu Dairy Farm, most of the local people were dependent on the surrounding farms as main source of employment. Employment was the major economic earner of the local during the existence of the Kafubu Dairy Farm.
There are two parallel administration systems in the district, the Central and Local Government systems. The Central Government System is composed of all government departmental heads, under the headship of the District Commissioner (DC) who co-ordinates all district developmental activities.

To discharge these functions, the District Administrator and the Town Clerk co- chairs the District Development Coordinating Committee (DDCC), whose composition encompasses district government departments, the Council, major companies in the district, Community Based Organizations (CBOs), Non-governmental Organizations (NGOs) and many other stakeholders.
The local government system is composed of the elected Councillors headed by his Worship the Mayor. These collectively constitute the council. The council is the highest policy making body in the district. It is composed of twenty five (25) Councillors representing twenty five (25) wards and four (4) members of parliament representing four constituencies in the district. The council has six Standing Committees namely Finance and General Purposes, Plans, Works and Development, Housing and Social Services, Public Health and Establishment. Council discharges its functions through these committees. Six Chief Officers under the headship of the Town Clerk as the Chief Executive with the labour force under them support the Council in regard to the implementation of policies and resolutions.

5.13.1 Population

According to the 2010 census of population and housing *(CSO 2010 census report),* the population of Ndola stands at 455,194 inhabitants.

5.13.2 Growth rate, population density and distribution

Ndola represents 23.7% of the total provincial population of 1,920,649 in the Copperbelt. Out of the district population of 455,194 49% are males with females representing 51%. This figure is shared by about 91,053 households out of which 53,185 are in Ndola Central Constituency with 13,552 households in Chifubu constituency, 29,998 in Bwana mkubwa and 24,318 in Kabushi constituency. Furthermore, Ndola Central Constituency has the largest population in the district with 112,129 and Chifubu Constituency with the lowest population of 96,642 inhabitants. The population of Ndola district has steadily grown from 374,757 inhabitants in 2000 to 455,194 in 2010 representing a growth rate of 2.0% per annum.
Kafubu farm is located in Bwana Mkubwa constituency and in Chichele ward with populations of 118,464 and 7,767 respectively.

5.13.3 Social services and amenities

Kafubu farm area is predominantly a low income economy with most inhabitants being local peasant farmers and dependent on the large existing farms such as Battledore farm for employment and economic activities. In terms of social services, the area has two primary Schools namely Kasongo Primary on the entrance to Kafubu Farm and Roma Community primary School located 2km on the western boundary of the farm near Battledore farms.

The area has no clinic in the nearest 5 km radius except for Fisenge Clinic located 3.5km off the Baluba –Luanshya road. The area has No existing Police Post for maintenance of security and order.

Other social services available include churches and community groups. The area is also serviced by passable gravel roads, mobile network such as Airtel Premiere, MTN and Zamtel.

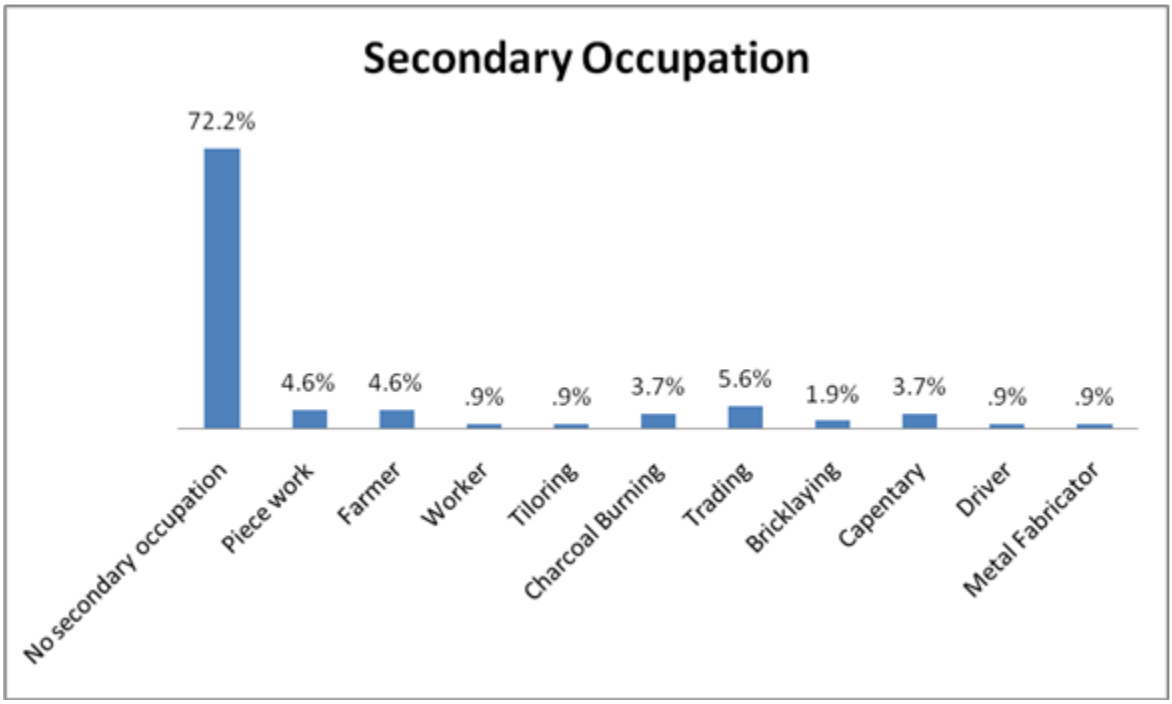
5.13.4 Market availability on various commodities

Market for the grown crops in the area is available through local community make-shift markets especially during the harvest season. Vegetables grown almost throughout the year are readily sold on the local markets. A significant portion of the maize harvested by the local subsistence farmers is readily sold to the Food Reserve Agency (FRA) through the nearest depot in Fisenge and Baluba areas. Local traders from Ndola and Luanshya also purchase the commodity for resale to local millers such as Roan Antelope and Chimanga Changa Millers.

5.13.5 Literacy levels, Health and Gender equity

The project area has only two primary schools offering up to basic education level to the children of the area. The schools offer up to the 7^{th} grade of the Zambia education curriculum. The project area has no secondary school offering higher education. From the socio-economic survey conducted, most of the inhabitants of the area practice farming as their primary occupation. Most of the people have not attained higher level and tertiary education due to lack of school facilities. However, most people on average are able to use English, interpretation of information and understanding of the political and socio-economic status.

The statistics for the secondary occupations of the local people are highlighted in the figure below.



Source: Kafubu farm survey, 2013.

There are no reliable records of the health status and disease prevalence in the area because there is no health facility in Kafubu Farm.

In terms of employment, there are more males employed in the surrounding farms than women as most jobs available are labour intensive and manual in nature such as stamping and tree cutting. However, women are also employed in the nearby Banana plantation in various fields. Skilled labour in the area is very limited owing to the lack skills training facilities within and surrounding areas.

5.13.6 Resettlement and compensation

Kafubu Farm has a number of settlers within the boundary of the farm that occupied the land during the tenure or ownership of Mr. Mutambo. According to the land sale agreement between GoldenLay and Mr.Mutambo, the settlers are dotted on one end of the farm near beacon B and occupied the land illegally within the titled land of the former owner.

GoldenLay limited has committed 200Ha of land within the farm that will be used for resettlement of the settlers once an agreement is reached in accordance with the IFC international resettlement standards and in liaison with the Zambian government.

According to the International Finance Corporation-IFC, involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition. Resettlement is considered involuntary when affected individuals or communities do not have the right to refuse land acquisition that result in

displacement. This occurs in cases of: (i) lawful expropriation or restrictions on land use based on eminent domain; and ii) negotiated

Settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

Unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment to affected persons and communities, as well as environmental damage and social stress in areas to which they have been displaced. For these reasons, involuntary resettlement should be avoided or at least minimized. However, where it is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.

Experience demonstrates that the direct involvement of the developer in resettlement activities can result in cost-effective, efficient, and timely implementation of those activities, as well as innovative approaches to improving the livelihoods of those affected by resettlement.

Negotiated settlements help avoid expropriation and eliminate the need to use governmental authority to remove people forcibly. Negotiated settlements can usually be achieved by providing fair and appropriate compensation and other incentives or benefits to affected persons or communities, and by mitigating the risks of asymmetry of information and bargaining power.

The settlers on the farm that will be relocated due to the project implementation have been engaged by GoldenLay limited to ensure that compensation and/or relocation is conducted according to the guidelines. Two groups were identified to have been resident within the farm. The first group was composed of ex-employees that illegally occupied the land and represented by the Kafubu dairy association. The group claimed ownership of the land they occupy. The second group was composed of settlers that had offer letters from the ministry of land to acquire the land they were occupying.

Meetings were held between the representatives of the two groups of settlers and GoldenLay Limited. These meetings were facilitated by the office of the district commissioner in Ndola and resolutions were made to compensate the inhabitants legally occupying the land in question.

The first meeting was held on 26th August, 2013 between GoldenLay and the settlers represented by the Kafubu Dairy farmers Association leader Mr. Manda *(see attached minutes in appendix)*. The meeting was facilitated by the Ndola district Commissioner's office and chaired by the District Administration Officer. Various submissions were made by the affected parties regarding the status of the land and clarifications on hectare and size were made.

The meeting resolved that;

a. The legal owner of the 2,964 Ha of land was GoldenLay limited.
b. Representatives of the settlers should inform their members who the legal owner of the land is.
c. No one should occupy and claim ownership of the land except for the settlers with offer letters.

d. No collection of money should be undertaken by any group for purposes of offering land to the people.

The second meeting was held on 5th September, 2013. The meeting was attended members believed to have offer letters from the ministry of lands for land within Kafubu farm. The identified settlers were those with offer letters and settled within Kafubu farm. They were a total of 47 *(see attached minutes in appendix)*.

There were three options suggested in the meeting for compensation:

a. Payment in monetary terms for the land (hectares) and structures owned.
b. Relocation of the settlers to Mpongwe and increase of 50% on original land size and compensation for the structures.
c. Allocation of the same size of land within the farm boundary for all the settlers and relocation from the original land.

The settler's demands were that GoldenLay must allow the farmers to cultivate for this season, move the boundary fence, increase in the number of hectares for compensation and consider compensation for other things like trees.

In view of the outcomes of the meetings and concerns from stakeholders and government departments, a Resettlement Action Plan (RAP) was prepared to help in settling the occupants and finding a lasting solution to the issue of land.

15.5.7 Traditional and religious practices

The project area falls in the Bwana Mkubwa constituency which is managed under the civic administration of the Ndola City council. Kafubu farm is under state land and there are no customary related activities undertaken in the area. Kafubu area is composed of local residents of mixed ethnic and tribal backgrounds. Therefore no specific traditional practices are conducted typical of a single tribe or culture. The area has a Christian setup that comprises catholic, Pentecostal and Presbyterian churches.

6.0 PROJECT IMPACTS

This chapter discusses the Kafubu farm project impacts on both the biophysical and socio-economic and cultural environment within the project's area of influence. A matrix was used to establish the likely changes effected by the project on the environment. Results obtained were then analyzed and assessed to establish significant, major and minor impacts. The following criterion was used:

- The Sensitivity of the environmental element being impacted
- The spatial extent of the impact
- The severity/intensity of the impact
- The duration of the impact
- The Probability/frequency of occurrence of the impact or source of impact.

Furthermore, impacts were characterized according to the phase of the project implementation as follows:

- Impacts associated with preparatory and construction phase
- Impacts associated with Operational Phase
- Impacts associated with Decommissioning and Closure Phase

Impact significance characterization was determined at four levels namely: Non- Significant, Low Significant, Moderately Significant and highly significant impacts.
Impact characterization definitions adopted for the study were as follows:

(i) Highly Significant impact: A frequent Impact and or one with highly severe effects.
(ii) Moderately Significant Impact: A frequent impact of moderate severity.
(iii) Low Significant Impact: An infrequent impact of moderate severity.
(iv) Non- Significant Impact: An improbable impact or one with non-severe effects.
(v) Severe Impact: impact infringing on legal provisions or established social norms and with widespread effect i.e. impact affecting areas outside the immediate confines of the defined project area.
(vi) Moderately Severe Impact: Impact causing serious but reversible damage and result in moderate public outcry.
(vii) Non Severe Impact: Impact not subscribing to any of the above.

Project impact identification and their spatial extent were restricted to the following classes:

1. Environmental impacts: these included impacts on Air quality, surface & ground water, soils, flora, fauna and avifauna. Impacts of chemical application on the surrounding communities and settlements in Kafubu area.
2. Socio-economic and cultural impacts: impacts of increased crime, HIV/AIDS prevalence, impacts on revenue base for Kafubu area and Ndola as a district, impacts on public health and safety, labour conditions and employment, social welfare, social amenities and impacts on historical and cultural sites near or within the project area.

Mitigation measures aimed at preventing, reducing, compensating and/or managing the impacts were identified for all significant impacts with monitoring activities proposed for residual impacts of the project in the event that GoldenLay limited ceases the operations of the farm.

6.1 Biophysical Environment

The impacts on the biological and physical environment of the project area have been detailed in accordance with the three project implementation phases i.e. preparatory and construction, operation and decommissioning and closure. The impact characterization details of each evaluated impact according to Nature of impact (positive, direct/ indirect and reversible/ irreversible), timing, duration, spatial extent, likelihood, frequency and sensitivity are given in the foregoing.

6.1.1 Preparatory and construction phase impacts

Surface Water Quality

There are no permanent wetlands in the 2964Ha extent of Kafubu Farm. No rivers or streams traverse within the farm land. However, the nearest river close to the project site is the Kafubu located 3.5km from the site on the eastern side. The river has a catchment area of 539 Km^2. Chemical application activities and poor management of soils resulting into erosion and also from water runoff especially during rainy season may pose a risk of surface water contamination over a long period. This impact if it occurs will be minimal or negligible considering the land orientation and water drainage systems in the area. The other possibility is that of storm water flowing along road way drains and across the farm land. This impact is also considered minimal.

Ground Water Quality

GoldenLay limited intends to drill ten (10) underground water boreholes for purposes of supporting winter cropping, livestock and poultry operations. The project site has a rich underground water resource as evidenced from the historical information obtained from the previous owners of the farm. Kafubu Farm currently has one borehole near the farm site with an estimated yield of 25l/s.

Petroleum handling at the farm specifically the handling of fuels (diesel) at the fuel storage tank, leakages of oils from farm machinery, vehicles and handling of used oil at the workshop is likely to result into ground water contamination through introduction of hydrocarbons into the soil and direct infiltration into ground water. During the rainy season, fuel and oil spills if not properly handled, they will end up in the soil and eventually in ground water. This impact may affect both the proposed project site and surrounding areas as they share the same underground water aquifer. The impact will be regional since the area shares the same underground water aquifer.

Impact significance: *Moderate*

Ambient Air Quality

The main access gravel road to other areas beyond Kafubu farm passes within the project site boundaries. The road leads to Battledore and Simpito's farms.in creased traffic on this road will result into high levels of dust thus affecting the air quality of the area. Movement of construction vehicles during access road rehabilitation, clearing of vegetation, sinking of boreholes, construction and/or rehabilitation of the milking parlor, farm house, feedlot, poultry houses, workshop, chemical store and other support infrastructure will result in increased dust and exhaust fumes from motor vehicles and machinery on site. Ploughing and tilling, transportation of materials and construction of all ancillary facilities will certainly generate appreciable amount of dust. This impact will be regional as it may affect both the proposed project site and its vicinity.

Impact significance: *Moderate*

Soil Contamination

Poor management of fresh and used oils will also certainly contaminate the soil. This impact will be regional as it may affect the proposed project site and its vicinity.

The poor management of effluent from poultry house, dairy and beef feedlot wash water may contaminate ground water and soil within the farm area. This impact is considered localised and of low magnitude.

Impact significance: *Low*

Soil erosion

A greater part of the farm land will be cleared for agricultural activities and construction of other infrastructure. Clearing of vegetation, construction of access roads and infrastructure will result into possibilities of soil erosion. This impact will be local as it will be restricted to the proposed project site. Soil erosion will eventually result into poor soil fertility as the nutrients will be leached out.

Noise

Transportation of farm implements, use of dozers, graders, tractors and any other equipment in vegetation clearing, sinking of boreholes and construction of infrastructure will result into noise generation. This impact will be regional as it may go beyond the proposed project site. Operations of machinery will be restricted to day light (between 07:00 to 18:00hours) and machinery will be regularly serviced to emit sound with the acceptable audible frequencies of 65dB (*IFC noise level standards, 2010)*.

Impact significance: *Low*

Land Use

Construction of all necessary farm infrastructures will certainly have a positive impact on land use. Land use will change from idling and transformed to its intended purpose of commercial agricultural activities under the management of GoldenLay Limited.

Damage to agricultural lands/fisheries

This impact is unlikely to occur as Kafubu farm has no streams or rivers with fish likely to be destroyed by the project. Irrigation water will be obtained through boreholes. The farm already has used farm land (brownfield) thus no significant land destruction is expected. Kafubu farm will be developed in line with appropriate farming methods that will not result in indiscriminate use of land.

Impact significance: *Low*

Flora

Clearing of vegetation will certainly reduce the number of trees in the area. Some of trees that will be cleared are endangered specifies. It is almost impossible or very difficult to replace the endangered species at any time. Most of the trees in the farm were cleared because Kafubu farm was an existing farm land utilized by Mr. Mutambo prior to acquisition by GoldenLay. Impact on flora will be localised.

Impact significance: *Low*

Fauna

The impact on fauna is unlikely as there are no bigger animals in the proposed project site or in the vicinity which are sensitive to such developments. The only animals present are those that are able to survive even with such developments. Examples are birds, rabbits, lizards, rodents, snakes and smaller animals. Impact of construction and operation activities will be localised.

Impact significance: *Low*

Landscape and Visual characteristics

Construction of new infrastructure will certainly result in change in aesthetics of Kafubu farm. Clearing of certain portions of vegetation and construction of different farm infrastructure will certainly have an impact on the landscape and visual characteristic of the proposed project site. This impact will be local. The landscape and visual characteristics will change drastically.

Impact significance: *High*

Public Safety

Increased traffic in the main road passing through the farm will increase the risk of road traffic accidents especially to pupils at Kasongo primary School who use the road as the only means of aces to the school. The school is situated about 300m from the main road. The impact is considered significant and of high frequency. GoldenLay Limited will install speed limit signage near the school to control vehicle speed and also the construction of speed humps to deter over speeding. Road traffic wardens from within the farm area will be identified and trained in helping school children cross the road at reduced accident risks.

The revamping of Kafubu farm will result in the influx of people around the project area seeking employment and business opportunities. This will result in increased crime rates in the area. Vehicular movement and farm equipment may possibly cause accidents to members of the public who may illegally stray into the farm area. Open boreholes are certainly a danger to public safety. GoldenLay Limited has engaged the Zambia Police Service through the Ministry of Home Affairs to offer manpower and that the company will construct a police post in the area to help reduce incidents of crime and theft. The police post will be constructed once the construction commences upon approval.

Impact significance: *high*

Archaeology and cultural sites

Kafubu farm formerly *Kafubu dairy farm* was an established farm with over 20 years of existence. Archaeological sites having items such as cultural relics, iron and Stone Age objects, old caves, artistic work and paintings, spiritual and worshiping items, churches, traditional places *(Insaka)* may possibly be damaged during construction phase if found within the vicinity of the farm. Kafubu farm has no historical, cultural and archeological sites within the farm. The nearest historical sites are the *Dag Hammarskjold* memorial site and the *Chichele Mofu* tree located far away from the farm and will not be affected by the project implementation. Therefore this impact is very negligible.

Impact significance: *Low*

Hazardous Waste

Fresh and used machinery oil is likely to be spilled into the soil during the construction phase depending on the management of these items. Other hazardous waste such as expired chemicals, batteries, electronic waste and filters will also be generated. The impact will be localized.

Solid Waste

Construction packaging material (e.g. cement bags), off cuts from steel, timber, rubble and domestic waste will be generated during construction. This impact will be local.

Sewerage Waste

Use of toilets whether pit latrines or advance will result into sewer waste being generated. This may possibly affected ground water quality in the vicinity of the pits. This impact is minimal and will be localized.

6.1.2 Operational phase impacts

Surface Water Quality

There may be possibility of surface water contamination resulting from water runoff containing chemical residues of pesticides and herbicides from the farming operation. The other possibility is that of storm water flowing along road way drains and across the farm land. Effluent water from the poultry operations, beef and dairy feedlot operations may also affect surface water quality. This water will finally sink or percolate into the soil. It is therefore unlikely that there will be surface water pollution resulting from the any activities from the farm and any associated activities.

Impact significance: *Low*

Ground Water Quality

Handling of fuels at the fuel storage tank, leakages of fuel from vehicles and handling of used oil at the workshop may lead to ground water contamination by hydrocarbons. Incorrect handling of fresh fuels and used oil may lead to leakages of fuel into the soil and in an event of rains and/ or storm water these hydrocarbons will end up in the soil and eventually in ground water.

Application of fertilizers, insecticides, fungicides and herbicides will certainly result into soil contamination and with rain water and storm water these chemicals will contaminate ground water. This impact may be regional as areas in the proposed project site may be affected.

Impact significance: *Low*

Ground water drawdown

Sinking of 10 boreholes on the farm to support the water requirements of the operations to be undertaken may result into significant ground water drawdown that will eventually affect the water table in the Kafubu ground water aquifers. This drawdown may also affect the shallow wells that may be found around the area due to pumping pressure on the underground aquifer.

The primary contributor to the availability and presence of groundwater resources in Kafubu area is rainfall. The porosity, permeability and hydraulic conductivity of the soils in the area guarantees constant recharge to the groundwater and consequent availability. Ndola in general and Kafubu area in particular have experienced uniform rainfall regime over a long period which provides sufficient recharge potential for the aquifer although seasonal groundwater level fluctuations may occur as the result of the spatial variability of the rainfall as well as due to pumping.

Pumping of water for irrigation from the ten boreholes will not be continuous. This will be so in order to allow the recharge of the underground aquifer. Water will be stored in a reservoir with 10000m^3 storage capacity. Irrigation water will then be abstracted from this reservoir at determined times. During the rainy season, pumping will be at its minimum since all the crops will be grown using rainfall. This will allow the water table to replenish the water table.

Impact significance: *High*

Ambient Air Quality

High wind velocities may also result into dust generation from the bare land that has been cleared of its vegetation. This may happen even during off season periods of farming or when the land is idle during the window period of crop rotation system that will be used at the farm.

Vehicular movement through the main road from Kasongo primary to outlying areas of the farm may lead to dust generation. Ploughing and tilling, transportation of materials (inputs and out puts), will certainly generate appreciable amount of dust.

This impact will be regional as it may affect both the proposed project site and its vicinity. This will be a nuisance.

Impact significance: *Low*

Soil Contamination

Poor management of fresh and used oils will also certainly contaminate the soil. This impact will be regional as it may affect the proposed project site and its vicinity.

It is also possible that soil contamination may occur due to inappropriate handling of chemicals such as fertilizer, insecticides, fungicides and herbicides. In the event of rain or irrigation leading to water runoff, these chemicals may percolate through surface soils causing contamination.

Soil Erosion

Poor maintenance of access roads and drainages may result into continuation of soil erosion. Soil erosion may be from storm water and or high velocity winds. This impact will be local as it

will be restricted to the proposed project site. Soil erosion will eventually result into poor soil fertility as the nutrients will be leached out.

Impact significance: *Low*

Noise

Transportation of farm implements and products, use of farm equipment in ploughing and tilling , application of fertilizers, insecticides, fungicides and pesticides, pumping of water, and any other activity associated with the operational phase will certainly result into noise generation. This impact will be regional as it may go beyond the proposed project site. The impact will be low as operations will be restricted to working hours only i.e. from 07:00 to 17:00 hours.

Land Use

The use of centre pivots, tilling and ploughing, transportation of farm inputs and outputs, built infrastructure, pumping of water from boreholes, supply of electricity and any other activity that will be carried out on the farm land at operational phase will certainly have a positive impact on land use. Land use will change from the dormancy period it has undergone the last ten years to commercial agricultural activity. Land use will bring about the needed infrastructural development and economic enhancement in the Kafubu area. This is a positive impact on the land as it will generate income.

Flora

During operational phase it is possible that invasive flora species may be introduced accidentally into the proposed project site and in the vicinity of the proposed project site. The agents of this invasive specifies may not be necessary the developer but may be from the out grower scheme that will be initiated and encouraged by the development.

Impact significance: *Low*

Fauna

Kafubu farm having been in existence for forty five (45) years has no large or endangered animal species that will be impacted by the development thus the operational phase activities will have no significant impact on fauna on the proposed project site or in the vicinity which are sensitive to such developments. Only small animals may be impacted by the revamping and operational activities on the farm. These animals may include birds, rabbits, lizards, rodents, snakes and squirrels. The impact if any will be localised to the project site.

Landscape and Visual characteristics

The landscape and visual characteristics of the project site will change drastically. Use of access roads, buildings, tilling and ploughing, irrigation system, growing of crops and use of machinery at the farm will certainly have an impact on the landscape and visual characteristic of the proposed project site. This impact will be localised.

Public safety and occupational health risk

Movement of haul vehicles, farm machinery such as tractors and circular movement of the centre pivots may cause serious occupational health risk to workers on site and also to the public. The fuel storage facility and open boreholes may also be a source of public safety hazard resulting from fire and physical injuries respectively.

Archaeology and cultural sites

Operational phase activities are unlikely to have any impact to archaeological and cultural sites as they are located away from the project site. The impact of activities on these sites will be insignificant.

Hazardous Waste

The management of fresh and used machinery oils if not adequately addressed may result in contamination of soils and subsequently ground water within the farm site or workshop and/or oil storage areas. This may be so also in the fuel storage facility. Other waste will be obsolete and expired chemicals, fertilizers and empty chemical containers. The impact will be localised to the above stated areas.

Solid Waste

Domestic and Biomass waste will be generated during operational phase. This impact will be local. The domestic waste generation is negative while the biomass generation is a positive impact. The biomass may be used as an energy source with appropriate technology that may be considered by GoldenLay Limited.

Sewerage Waste

Waterborne toilets will be used at the farm and will be connected to a septic tank-soak away system. In other operation centers where applicable, the farm will construct Ventilated Improved Pit latrines (VIP's). These operations will result in the generation of sewer waste. This may possibly affect ground water quality in the vicinity of the project site.

Impact significance: *Low*

6.1.3 Decommissioning and closure impacts

Soil Erosion

Poor maintenance of access roads and drainages around the farm may result into soil erosion. Soil erosion may be caused by storm water and or high velocity winds. This impact will be local as it will be restricted to the proposed project site. Soil erosion will eventually result into poor soil fertility as the nutrients will be leached out.

Land Use

Land use will certainly change after decommissioning and closure. After rehabilitation and re-vegetation, land use may be restored to the original state or up to a certain acceptable standard.

Public Safety

Boreholes, electricity lines and old farm equipment may pose physical danger to locals who may illegally enter the proposed project site after closure. This impact is considered significant as the farm has a main road that traverses across it from east to west leading to other farms.

Landscape and Visual characteristics

Infrastructure such as the feedlot, poultry houses, milking parlor, farm house, workers compound, workshop and the fuel storage tank will be demolished. These activities will alter the visual characteristics and the landscape of the site. There will be no cultivation of crops, no irrigation and out grower schemes after farm closure. This will certainly change the landscape and visual characteristics of the farm.

Solid Waste

Biomass generation will cease as there will be no growing of crops and livestock rearing activities. Closure activities will result into generation of rubble and obsolete equipment. Domestic waste generation will continue but at very minimal scale as the population at the farm will drastically reduce. The farm will be placed under care and maintenance after the closure period.

Sewerage Waste

After decommissioning and closure phase, the use of toilets and sewer facilities will only be restricted to the care taker and family and thus the impact will be very minimal considering the number of occupants. This may possibly affected ground water quality in the vicinity by increasing the traces of total and feacal coliforms likely to result from sewer waste. This impact will be localised.

6.2 Socio-Economic and cultural impacts

6.2.1 Impacts of flooding on fields and houses

Construction Phase

The likelihood of the construction phase to result into flooding of the nearby school, fields and houses is very minimal. All neighbouring farms are at safe distances away from Kafubu Farm. This impact if manifested will be localised to the boundaries of the farm infrastructure.

Operational Phase

After the completion of all construction works, full scale cultivation activities, the anticipated impact may continue on a localised basis affecting only the farm under development.

6.2.2 Impacts of possible drinking water contamination

Construction Phase

The anticipated impact of water contamination at this stage is considered very minimal.

Operational Phase

The possibility of ground water contamination due to chemical laden water runoff is there if water runoff is not controlled. In the event that chemical application commences, local residents will be affected by the residue chemical effects depending on the direction of the winds at the time of chemical application. This impact may also affect water wells in the vicinity of the project site.

GoldenLay Limited will not conduct any aerial application of chemicals (fungicides, herbicides and pesticides).Boom sprayers with ability not to cover a larger aerial view that may result in affecting nearby residents will be utilized. The impact would be considered negative and significant if established as it endangers human life. In terms of magnitude, likelihood, extent and frequency, the impact is considered negligible, possible, confined to the project site surrounding and could possibly be an activity that occurs when spraying is done respectively.

6.2.3 Impacts of air pollution on residents

Construction Phase

Respiratory diseases due to air pollution

The major source of the impact will be dust from construction equipment such as front end loaders and dozers making access roads, clearing ground for construction and tree-cutting in the farm. This impact may affect nearby establishments and households.

Operational Phase

The impact will continue as most of the trees will have been cleared and the whole farm under full cultivation, although the other causes of this problem include actual farming activities which raise dust and the chemicals during the spraying of crops in the farm.

In terms of magnitude, likelihood, extent and frequency, the impact is considered marginal, possible, confined to the project site surrounding and a weekly activity once spraying starts respectively.

6.2.4 Impacts/ Pressure on existing facilities/social/cultural services

Construction Phase

Hospital

During construction and farm clearing phase, all occupational health related injuries will be referred to the nearby Fisenge clinic and Luanshya General Hospital. This will have an impact on the capacity of the staff, available bed space and other associated hospital facilities as this entails extra load.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and a daily/weekly occurrence respectively.

Land for housing

Migrant labour seeking employment opportunities during the on-going farm clearing and construction stages is likely to result in pressure on land around the farm for occupation by prospective migrant workers from the surrounding villages and districts.

In terms of magnitude, likelihood, extent and frequency, the impact is considered negligible, unlikely, confined to the district and a daily occurrence respectively.

Municipal services

Kafubu farm being far from Ndola CBD is not serviced by *Kafubu Water and Sewerage Company* in terms of water and municipal services support. The farm has in the past years of existence utilised the septic tank and soak away system for the management of its municipal waste. The area is also not catered for in terms of solid waste collection by the council. The impact at construction phase is considered insignificant.

Operational Phase

Health

During the operational stage, Goldenlay Limited will employ nearly 100 people both skilled and unskilled with high employment peak during peak seasons such as planting and harvesting. 30% of the employees will be women. This will result in increased pressure on existing health facilities. The farm will also attract a number of residents from other villages, districts for employment and this will put pressure on existing health facilities at Fisenge. In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and a daily occurrence respectively. The impact is negative.

Schools

Farming is usually a labour intensive venture as workers are required at every stage- field preparation, cultivation, weeding, fertilizer and other chemical application as well as harvesting. At full scale operational stage, the company will attract, employ a lot of people from other parts of the village, chiefdom and district who will come along with their families. This is likely to create pressure on existing schools at Kasongo and surrounding areas. The impact is considered negative as this will result in increased teacher – pupil ratio, a factor which limits the provision of quality education. In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and an annual occurrence (during enrolments only) respectively.

Increase in criminal activity

Due to massive infrastructural development to be implemented at the farm and increased population in the area resulting from prospective employment opportunities, the crime rate in the area is likely to increase. This increase may be aggravated by a lack of a police post in the area. The impact is considered significant with likely occurrence and high frequency.

GoldenLay Limited will construct a Police Post in the area and request for manpower from the central Police command through ministry of home affairs to mitigate against the crime risk in the area.

Land for housing

As stated above, the influx of workers in search of employment opportunities during the on-going farm preparation stage is likely to increase once the farm is under full scale operation.

Municipal services

Kafubu farm once fully operationalized as planned, the surrounding area, built up by those seeking employment, which is usually developed without regard to basic services such as clean drinking water and sanitation facilities, disease outbreaks can be unavoidable. Population concentration within the project area will lead to production of solid and liquid wastes which will aid the breeding of disease vectors like mosquitoes and house flies.

Population concentration can also lead to disease when there is inadequate housing leading to overcrowding, lack of free circulation of air and poor ventilation.

Contagious diseases can also easily spread under these conditions. Transmission of an infectious disease may occur through one or more of diverse pathways including physical contact with infected individuals. These infecting agents may also be transmitted through liquids (e.g., cholera), food, body fluids, contaminated objects, airborne inhalation (e.g. respiratory diseases and meningitis), or through vector-borne spread. Disease outbreaks in such a situation can be the order of the day with a resulting loss of life. If not properly handled, the impact may be negative.

Impact significance: *High*

Loss of livelihood

Development of this nature may result in loss of livelihood for the local people especially when it involves displacement of the locals. The impact is considered insignificant and localised as the project will not result in loss of economic stance of the people.

Loss of access route

The main access route through Kafubu farm to other settlements and to the local primary school in the area will be maintained and will not be closed. This impact is minor as the developer will make the road passable in all-weather and ensure the safety of the pedestrians by maintaining appropriate speed limits in the road. The impact is considered insignificant as the road will be maintained and upgraded leading to positive use of the access road.

6.2.5 Impacts on Labour situation/employment

Construction Phase

During this phase, skilled and unskilled labour will be required. The project area has been characterized by high level of unemployment since the closure of Kafubu Dairy Farm over ten years ago. Creation of employment opportunities will therefore increase the positive benefits for the local people who are in dire need of income for sustenance. Furthermore, indirect opportunities for employment will arise from the provision of services to the construction teams/those clearing the farm, such as sale of food and beverages. In this sense the construction

phase may have a positive impact on the employment situation in the nearby communities. In terms of magnitude, likelihood, extent and frequency, the impact is considered definite, possible, confined to the entire district and a mainly a seasonal occurrence especially during harvesting respectively.

Operational Phase

Socio-economic benefits provided by the project will include job provision to the locals during the whole operational phase. GoldenLay Limited will employ a total workforce of 100 people comprising skilled and unskilled labour. Priority will be given to the local people for employment opportunities. Employment increase will bring about an increase in income levels for the local people as well as increased skill base through job on training for non-skilled man power that will be engaged on the farm.

Impact significance: *High*

6.2.6 Impact on Settlements and private farms

Construction Phase

The implementation of the project will result in displacement and/or resettlement of people that are currently occupying portions of the land within Kafubu farm. Most of the settlers on the farm are former Kafubu Dairy Farm workers and seasonal farmers that have maize fields that they claim were allegedly leased to them by the previous owner. Displacement of the settlers during the construction phase of the project will result in loss of houses, cultivation fields and habitats to pave way for land preparation and construction of poultry houses and other support farm structures. This will also lead to loss of livelihood in terms of the main source of income (farming). Furthermore, during the construction phase heavy machinery will be used for the clearance of access roads. Heavy machines may affect households and other privately owned farms in the vicinity of the project area.

Impact significance: H*igh*

Operational Phase

Actual farming operations (poultry, animal rearing, milking and cropping) may disturb the local small scale farmers in the area through displacement.

During this phase, the impacts of involuntary resettlement and /or displacement will include loss of access to social amenities such as primary school facilities for school going children. The other impact will be the loss of social and cultural interaction due to inconvenience. This may result in long-term hardship and impoverishment for affected persons and communities, as well as environmental damage and social stress in areas to which they have been displaced. All

farming activities will be confined to the boundaries of the farm and no activity will be undertaken outside the allocated farm land.

Impact significance: H*igh*

6.2.7 Impacts on public/workers occupational health and safety

Construction Phase

During the construction phase heavy machinery like tractors, dozers, excavators and haul trucks will be employed for the clearance of access roads. Heavy machinery will generate noise, cause carbon dioxide emissions and generate dust and may cause accidents among operators if not handled properly. Haul trucks delivering construction material to site may pose accident risks to the public surrounding the project site.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and a daily occurrence on workers if preventive measures are not considered respectively.

Operational Phase

Access by unauthorised people into the farm, an action which merits trespassing may result in injury if found by farm security personnel. Besides, accidents with the basic cultivation tools, other machinery and farming implements that the workers will be using may occur. In terms of magnitude, likelihood, extent and frequency, the impact is considered insignificant, highly unlikely (as the farm is fenced), confined to the project site surrounding and of negligible frequency respectively.

6.2.8 Impacts of poor conditions of service

Construction Phase

The impact is anticipated at this stage. Subjection of workers to poor conditions of service is against the country's Labour Laws and is therefore considered negative and significant if established and reported.

Operational Phase

The impact may continue if not controlled. In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site and a monthly occurrence respectively.

6.2.9 Impacts of HIV/AIDS

Construction Phase

Presence of migrant workers from other parts of the district and province will, during this phase will be responsible for the spreading of HIV/AIDS as they will be interacting with local people. Casual and unprotected engagement in sexual activities may spread the infection, not only to the members of the community but also the contractors and workers Kafubu Farm.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and a once off occurrence respectively.

Operational Phase

With increased economic activity in the area, people may engage in illicit behavior likely to increase the prevalence of HIV/AIDS and other sexually transmitted infections. The practice could continue and this habit could lead to more cases of HIV/AIDS and consequently death.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and a daily occurrence respectively.

6.2.10 Impact of out grower scheme to local farmers

Construction Phase

The impact is negligible and insignificant at this stage.

Operational Phase

Engagement of local people in soya beans production on out grower scheme basis will help boost productivity, enhance local farmers' incomes and subsequently improved lives and reduced poverty.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and an annual occurrence respectively.

6.2.11 Improved Local Authority Revenue base

Construction Phase

GoldenLay Limited will make statutory contributions to the Ndola local and regulatory authorities through payment of land rates, taxes, pension contributions and other licences to be issued for compliance. The impact is considered significant at this stage.

Operational Phase

Through payment of various levies and revenues, full operations of the farm will improve the financial standing of the Ndola City Council and other regulatory agencies.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and an annual occurrence respectively.

Environmental Aspect	Potential Impact	Environmental Impact Characterisation						
		Nature	Likely hood	Timing	Duration	Extent	Frequency	Sensitivity
Surface Water Quality	Storm water contamination	• Negative • Direct • Irreversible	likely	Pre-construction to distant future	Short term	Regional	2	1
Ground Water Quality	Ground water contamination	• Negative • Direct • Irreversible	likely	Near-future	Short term	Regional	1	5
Drawdown	Reduction in drawdown levels	• Negative	unlikely	Near-future *(operations)*	Short term	Regional	1	5
Ambient Air Quality	Contamination of ambient air with dust	• Negative • Direct • Irreversible	Certain	Pre-construction to near future	Short term	regional	3	3
Soil Contamination	Contamination of soil with hazardous waste (used oil)	• Negative • Direct • Irreversible	likely	Pre-construction to near future	Medium term	Local	2	3
	Contamination of soil with Pesticides, fungicides and herbicides	• Negative • Direct • Irreversible	unlikely	Start of operational to near future	Medium term	Local	1	4
Soil Erosion	Lose of soil fertility as a result of soil erosion by wind and or by water.	• Negative • Direct • Irreversible	Likely	Pre – construction to distance future	Permanent	Local	3	4

Noise	Generation of Noise	• Negative • Direct • Irreversible	Certain	Pre-construction to near future	Medium term	Regional	2	3
Land Use	Change of land use	• Negative • Direct • Irreversible	Certain	Start of operational to closure	Medium term	Local	2	4
Flora	Clearing of vegetation	• Negative • Direct • Irreversible	Certain	Pre - construction	Permanent	Local	1	5
	Introduction of Invasive Species	• Negative • Direct • Irreversible	Possible	Pre-construction	Permanent	Regional	2	5
	Extinction of endangered species	• Negative • Direct • Irreversible	Certain	Pre-construction	Permanent	Regional	2	5
Fauna	Loss of fauna	• Negative • Direct • Irreversible	Certain	Pre-construction	Permanent	Regional	1	5
	Interruption of animal corridors	• Negative • Direct • Irreversible	unlikely	Pre-construction to operational phase	Permanent	Regional	2	5
	Loss of endangered fauna species	• Negative • Direct • Irreversible	unlikely	Pre-construction	Permanent	Regional	1	5
Archaeology and cultural sites	Damage and removal of archaeological sites	• Negative • Direct • Irreversible	Unlikely	Pre - Construction	Permanent	Local	1	4
	Damage and removal of	• Negative	Unlikely	Pre -	Permanent	Local	1	4

	Cultural Sites	• Direct • Irreversible		Construction				
Public Safety	Danger to the community from farm equipment	• Negative • Direct • Irreversible	Possible	Pre – construction to Near future	Medium Term	Regional	2	4
Landscape and visual characteristics	Change to landscape and visual characteristics	• Negative • Direct • Irreversible	Certain	Pre-Construction	Medium Term	Local	1	4
Hazardous Waste	Generation of hazardous waste such as used oil, chemical containers, batteries, florescence tubes, filters etc.	• Negative • Direct • Irreversible	Certain	Pre-Construction to Operational phase	Short Term	Local	2	4
Solid Waste	Generation of Solid Waste from plant biomass	• Negative • Direct • Irreversible	Certain	Operational Phase	Medium Term	Local	1	4
	Generation of Domestic Waste	• Negative • Direct • Irreversible	Certain	Pre – Construction to Mid Future	Short Term to Medium Term	Local	3	3
Sewerage Waste	Generation of Sewer Waste	• Negative • Direct • Irreversible	Certain	Pre – Construction to Mid Future	Short Term to Medium Term	Local	3	3
Surface Water Quality	Surface water contamination	• Negative • Direct • Irreversible	unlikely	Pre-construction to distant future	Short term	Regional	3	1
Ground Water Quality	Contamination of ground water	• Negative • Direct	Possible	Near-future	Short term	Regional	1	5

		• Irreversible						
Drawdown	Reduction in drawdown levels	• Negative	Certain	Near-future	Short term	Regional	1	5
Ambient Air Quality	Contamination of ambient air with dust & vehicular emissions.	• Negative • Direct • Irreversible	Certain	Pre-construction to near future	Short term	regional	3	3
Soil Contamination	Contamination of soil with hazardous waste (used oil & chemicals)	• Negative • Direct • Irreversible	likely	Pre-construction to near future	Medium term	Local	2	3
	Contamination of soil with Pesticides, fungicides and herbicides	• Negative • Direct • Irreversible	Certain	Start of operational to near future	Medium term	Local	1	4
Soil Erosion	Loss of soil fertility as a result of soil erosion by wind and/ or by water.	• Negative • Direct • Irreversible	Possible	Pre – construction to distance future	Permanent	Local	3	4
Noise	Generation of Noise	• Negative • Direct • Irreversible	Certain	Pre-construction to near future	Medium term	Regional	2	3
Land Use	Change of land use	• Negative • Direct • Irreversible	Certain	Start of operational to near future	Medium term	Local	2	4
Flora	Clearing of vegetation	• Negative • Direct • Irreversible	Certain	Pre - construction	Permanent	Local	1	5
	Introduction of Invasive Species	• Negative • Direct	Possible	Pre-construction	Permanent	Regional	2	5

		• Irreversible						
	Extinction of endangered species	• Negative • Direct • Irreversible	Certain	Pre-construction	Permanent	Regional	2	5
Fauna	Loss of fauna	• Negative • Direct • Irreversible	Certain	Pre-construction	Permanent	Regional	1	3
	Interruption of animal corridors	• Negative • Direct • Irreversible	unlikely	Pre-construction to operational phase	Permanent	Regional	2	5
	Loss of endangered fauna species	• Negative • Direct • Irreversible	unlikely	Pre-construction	Permanent	Regional	1	5
Archaeology and cultural sites	Damage and removal of archaeological & cultural sites	• Negative • Direct • Irreversible	Unlikely	Pre - Construction	Permanent	Local	1	4
	Damage and removal of Cultural Sites	• Negative • Direct • Irreversible	Unlikely	Pre - Construction	Permanent	Local	1	4
Public Safety	Danger to the community from farm equipment & motor vehicles	• Negative • Direct • Irreversible	Possible	Pre – construction to Near future	Medium Term	Regional	2	4
Landscape and Visual characteristics	Change to landscape and visual characteristics	• Negative • Direct • Irreversible	Certain	Pre-Construction	Medium Term	Local	1	4
Hazardous Waste	Generation of hazardous waste such as used oil, chemical containers,	• Negative • Direct • Irreversible	Certain	Pre-Construction to	Short Term	Local	2	4

	batteries, florescence tubes, filters etc.			Operational phase				
Solid Waste	Generation of solid waste from farm biomass.	• Negative • Direct • Irreversible	Certain	Operational Phase	Medium Term	Local	1	4
	Generation of domestic waste.	• Negative • Direct • Irreversible	Certain	Pre – Construction to Mid Future	Short Term to Medium Term	Local	3	4
Sewerage Waste	Generation of Sewer Waste	• Negative • Direct • Irreversible	Certain	Operation to decommissio n phases.	Short Term to Medium Term	Local	3	3
Ambient Air Quality	Contamination of ambient air with dust & exhaust fumes.	• Negative • Direct • Irreversible	Unlikely	Pre-construction to near future	Short term	Regional	3	3
Soil Erosion	Loss of soil fertility as a result of soil erosion by wind and/ or by water.	• Negative • Direct • Irreversible	Likely	Pre – construction to distance future	Permanent	Local	3	4
Land Use	Change of land use	• Negative • Direct • Irreversible	Certain	Start of operational to near future	Medium term	Local	2	4
Public Safety	Danger to the community from farm equipment	• Negative • Direct • Irreversible	Possible	Construction to operation phase	Medium Term	Regional	3	4
Landscape and Visual characteristics	Change to landscape and visual characteristics	• Negative • Direct • Irreversible	Certain	Pre-Construction	Medium Term	Local	1	4
Solid Waste	Generation of Domestic	• Negative	Certain	Pre –	Short term to	Local	3	3

	Waste	• Direct • Irreversible		Construction to Mid Future	Medium Term			
Sewerage Waste	Generation of Sewer Waste	• Negative • Direct • Irreversible	Certain	Pre – Construction to Mid Future	Short Term to Medium Term	Local	3	3
Houses	Flooding of houses	• Negative • Direct • Irreversible	Unlikely	Pre – Construction to Mid Future	indeterminate	Regional	3	5
Drinking Water	Contamination of drinking water	• Negative • Direct • Irreversible	Possible	Pre – Construction to Mid Future	Indeterminate	Regional	3	5
Air Quality	Air pollution on residents near the farm	• Negative • Direct • Irreversible	Likely	Pre – Construction to Mid Future	Short term	Regional	1	1
Social Services/ Amenities	Pressure on existing social services (Kasongo P. school & Fisenge Clinic)	• Negative • Direct • Irreversible	Certain	Pre – Construction to Mid Future	Short to long term	Regional	2	4
Labour/ Employment	Employment creation	• Negative • Direct • Irreversible	Certain	Throughout project cycle	Short to long term	Provincial	3	5
Displacement & re-settlements	Impact on settlements	• Negative • Direct • Irreversible	Certain	Pre – construction to mid future	Permanent	Regional	2	4
Public Health and Safety	Danger and Risks to the Public	• Negative • Direct • Irreversible	Possible	Pre – construction to mid future	indeterminate	Local	3	4

Worker Welfare	Poor or good conditions of service	• Negative • Direct • Irreversible	Possible	Throughout project cycle	indeterminate	Regional	3	5
HIV and AIDS prevalence	Transmission of HIV and AIDS through casual sex	• Negative • Direct • Irreversible	Certain	Pre – construction to mid future	indeterminate	Regional	3	5
Local Farmer support	Impact of the out grower scheme	• Negative • Direct • Irreversible	Certain	Start of operational to mid future	Short to long term	Regional	2	4
Revenue & disposable income	Improved revenue base for the Ndola council & residents	• Negative • Direct • Irreversible	Certain	Pre – construction to mid future	Short to long term	National & regional	3	5

Rating Key:

A. Frequency of occurrence of the impact is rated from 1 to 5
   1-lowest
   2-low
   3-meduim
   4-high
   5-very high

B. Sensitivity of the occurrence refers to the response that the impact will receive from the affected parties. This is rated from 1 to 5. With 1 representing the minimal response to the impact while 5 represents the highest response level to the impact.

7.0 ENVIRONMENT AND SOCIAL MANAGEMENT PLAN

The Environmental Impact Assessment Regulations require the developer to provide an Environmental and Social Management Plan. An EMP is a document where all the measures that are required for environmental protection, which will include the mitigation measures and the monitoring plan, will be found for easy reference. The aim of an environmental management plan is to avoid, minimize, or ameliorate effects or impacts resulting from project implementation and where possible, enhance beneficial effects.

This EMP seeks to limit the interaction of disturbed with undisturbed lands at Kafubu farm and through the various processes of project implementation, restore the disturbed land to a pre-determined form of land-use or to a productivity level similar to that occurring prior to disturbance.

The Environmental Management Plan for the management of the identified environmental impacts associated with this project consists of three main components:-

- Implementing the Impact Mitigation Plan.
- Monitoring the implementation of the EMP.
- Institutional Framework for Monitoring, reporting and supervision of the EMP

7.1 Impact Mitigation Plan

The impact mitigation plan allocates the responsibilities for implementation of the proposed mitigation measures to the various stakeholders and indicates at what stage in the project they should be performed. The Plan is presented in this section and it addresses the negative impacts generated by the project and presents the associated cost estimates of mitigating the adverse impacts. The key components of the proposed impact mitigation plan are:-

(i) Surface and ground water quality management
(ii) Soil erosion Control
(iii) Vegetation and Flora
(iv) Wildlife and Fauna Habitats
(v) Bush fires
(vi) Noise and vibrations
(vii) Occupational Health and safety
(viii) Land use and Soil
(ix) Air Quality
(x) Landscape, land use and Aesthetics

Socio-economic components of the mitigation plan include:-

(i) HIV/AIDS
(ii) Cultural and Historic Sites
(iii) Employment and conditions of service

Surface and ground water management

Surface and ground water are an important component of agricultural, ecological and human use of the land in Kafubu farm. The aim of the water management program is to ensure that where practical, flows into and through the project site and the Kafubu River is maintained and that ground water sources (boreholes within the farm) are used efficiently to prevent inconsistent draw down of water during abstraction. The following will be undertaken to protect surface and ground water:

- An effective drainage system will be put in place to capture all waste water.
- Oil spillages from vehicles and machinery will be avoided on site. Compliance with the Hazardous Waste Regulations will be priority.
- A good and effective monitoring system will be put in place during operations. Regular surface and ground water samples will be collected and analyzed. Bi-annual results will be submitted to the ZEMA.
- Ensuring that boreholes and septic tanks are at least 60 meters apart.
- All the waste water from the chicken houses and dairy will be channeled to stabilization ponds.

Soil erosion control

The Kafubu farming area has soils with less likelihood of soil erosion. However, the nature of the soil in high rainfall or winds may be prone to erosion. The cultivation methods to be employed by GoldenLay will ensure less risk of soil erosion and runoff water to nearby farms and settlements.

Vegetation and Flora

Kafubu farm being an existing farm land has 1800Ha of disturbed arable land that has been used for cultivation. Most of the flora was cleared for purposes of cultivating crops during operations by the previous owner. A number of management initiatives shall be implemented to reduce further potential impacts and disturbance to flora and vegetation. These include clearly marking and restricting access to areas of high conservation value; concentrate the farming operations to already cleared land for cultivation purposes.

Wildlife and Fauna habitats

Due to previous farming and other anthropogenic activities at Kafubu farm, the area has no large animals that will be disturbed or likely to migrate due to the farming activities to be undertaken by GoldenLay. However, in the event that the small identified animals are threatened, it is most likely that the species will tend to migrate from the areas of greatest activity during site preparation and operation but will return during the night and more stable years of the operations. The selected potential impacts on fauna will be reduced by restricting disturbance and clearing of habitats to the minimum required for safe and efficient operations of the farm and progressively rehabilitating disturbed areas to re-establish habitats for the animals.

Bush fires

The impact of bush fires is more significant in the dry season as the risk of flora and fauna disturbance and threat is high. This is so because the flora and grass are dry and of little moisture likely to provide more means of fuel for ignition. Other than ignition, and fuels, other factors such as season, wind pattern and proximity with human settlements will play an important role in open burning. Such factors will need to be ascertained as appropriate timing of burning may facilitate a good burn and at the same time minimize air pollution impact. Consideration of the regional factors will enable classification of the area in terms of air pollution risks. All workers will be warned of the dangers of deliberate ignition of fires and its impact on wildlife, crops and other natural resources.

Noise and vibrations

Operation of machinery at the farm will have little impact on the local surrounding community as the noise levels to be emitted will be within the acceptable audible levels. The settlements around Kafubu farm are at reasonable distances unlikely to receive destructive noise levels. The team will also ensure that only well serviced machinery, trucks and tractors are used to avoid generating noise levels that are above the recommended limit. Operations will be limited to day time only.

HIV/AIDS Awareness

The HIV/AIDS work place policy already in existence at GoldenLay Limited will be implemented at Kafubu Farm. This policy provides for the creation and implementation of HIV/AIDS sensitization and support program for its employees. The program currently underway at GoldenLay in conjunction with an NGO called Afia-Mzuri focuses on awareness, stigma reduction and providing nutritional support to the employees and their families. The program will be extended to the local community through the support of the local clinic and Ndola District Health Management Team.

Employment and conditions of service

GoldenLay Limited will employ up to 100 workers at full implementation of the project. In accordance with its employment policy, this will constitute thirty (30%) of women. The company will uphold the government directive under the labour laws to pay all workers the stipulated minimum wage. Further, the company will observe all labour related regulations pertaining to normal working hours and other conditions of employment.

Cultural and Historic Sites

Kafubu farm has no cultural, historical or archeological sites within the farm area that may be disturbed by the project implementation from pre-construction to decommissioning phases. The nearest historical sites are located away from the farm along the Ndola-Kitwe highway. These are

the Chichele-Mofu tree and the Dag Hammarskjold memorial crush site. Development of Kafubu farm will not have any impact on these sites.

Table 23: Environmental and Social Monitoring Plan

Environmental Aspect	Objective	Monitoring Frequency	Mitigation/Enhancement measure	Responsible Person	Time frame		Monitoring costs(US$)
					Start	End	
PREPARATION & CONSTRUCTION PHASE							
Surface Water Quality	To protect contamination of storm water.	Seasonal	Construction of proper drains along access roads and drains within the farm land and operation areas.	Operations Director	2013	2014	4,200
Ground Water Quality	To protect ground water contamination from oil spills and chemical run off.	Quarterly	Drip trays will be used when removing used oils from equipment waiting servicing.	ESG manager	2013	2014	3,400
			Fuel storage tanks will be placed in a banded wall and concreted surface. The bunding shall have a volume equivalent to 110% the volume of the fuel tank. A sump shall be constructed in such a way as to drain any oil that has spilled.	ESG manager	2013	2014	
			Used oil storage facility shall be kept under lock and key, concreted and bunded.	ESG manager	2013	2015	-
			Drainage systems in the farm will be constructed to prevent chemical runoff during irrigation and rainy season.				
Drawdown	To reduce the impact of draw down.	During borehole drilling & test pumping	Boreholes shall be located and drilled in such a way as not to increase the impact of drawdown. Boreholes will be sighted in areas within the farm away from shallow wells to protect shallow wells from drawdown.	Farm Manager	2013	2015	-
Ambient Air Quality	Reduction of gas and fumes from borehole drilling and diesel machines	Quarterly	Diesel equipment to be equipped with gas absorbers.	ESG manager	2013	2015	2,200
			Use of low Sulphur content fuel (diesel) will be prioritised.	ESG manager	2013	2015	-
	Suppression of dust from	Weekly	The farm shall have a water bowser which shall be used to suppress dust on the main	ESG manager	2013	2015	-

	construction sites and access roads		road and other access roads and construction sites where there is dust.				
			If available molasses will be sprayed on roads and construction sites to suppress dust formation. Emissions and dust levels will be monitored by way of periodical air sampling using mobile dragger pump. Results will be submitted to ZEMA quarterly.	ESG manager	2013	2015	1,400
Soil Contamination	To protect soil from contamination from fresh and used oil spills, and fuel.	Quarterly	Refuelling & repair of construction equipment will be done in designated areas and periodic maintenance will be done on all equipment to avoid oil leaks getting into the soil.	ESG manager	2013	2015	-
			Drip trays will be used in maintenance areas to drain used oil from equipment.	ESG manager	2013	2015	-
			Fresh and used oil will be stored in separate and lockable shades whose floors shall be concreted.	ESG & Workshop manager	2013	2015	-
			A bioremediation plan shall be established for the purpose bioremediation of oil contaminated soils.	ESG manager	2013	2015	3,000
Soil Erosion	To protect the soil from erosion	Monthly	Storm water drains will be constructed around construction sites to collect storm water and there by prevent soil erosion.	Farm Manager	2013	2015	-
			Access roads and the plant periphery will be left with trees and this will protect soil erosion.	Farm Manager	2013	2015	-
Noise	Minimise Noise to acceptable levels	Monthly	All farm equipment will be subject to a routine maintenance to ensure they are in good working order, hence minimising noise levels. Restrict operations to day time only.	Farm Manager	2013	2015	-
	To protect workers from noise exceeding	Monthly	Employees shall wear ear muffs or ear plugs and other necessary Personal Protective Equipment (PPE).	Farm Manager	2013	2015	1,000

	acceptable levels		Periodical monitoring of noise levels shall be conducted.				
		Annually	Selection of low noise level equipment when purchasing farm and workshop equipment will be first priority.	ESG manager	2013	2015	
			Trees along access and periphery roads shall left intact to shield and reduce noise levels.	Farm Manager	2013	2015	
Land Use	To rehabilitate the farm area and try to restore to its original state.	Annually	The mitigations here shall only come at closure. Buildings like the farm house, workers houses, fuel storage facility, used oil storage shed and the mini workshop will be demolished, area cleared and rehabilitated. The centre pivot shall be removed and the other irrigation equipment removed also. Pumps shall be roved and boreholes caped. The farm land shall be re-vegetated and or allowed to naturally re-vegetate.	Operations Director	2013	2015	
Flora	To protect the local flora where possible.	Quarterly	The project will be implemented in already cleared areas previously used under *Kafubu Dairy farm*.	ESG manager	2013	2015	1,800
Fauna	To protect local fauna.	Quarterly	Noticed fauna in the proposed project site will be preserved by taking it to areas that will remain undisturbed.	Farm Manager	2013	2015	1,200
Archaeology and cultural sites	To protect cultural heritage from damage	Project Inception	Any cultural heritage site discovered during construction will be preserved and the cultural heritage commission informed accordingly.	Farm Manager	2013	2015	1,500
Public Safety	To minimise health and safety risks.	Quarterly	Pre-employment and regular medical examinations will be carried out on all farm employees to ascertain their health.	ESG manager	2013	2015	1,450
			All plant equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising health and safety risks.	Farm Manager	2013	2015	-

			All workers including contractors will be subject to wearing appropriate personal protective equipment (PPE) depending on the work type and place.	ESG manager	2013	2015	-
			All workers to go through safety and health inductions upon employment.	ESG manager	2013	2015	-
	To protect members of the public from hazards associated with construction activities.		Only authorised workers will be allowed to enter construction areas. No members of the public will be allowed to enter construction sites as well as the farm premises.	ESG manager	2013	2015	-
			"Danger" warning signs to be placed in different points along the boundary of the farm and along the access road.	ESG manager	2013	2015	-
			Warning signs to be written in symbols, English and Vernacular language for easy interpretation.	ESG manager	2013	2015	
Landscape and Visual characteristics	To protect visual characteristics of the landscape.	Project inception	Where there shall be no roads and buildings, the visual characteristics of the landscape shall not be altered.	ESG manager	2013	2015	1,100
Hazardous Waste	To safely keep generated hazardous waste and dispose of appropriately.	Throughout Project	Used oil and used batteries storage areas shall be constructed according to environmental guidelines. Lockable, concreted and bunded shed shall be constructed.	ESG manager	2013	2015	1,200
Sewerage Waste	To protect sewer waste from contaminating the soil and or ground water	Throughout Project	A septic soak way system shall be revamped and/or constructed to treat sewer waste since Kafubu farm & surrounding areas are not serviced by municipal infrastructure.	ESG manager	2013	2015	1,250
Solid Waste	Dispose solid waste at construction site accordingly	Throughout Project	Metallic and timber off cuts will be stored in designated areas and sold or given to authorised scrap metal dealers or given to the locals for domestic use.	SHE officer	2013	2015	1,450
			Cement empty bags and containers will be re-used or returned to supplier for re-use.	ESG manager	2013	2015	

OPERATIONAL PHASE							
Surface and ground Water Quality	To protect contamination of surface and ground water	Quarterly	Proper maintenance of storm water drains along access roads and drains within the farm land	Operations Director	2014	2101	
			The transport of hazardous materials to and from farm will be done in accordance with laid down procedures. Requirements will Include: documentation and inventory control through chain of custody; emergency response training for spills.	ESG manager	2014	2101	
			Only designated transport routes shall be used to transport chemicals such as fertiliser, fungicides, herbicides, fuel, used oil, fresh oil, lime and pesticides to and from the farm.	ESG manager	2014	2101	
			Contracted transporters of chemicals shall be licenced with ZEMA.	ESG manager	2014	2101	
			Contracted transporters of petroleum products shall be licenced with the Energy Regulation Board.	ESG manager	2014	2101	
			Application of fertilisers, fungicides, pesticides and herbicides will be in accordance will the law and guidelines.	ESG manager	2014	2101	
Drawdown	To protect the locals from being affected by the effect of drawdown on their water supply wells.	Monthly	A drawdown monitoring programme will be put in place.	ESG manager	2014	2101	-
			Locals will be informed how far from the farm should they put their wells.	ESG manager	2014	2101	
			Boreholes in the farm to located far away from residential areas where locals are likely to put boreholes. A minimum of 300 metres away is recommended.	ESG manager	2014	2101	
Ambient Air Quality	To prevent contamination of air due to dust emissions from	Quarterly	The farm shall have a water bowser which shall be used to suppress dust on access roads and construction sites where there is dust.	ESG manager	2014	2101	1,250

	vehicles and trucks operating on dirt roads.		If available molasses will be sprayed on roads and construction sites to suppress dust formation	ESG manager	2014	2101	
			Trees will be left along access roads and on the periphery of the proposed project site to act as a wind breaker and thereby reduce dust levels.	Farm Manager	2014	2101	
	Low fume and gas emissions		Diesel equipment to be equipped with gas absorbers	ESG manager	2014	2101	
			Use of low Sulphur content fuel will be prioritised	ESG manager	2014	2101	
Soil	Protection of soil from contamination by hazardous waste	Quarterly	Hazardous waste shall be kept in a lockable, concreted and bunded storage facility.	ESG manager	2014	2101	
	Protection of Soil from contamination by fertiliser, pesticides, fungicides and herbicides		Pesticides. Herbicides, fertiliser and fungicides shall be kept in a properly constructed area with proper ventilation, concreted floor, bunded and lockable shed.	ESG manager	2014	2101	
			Application of these chemicals shall follow the right procedures.	Farm Manager	2014	2101	
Soil Erosion	To protect the soil from erosion	Quarterly	Storm water drains will be periodically maintained to collect storm water and there by prevent soil erosion.	Farm Manager	2014	2101	
			Access roads and the plant periphery will be left with trees and this will protect soil erosion.	Farm Manager	2014	2101	
Noise	To minimise noise levels to acceptable levels.	Quarterly	All farm equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising noise levels.	Farm Manager	2014	2101	1,450
	To protect workers from noise exceeding		Employees will wear appropriate ear protection in workplaces where noise levels exceed 82 dB. GoldenLay management will	ESG manager	2014	2101	

	acceptable levels.		enforce the use of PPE in the farm.				
			Trees left along access roads and the farm periphery will not only act as a wind breaker but also sound proof.	Farm Manager	2014	2101	
Land Use	Protect land from being used in other ways.	Throughout project life	Kafubu farm will be strictly for commercial farming of soya beans, wheat, maize and rearing of livestock and poultry operations. Any other use will be prohibited.	Farm Manager	2014	2101	
Flora	To protect the local flora where possible.	Throughout project life	All the trees left after the construction phase shall not be cut for whatever reason. A procedure for cutting of trees shall be put in place. Progressive planting of trees shall be carried out and encouraged in areas where trees had been carelessly cut.	ESG manager	2014	2101	
	Extinction of endangered plant species.	Throughout project life	Identified Endangered plant species shall be preserved and planted elsewhere at all costs if possible.	ESG manager	2014	2101	
	Protection from introduction of invasive species.	Throughout project life	No invasive or alien species shall be introduced on this farmland in accordance with the invasive species act.	ESG manager	2014	2101	
Fauna	To protect local fauna.	Throughout project life	Noticed fauna in the proposed project site will be preserved relocating it to areas that will remain undisturbed.	ESG manager	2014	2101	
Archaeology and cultural sites	To protect cultural heritage from damage.	Throughout project life	Any cultural heritage site discovered during operational phase other than the existing grave site will be preserved and the cultural heritage commission informed accordingly.	Farm Manager	2014	2101	
Public Safety	To minimise health and safety risks.	Throughout project life	Pre-employment and regular medical examinations will be carried out on all farm employees.	ESG manager	2014	2101	
		Throughout project life	All plant equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising health and safety risks.	Farm Manager	2014	2101	
			All workers whether contractor or not will	ESG manager	2014	2101	

			be subject to wearing appropriate personal protective equipment (PPE) depending on the work type and place.				
		Throughout project life	All workers to go through safety and health inductions when just employed.	ESG manager	2014	2101	
	To protect members of the public from hazards associated with construction activities.		Only authorised workers will be allowed to enter construction areas. No members of the public will be allowed to enter construction sites.	ESG manager	2014	2101	
			"Danger" warning signage to be placed in different points along the boundary of the farm.	ESG manager	2014	2101	
			Warning signs to be written in symbols, English and vernacular language.	ESG manager	2014	2101	
Landscape and Visual characteristics	To protect visual characteristics of the landscape.	Throughout project life	Where there shall be no roads and buildings, the visual characteristics of the landscape shall not be altered.	ESG manager	2014	2101	
Hazardous Waste	To safely store and handle generated hazardous waste	Throughout project life	Used oil and batteries storage areas shall be maintained according to environmental guidelines. Lockable, concreted and bunded shed shall be used.	ESG manager	2014	2101	
Sewerage & effluent Waste	To protect sewer waste from contaminating the soil and/ or ground water	Throughout project life	A septic soak way system shall be used to treat sewer waste. HDPE lined effluent ponds will be constructed on the farm for bio-treatment of effluent.	ESG manager	2014	2101	
Solid Waste	Disposal of solid waste	Throughout project life	Biomass from the plants will be stored and energy generation options evaluated.	ESG manager	2014	2101	
			Domestic solid waste will be disposed of at the Ndola City Council disposal site in accordance with the waste management regulations.	ESG manager	2014	2101	
DECOMMISSIONING AND CLOSURE PHASE							
Ambient Air Quality	Contamination of ambient air with	Quarterly	Progressive and natural re-vegetation shall be done and this will protect land from	ESG manager	2102	2105	-

	dust		winds and that result into generating of dust.				
Soil Erosion	To protect the soil from erosion	Quarterly	Storm water drains will be periodically maintained to collect storm water and there by prevent soil erosion.	ESG manager	2102	2105	-
			Access roads and the plant periphery will be left with trees and this will protect soil erosion.	ESG manager	2102	2105	-
Land Use	Change of land use	Bi-annual	Demolition of all surface infrastructures, grading and re-profiling of the surface and re-vegetation will be done. If possible land use will change to the original one.	ESG manager	2102	2105	-
Public Safety	Danger to the community from farm equipment	Monthly	All farm equipment removed and infrastructure will be demolished. Areas requiring rehabilitation rehabilitated. Bore holes shall be caped.	ESG manager	2102	2105	3,000
Landscape and Visual characteristics	Change to landscape and visual characteristics	Quarterly	Demolition of all surface infrastructures, grading and re-profiling of the surface and re-vegetation will change the landscape and visual characteristics	ESG manager	2102	2105	-
Solid Waste	Generation of Domestic Waste	Quarterly	Domestic solid waste will be disposed of at the Ndola City Council disposal site according to the waste management regulations.	ESG manager	2102	2105	-
Sewerage Waste	To protect sewer waste from contaminating the soil and or ground water	Quarterly	A septic tank-soak way system shall be used to treat sewer waste.	ESG manager	2102	2105	-

Table 24: Socio-Economic Impact Management Plan

Project Phase	Impact	Mitigation measure	Responsible Person	From	To
Construction	Impacts of flooding of fields, houses in the project area.	If established that the flooding problem is caused by current farming activities at Kafubu farm, the farm will take up responsibility of the impact such as diverting, burying the water channels and gullies. **<u>Damage to agricultural lands/fisheries</u>** This will not happen as the farm area has no streams or rivers with fish likely to be destroyed by the project. Irrigation water will be obtained through boreholes. The farm already has used farm land (brownfield) thus no significant land destruction is expected.	Farm Manager	2013	2015
Operational				2015	2105
Construction	Impacts of possible drinking water contamination	During and once spraying of crops with chemicals starts, the farm will ensure that spraying is done during early hours or late afternoons when the weather is calm, without strong winds to avoid residents whose water wells are located in the wind ward direction and near the farm from being affected. The farm has committed to sinking of a borehole for the surrounding community as part of its CSR program.	Farm Manager	2013	2015
Operational				2015	2105
Construction	Impacts of air pollution on residents	A water bowser will be used to water down the dust and prevent respiratory diseases to the locals and workers.	Farm Manager	2013	2015
Operational		During spraying of crops with chemicals, the farm will ensure that doing it in early hours or late afternoons when the weather is calm, without strong winds.		2015	2105

Project Phase	Impact	Mitigation measure	Responsible Person	From	To
Construction	Pressure on existing facilities/social services	**Hospital** To minimise a lot of occupational health related injuries which may affect the operations of the nearby clinic, the company/farm will ensure that they have first aid services for minor injuries and also provide adequate Personal Protective Equipment for its employees. **Land for housing** GoldenLay will rehabilitate the existing workers houses within the farm to accommodate a sizeable number of employees. Migrant workers will be provided with appropriate housing allowances for accommodation.	Environmental and Social Governance (ESG) Manager Farm Manager	2013	2015
Operational		**Health** To reduce increased pressure on existing health facilities, the farm may have to put up a health post for the workers within the farm prior to being referred to Fisenge Clinic. **Schools** To reduce increased pressure on existing educational facilities at Kasongo primary, the farm may have to help expand	Environmental and Social Governance (ESG) Manager Farm Manager	2015	2105

Project Phase	Impact	Mitigation measure	Responsible Person	From	To
		existing schools in the area. **Land for housing** GoldenLay will rehabilitate the existing workers houses within the farm to accommodate a sizeable number of employees. Migrant workers will be provided with appropriate housing allowances for accommodation. **Loss of land** Since the land is on title, no loss of land will occur for the local people. In the event of resettlement, GoldenLay has set aside 200Ha for this eventuality within the farm area. Settlers within the titled land will be resettled and compensated in accordance with GRZ regulations. **Loss of access route** The main access road will still be maintained through Kafubu farm as it is the main access route for other farms nearby. The road will be maintained and graded. Traffic will be regulated and speed controlled by way of humps and road signage. **Loss of customary rights** Kafubu farm has no cultural, archaeological and heritage sites that will be lost or disturbed during the implementation of the			

Project Phase	Impact	Mitigation measure	Responsible Person	From	To
		project. **<u>Municipal services</u>** Clean drinking water and sanitation facilities will be provided by the farm as it has committed to this already. Only potable water will be used as the operation (dairy) requires treated water to avoid contamination and disease prevalence. **<u>Increase in criminal activity</u>** GoldenLay has already engaged the Zambia Police Service regarding establishment of a police post in the area. GoldenLay will construct the structure and Police will provide manpower. **<u>Loss of amenity values</u>** The project will not result in loss of amenities as the project will not negatively impact on economic activities of the local people. The project will lead to income generation activities.			
Construction	Impacts on Labour situation/employment	Creation of jobs should be promoted, encouraged and the impact enhanced. A total of 100 employs will be engaged for the full implementation of the project. This will result in increased revenue for the local people.	Farm Manager	2013	2015
Operational				2015	2105
Construction	Impact on	The land under the previous owner had no settlers except for	Farm Manager	2013	2015

Project Phase	Impact	Mitigation measure	Responsible Person	From	To
Operational	Settlements and private farms	caretakers who have been employed by the company and will occupy company housing. Clarifications on the issue of settlers has been handled by the GoldenLay management and local government officials. The local people to be displaced from Kafubu farm will be compensated and relocated to new land provided by the ministry of lands.		2015	2105
Construction	Impacts on public/workers safety and health	All workers will be provided with adequate PPE. Only trained workers will operate farm machinery.	Environmental and Social Governance ESG Manager	2013	2015
Operational				2015	2105
Construction	Impacts of poor conditions of service	Strict adherence to Zambian Labour Laws and specifically, sector approved minimum wage as well as provision of PPE, normal working hours, observance of stipulated holidays and other labour related matters will be undertaken.	Human Resource Manager Managing Director	2013	2015
Operational				2015	2105
Construction	Impacts of HIV/AIDS	In liaison with the National Aids Council, District Health Office and Afia-Mzuri sensitise the workers and encourage them to go for VCT. Goldenlay Limited has a working HIV/AIDS workplace policy that will be implemented at Kafubu as part of the company wide commitment to fight the disease.	Human Resource Manager Managing Director	2013	2015
Operational				2015	2105

Project Phase	Impact	Mitigation measure	Responsible Person	From	To
Construction	Impact of out grower scheme to local farmers	Because this will result in improved income for the local people and reduced poverty levels, the impact should be enhanced and supported.	Farm Manager	2013	2015
Operational				2015	2105
Construction	Improved Local Authority Revenue base	Because this will result in improved revenue for the local Authority, improve municipal service delivery, the impact should be enhanced and supported.	Local Authority	2013	2015
Operational				2015	2105

7.2 Emergency Response Plan

This Emergency Response Plan is a guide to respond to emergency situations which may arise in the cause of implementing of the project at Kafubu farm. The plan identifies likely emergency situations together with their causative factors followed by an elaboration of the proposed response. The plan finally identifies the respondents in order of priority. It is anticipated that implementation of the plan would help minimise the risks associated with implementation of the proposed project within acceptable levels. The plan is however subject for review each time there is a new, unforeseen emergency situation and incorporates all causative factors resulting in such emergency situations for improved future response performance.

Table 25: Emergency Response Plan

Emergency Situation	Likely Cause	Proposed Response	Respondents
1.Road traffic accidents (RTA)	a) Speeding motor vehicles on the farm roads. b) Lack of speed control humps & signs.	• Create speed limit signs on the road and sensitize school children at Kasongo primary school on safe road usage. • Construct speed humps to control speed of vehicles. • RTA's will be reported to the Police to be set up in the project area. • Victims will be treated using first aid skill o site prior to reference to the nearest health centre.	Farm manager, Environmental officer, Zambia Police and health centre medical personnel.
2.Staff Injury	a)Unskilled labour b)Neglect of safety procedures c)Faulty equipment and tools d)Sheer Accidents e) No safety induction	• Apply appropriate First Aid. • Document incidence. • Evacuate to hospital if necessary. • Investigate causative factor and institute appropriate measures to prevent similar occurrence.	Environmental officer, First Aid Attendant on Duty, and Hospital Staff.
3. Bush Fires and fires on machinery and buildings.	a) Neglect of safety procedures. b) Act of arson c) Equipment failure d) Natural bush fires	• Sound alarm and instruct all to assemble at Fire Assembly point. • Conduct roll Call. • Fight the fire using appropriate technic (use of fire breaks on the cropping section) and fire extinguishers, sand, water on buildings and equipment. • Document incidence	Environmental Officer Emergency Response Team, Fire Brigade, Zambia Police

4. Oil and Fuel Spillages	a)Neglect of safety procedures b)Equipment/machinery malfunction	• Contain spillages by applying suitable material to stop material flow and spread (e.g. Spill Kits). • Inform ZEMA and other relevant agencies. • Clean up affected areas. • Document incidence.	Environmental Officer Emergency Response Team, ZEMA,
5. Effluent system blockages/failure	a)Effluent system failure. b) Neglect of duty. c) Increased pressure on existing facility.	• Isolate system by use of vacuum tankers. • Clean up the affected areas.	Environmental Officer & farm manager
6. Chemical poisoning	a) Neglect of safety procedures b) Unskilled labour c) Incorrect handling of chemicals	• Apply first aid to victims. • Document the incident. • Evacuate to hospital or clinic if necessary.	Environmental Officer & farm manager.

The above proposed Emergency Response Plan will be reviewed each time an emergency situation has occurred to incorporate any missing causative factors and review response mechanisms for enhanced effectiveness in future occurrences within the farm.

7.3 Enhancement plan for environmental, socio-economic and cultural impacts

GoldenLay Limited will implement a Plan that will seek to enhance the positive environmental, economic and social cultural benefits of its presence in the operational area of Kafubu and the surrounding areas. The focus of the plan would be to prevent the occurrence of negative effects on people resident in the project area of influence while maximizing their benefits.

GoldenLay Limited will implement the following programs as part of its socio-economic management plan. The proposed interventions are aimed at broadening the beneficiary base for the company's business undertakings beyond the traditional beneficiary groups of shareholders, employees and tax/levy collectors by including the public especially those closest to the operational area.

7.3.1 Employment action Plan

GoldenLay Limited will continue to give priority to local residents starting with those closest to the farm in offering employment opportunities. Employment will only be offered to outsiders if the required skills and experience could not be found locally. Further, the company will provide equal opportunities to both males and females provided they meet the education and skills/experience criteria. Furthermore, in line with the company's HIV/AIDS policy, no discrimination of employees based on their HIV status will be allowed. Contractors and other stakeholders will also be encouraged to abide by the same employment policies. The company will endeavour to institute a counseling program to help prepare all employees scheduled for retrenchment or retirement prior to the effective dates. This will also be done for employees on contractual employment. GoldenLay Limited will ensure that casualization of labour is minimized by offering employees fixed term contract type of employment.

7.3.2 Educational and training support plan

GoldenLay Limited will explore ways of supporting the education and training programs at community level especially the schools in the project area such as Kasongo Primary School. This will be part of the company's corporate social responsibility. Training of employees in areas that will benefit both the company and individual employees will be undertaken and sponsored. It will also seek to support schools in the neighborhood by addressing needy areas such as infrastructure development.

7.3.3 Local economic development

Priority will be given to local suppliers of goods and services as a way of empowering the local economy. This will be done with a view to supporting local economic development. Information on how to conduct business with GoldenLay limited will equally be publicized to help would be local contractors and suppliers. The company will also implement an out grower scheme for the cultivation and supply of Soya beans and Maize to Kafubu farm. The company will issue seed, chemicals and fertilizer to the local farmers and then purchase the harvested crops from them at an agreed rate. This will increase the revenue base of the local farmers in the project area.

7.3.4 Community Support Plan

GoldenLay limited periodically liaise with local communities in the project area in identifying development programs reflecting major community needs and work with them in supporting the community provided the community will have demonstrated the willingness to help themselves with the company providing supplementary support. As part of its policy on corporate citizenship, GoldenLay limited will inform the community in which it operate and get them up-to-date with developments taking place at the farm. This will facilitate community participation in decision making on major developments. This process as witnessed during this EIA preparation process will continue throughout project implementation phase by calling the public and consulting them on major decisions with a bearing on the local and wider environment.

8.0 DECOMMISSIONING AND REHABILITATION PLAN

8.1 Closure objectives

Upon the successful operation of the farm by GoldenLay limited, the closure objective will be to restore the farm site to its natural state. This will be a transitional change over a period of time in order to restore the land to its original state. Kafubu farm will have to be restored to a condition which is safe, stable and minimizes environmental impacts on the flora, fauna, water, and soil and air quality. The area must as a minimum not negatively affect the socio-economic status of the local residents in the project area. Other objectives of the closure plan are to:

- Protect future human, flora and fauna health and safety.
- Minimize or prevent biophysical and social environmental degradation.
- As far as practical, return the site to the pre-farming land use (sustainable woodland) or another appropriate alternative, and
- Minimize any adverse socio-economic impacts.

Generally, closure objectives covering public health and safety, landform (soils) and vegetation will be developed as outlined in the table below.

Table 26: Closure Objectives

Aspect	Objective
Final land use	Maximize the beneficial use of the farm site after closure.
Safety and public health	Leave the site in a condition that reduces adverse effects on people and the environment as generally acceptable by stakeholders.
Vegetation	Re-vegetating the site to meet the agreed condition prior to farming activities and land acquisition by GoldenLay Limited.
Ground water contamination	Achieve a condition where contaminants on site are below acceptable standards. Minimize potential of offsite pollution.
Soil contamination	Achieve a condition where contaminants on site are below acceptable standards.
Socio-economic	Enable all stakeholders to have their interests considered during the closure phase of the project as explained in the project disclosure meeting.

8.2 Decommissioning during construction (project abandonment)

Prior to project completion, GoldenLay Limited may consider abandoning the project at preparation and/or construction phase, a decommissioning and closure plan will be instituted to ensure all the potential negative effects arising from the abandonment will be addressed in totality taking into consideration the cost attached to the undertaking.

8.2.1 Potential effects

Drilling of boreholes, grading of the main road and fencing off of the farm area will enhance the positive effect of easily accessible potable water for the local people. The community will benefit from the grading of the access road to the site by easily reaching the outlying areas and school in the vicinity.

During the construction phase, the road and drainage leading to the entrance of the project site will be rehabilitated periodically during the life span of the project.
Negative potential effects of the project abandonment can be classified into physical, environmental, ecological and social economic effects.

Negative environmental impacts
During the construction phase, temporary haul roads will be created for easy access to the site for transportation of farming equipment and raw materials for construction. This will result into dust generation that may affect the vegetation by settling on the leaves of flora around the farm. Settlements in the vicinity of the farm will be affected by dust resulting from the partially constructed gravel roads. Increased noise levels may be experienced by residents near the project site especially during the day when machinery is in full operation. This exposure may extend to construction workers on site by way of dust inhalation and high noise levels through increased exposure.
The boreholes drilled at the project area may be contaminated due to improper management and maintenance once the developers abandon the project at the construction stage.
The diesel fuel facility used for refuelling construction vehicles and machinery may lead to underground and surface water contamination if not properly managed at project abandonment stage.

Negative Physical impacts
Negative physical effects of the premature abandonment of the project will include generation and non-collection of construction waste materials such as sand, quarry dust, blocks, scaffolds, and cement. Dumps and foundations dug up during construction may lead to physical injuries if warning signs and security are not provided at the site during this phase. The presence of unfinished pivot construction may also pose physical danger that may result in injuries.
Unfinished structures such as milking parlour, feedlot, farm house, workers housing units, sewerage management systems such as toilets, soak away and septic tanks may be physical hazards resulting into injury. A lack of security fencing of the area will lead to local residents trespassing in the farm land and vandalising the incomplete structures.

Negative ecological impacts
Most of the trees that will be cut down during the construction phase will completely be lost resulting into water runoff and erosion during rainy season. Once trees are lost, this will change the biodiversity of the project area as the indigenous tree population will be reduced. The land that was cleared during the operations by the previous owners will remain bare and unutilised if the project is abandoned at this stage. This may lead to soil erosion as there will be no root support for the loose soil.

Socio-economic negative impacts

The potential employment opportunities for the local people will be lost due to the project abandonment. This may lead to increased crime rates in the area as the potential economic activity will no longer be attainable. This will further be aggravated by the fact that the area will have **no police post**, no support for the local clinic and the proposed out-grower scheme for the local farmers will not be realised. This in turn will lead to loss of economic value that would have been realised if the project was implemented.

All these effects are deemed potentially negative during the construction phase of the project. The potential effect, its class, score in terms of extent of the effect, occurrence frequency and the responsible personnel to ensure mitigation measures are implemented are summarized in the table below.

Table 27: Project abandonment potential effects

POTENTIAL EFFECT	CLASSIFICATION	EXTENT SCORE	FREQUENCY			RESPONSIBILTY
			L	M	H	
Soil erosion/water run off	Environmental	Medium		✓		ESG manager
Loss of out-grower schemes	Socio-economic.				✓	Operations Director
Solid waste generation	Environmental	Low		✓		ESG manager
Ground water contamination	Environmental/public health.	Low	✓			ESG manager
Air quality pollution	Environmental/occupational health.	Low	✓			ESG manager
Deforestation	Ecological.	Medium		✓		ESG manager
Loss of fauna habitat	Ecological	Medium		✓		ESG manager
Employment loss	Socio-economic.	High			✓	ESG manager
Increased Crime rates	Socio-economic.	High			✓	ESG manager

8.2.2 Mitigation measures

The existing infrastructure that will not be altered within the farm area will be protected by means of fencing off. Warning signs around the project area will be erected to warn potential trespassers of the physical danger posed by the abandoned project. The area will be fenced off during construction and fence will act as barrier to deter illegal entry into the farm area. All the materials that will remain unused at the project site will be taken away to avoid posing as a physical hazard.

Sampling of water will be conducted and analysed as part of the closure plan and results presented to relevant authorities such as the MOH and ZEMA. Corrective action will be taken depending on the outcome of the water sample results.

8.3 Decommissioning after ceasing operation

GoldenLay limited intends to undertake the farming and livestock operations project through the 99year lease as stipulated by the Zambian government land tenure. All relevant local and regional regulatory bodies such as Zambia Environmental Management Agency (ZEMA), Ndola City Council, government departments and other relevant local authorities and/or interested parties will be informed beforehand in the event that GoldenLay limited decides to abandon the implementation of the project for any predicted or unforeseen circumstances. A detailed final closure plan will be submitted for approval to ZEMA.

The following sections describe the activities to be undertaken by GoldenLay limited to successfully bring the project to a close taking into consideration all the environmental, physical and socio-economic impacts that may arise during this phase.

8.4 Dismantling of equipment and farm machinery

All the farm machinery, poultry houses and auxiliary equipment on site will be dismantled to manufacturer specifications in a well-planned manner in order to avoid contamination of soil, air and water and to eliminate the physical hazards associated with the equipment and machinery to be dismantled and relocated.

Un-installation/ removal of the centre pivot

All the components of the centre pivots will be dismantled component by component and packed into haul trucks for transportation to another site for alternative use and/or sale. The dam used for storage of irrigation water will be buried and the soil replaced and area re-vegetated.

Removal of pumps and burying of boreholes

The submersible and surface water pumps and all electrical components associated with the pumps will be disconnected from the power supply and uninstalled. A total of five (05) boreholes will be buried to restore the bore sites to their original state while the remaining 5 boreholes will be used as monitoring boreholes for underground contamination for the next two (02) years of the post closure program to be implemented by GoldenLay limited.

Movement of re-usable farm machinery

GoldenLay limited operates other ventures within Ndola and Mpongwe districts that will require the use of the machinery relocated from the Kafubu Farm project. The machinery salvaged from Kafubu farm will be moved to an appropriate farming operation that will utilise the equipment. The poultry operation may be relocated to Baluba area where the parent company runs another poultry and egg collection facility.

Demolition of the Farm infrastructure

The poultry houses, feedlot, milking parlour, administration building, workshop, chemical stores, farm house, workers quarters and other concrete related infrastructure will be demolished accordingly. This will be done systemically in order to recover as much reusable construction material as possible. The rabble resulting from this demolition will be used to level the ground and refill and re-profile the septic tanks and soak away system that will be utilized as a sewerage management facility during the operation phase. General cleaning of the areas formerly occupied by the demolished structures will be conducted to be coupled with grading and levelling the ground to pave way for tree replanting.

Enhancement of Soil fertility on land used for growing crops

GoldenLay Limited through its soils consultant *(Soils Inc. PVT-Zimbabwe)* will incorporate a soil enhancement program which will include the use of natural compost and chicken manure in the area used for the cultivation of soya beans, maize, and wheat in order to restore its natural existence. After repeated cultivation in the farm land, the soil structure and fertility levels may shift from its original natural state to support indigenous growth of local species of trees and shrubs.

Removal of surface fuel storage tank and related structures

The surface fuel (diesel) storage tank and fuel pump will be removed for alternative use including all the piping and fire prevention and fighting equipment to be installed during the operation phase of the project. The impermeable concrete surface at the facility will be unearthed and the roofing removed for alternative use. Assessment of the soil at the facility will be conducted by the soil specialist to establish if contamination occurred during the period of operation. In the event that the soil is contaminated with hydrocarbons from the diesel and oil storage facilities, Soil remediation will be conducted using hydrocarbon digesters prior to re-fertilization of the soils. The farm machinery workshop contaminated with used oil will be rehabilitated in line with the soil remediation program to be undertaken.

Installation of warning signage and symbols

In order to maintain safety and reduce the risk of physical accidents from trespassers, the areas considered to pose accident risks will have warning signage installed to prevent injury and restrict access to the site. This will also be done for the main access road that traverses through the farm.

8.5 Post closure sampling and analysis.

In order to ascertain that the baseline environmental conditions of the project site are maintained after ceasing operations, continuous sampling, analysis and reporting of the water, air quality, and noise and soil parameters will be conducted. Water, soil, air and

noise sampling and reporting shall be undertaken for a period of 12months post closure. Post closure monitoring may continue until positive trends emerge which indicate that no further management of vegetation, water resources and landform is required than would be necessary for the similar use of land. The following will be sampled during the period highlighted above.

8.5.1 Water

Ground water samples will be collected on a scheduled time line from the five respective boreholes including the borehole to be reserved for domestic use by the local residents. Analysis of the samples will be done in accordance with the World Health Organization (WHO) portable water parameter standards.

8.5.2 Soil

Contamination of the soil with hydrocarbons and other contaminants may occur especially near the workshop and fuel facility during the operation phase. Upon ceasing of operations, samples will be collected from the site as well as the crop fields to determine the nutrient levels of the soils in comparison with the baseline environmental conditions prior to commencement of the project. Samples collected will be analysed and results reported to ZEMA periodically. Soil bioremediation measures will be taken as per laboratory analysis recommendation in the event that contamination of the soils has occurred through hydrocarbons (fuel) and chemical application.

8.5.3 Air and Noise

The project to be undertaken at the site will be limited to arable and livestock agricultural activities. However, sources of air pollution may include emissions from the incinerator, vehicular emissions and dust especially from farm machinery and haulage trucks within and around the site. Others sources may be from wind gusts and occasional bush fires especially during the dry season.

Ambient air quality measurements will be conducted on site against known parameters that will include SO_2, CO, CO2, NOx and ambient dust. Results will be compared to initial baseline environmental conditions obtained during the EIA study.

Noise level measurements will be conducted on site and any changes noted and reported to ZEMA. Analysis of the changes in the socio-economic activities of the local people leading to changes in the noise levels will be reported on in the post closure phase.

8.6 Environmental closure plan budget

An estimated US Dollars Fifty thousand three hundred and thirty **(US$ 50,330)** will be used for the decommissioning and rehabilitation plan of Kafubu Farm. The amount will be disbursed on need basis during the period of closure and post closure monitoring.

GoldenLay will expend the above stated amount in accordance with the activities indicated in the table below.

Table 28: Proposed Closure Budget Estimate

Activity	Rate/ Unit measure (US$)	Quantity	Cost (US$)
Equipment /infrastructure dismantling			
Un-installation of centre pivots, water pumps			6,200.00
Demolition of farm houses and other concrete infrastructure.			3,600.00
Burying of boreholes	2000 /borehole	05	10,000.00
Disposal of demolition waste		-	1,300.00
Grading, levelling and clearing of demolished areas		-	2,300.00
Demolition of fuel storage facility and related structures	5000		2,200.00
Treatment of contaminated soils		-	2,300.00
Re-vegetation costs			
Supplying and planting trees	3.00	1,800,000 M^2	5400.00
Vegetation care and maintenance(20% of cost)			1080
Installation of warning signage		10	1000
Subtotal (for pre closure activities)			**35,380.00**
Post closure monitoring			
Collection and analysis of ground water samples (monthly)			6,000.00
Collection and analysis of surface water samples (monthly)	Not applicable	-	-
Collection and analysis of soil sample(bi –annual)			3000.00
Noise/Air quality measurements(bi annual)			1250.00
Public consultations			1,200.00
Summary reports(bi-annual)			2,000.00
Detailed reports (annual)			1,500.00
Subtotal (for a 12 month period)			**14,950.00**
GRAND TOTAL			**50,330.00**

Certain components of the project site buildings and infrastructures could be adapted for sustainable use including use as small business enterprise within Kafubu farm area. These buildings include offices, stores, workshops, feedlot, poultry house structures etc. The local community and businesses will be consulted in this regard prior to closure.

8.7 Stakeholder consultation

Relevant stakeholder consultations will be undertaken prior to the closure of the project with the aim of developing an understanding of the key environmental, socio-economic and cultural issues associated with the closure of the project. Any commitments made to the stakeholders by GoldenLay limited during the operation phase of the project will be monitored in the post closure phase to ensure timely implementation of these commitments.

In line with the company's commitment to involve various stakeholders especially those affected by the Kafubu farm project, Goldenlay Limited held two (02) consultative meetings i.e. scoping and project disclosure meetings *(see attached minutes in appendices)*. The two meetings discussed among other things; employment, land and resettlements, environmental impacts of the project and mitigation measure. Also issues highlighted in the meetings were the company's corporate social responsibility and out grower schemes for the local farmers.

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10.0 DECLARATION OF AUTHENTICITY OF REPORT CONTENTS

To the best knowledge of Greenline Environmental Solutions Limited (consultant) and GoldenLay Limited, the content of this report is the work of the consulting team and any work done by others have been quoted and referenced accordingly.

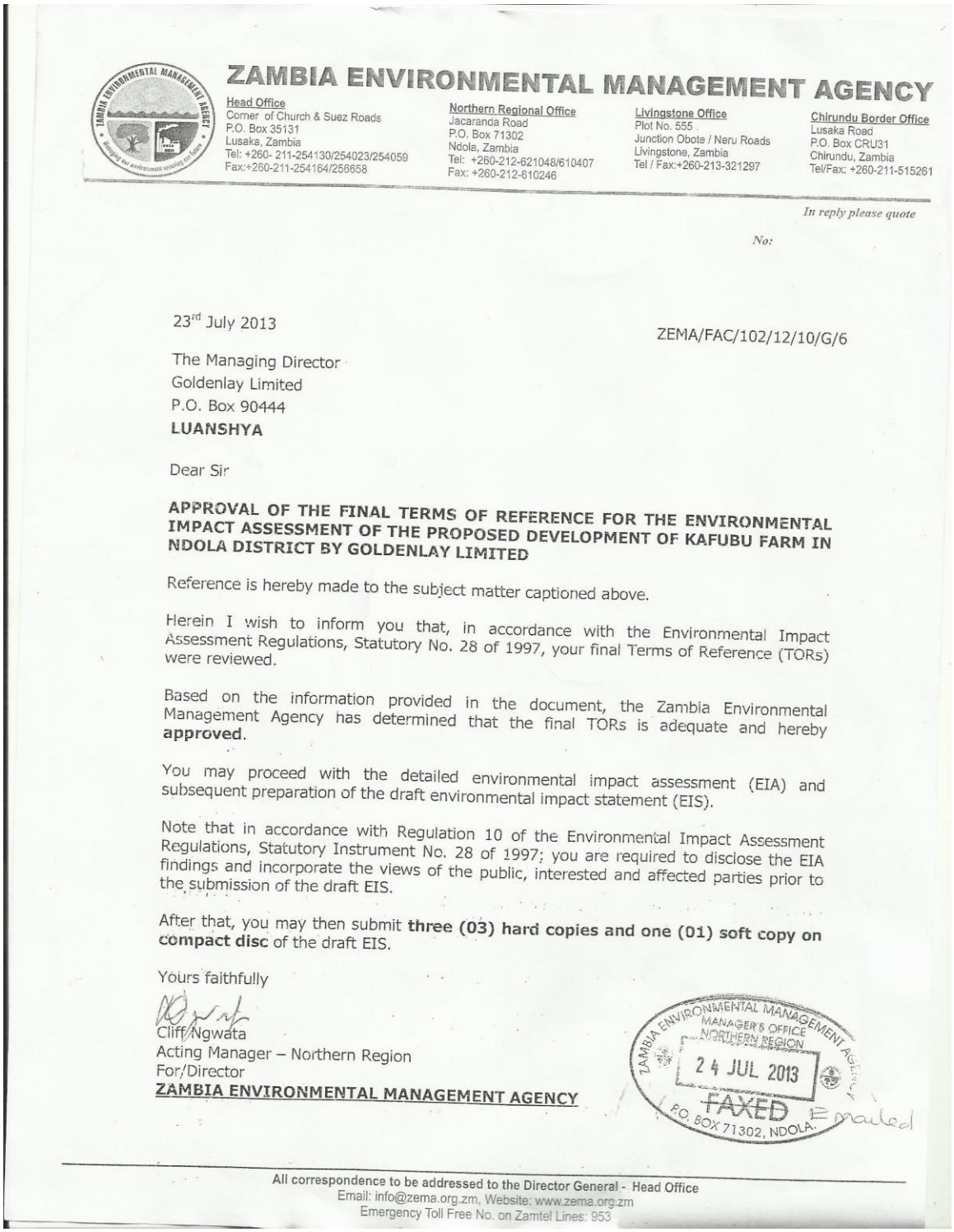
…… .....

Mubanga Mwansa
Managing Consultant
Greenline Environmental Solutions ltd

Mohamed Bushary
Managing Director
GoldenLay Limited

11.0 APPENDICES

11.1 Terms of Reference approval letter



ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

Head Office
Corner of Church & Suez Roads
P.O. Box 35131
Lusaka, Zambia
Tel: +260- 211-254130/254023/254059
Fax:+260-211-254164/256658

Northern Regional Office
Jacaranda Road
P.O. Box 71302
Ndola, Zambia
Tel: +260-212-621048/610407
Fax: +260-212-610246

Livingstone Office
Plot No. 555
Junction Obote / Neru Roads
Livingstone, Zambia
Tel / Fax:+260-213-321297

Chirundu Border Office
Lusaka Road
P.O. Box CRU31
Chirundu, Zambia
Tel/Fax: +260-211-515261

In reply please quote

No:

23rd July 2013

ZEMA/FAC/102/12/10/G/6

The Managing Director
Goldenlay Limited
P.O. Box 90444
LUANSHYA

Dear Sir

APPROVAL OF THE FINAL TERMS OF REFERENCE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED DEVELOPMENT OF KAFUBU FARM IN NDOLA DISTRICT BY GOLDENLAY LIMITED

Reference is hereby made to the subject matter captioned above.

Herein I wish to inform you that, in accordance with the Environmental Impact Assessment Regulations, Statutory No. 28 of 1997, your final Terms of Reference (TORs) were reviewed.

Based on the information provided in the document, the Zambia Environmental Management Agency has determined that the final TORs is adequate and hereby **approved**.

You may proceed with the detailed environmental impact assessment (EIA) and subsequent preparation of the draft environmental impact statement (EIS).

Note that in accordance with Regulation 10 of the Environmental Impact Assessment Regulations, Statutory Instrument No. 28 of 1997; you are required to disclose the EIA findings and incorporate the views of the public, interested and affected parties prior to the submission of the draft EIS.

After that, you may then submit **three (03) hard copies and one (01) soft copy on compact disc** of the draft EIS.

Yours faithfully

Cliff Ngwata
Acting Manager – Northern Region
For/Director
ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY

ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY
MANAGER'S OFFICE
NORTHERN REGION
24 JUL 2013
FAXED
P.O. BOX 71302, NDOLA.
Emailed

All correspondence to be addressed to the Director General - Head Office
Email: info@zema.org.zm, Website: www.zema.org.zm
Emergency Toll Free No. on Zamtel Lines: 953

11.2 Approved Terms of Reference

TERMS OF REFERENCE FOR UNDERTAKING ENVIRONMENTAL IMPACT ASSESSMENT KAFUBU FARM NDOLA

GOLDENLAY LIMITED
P.O. Box 90444
Baluba Road, Luanshya

EXECUTIVE SUMMARY

The government of the Republic of Zambia has in the past made pronouncements to make the agricultural sector the main economic earner following instabilities in copper prices and it being a non-renewable resource.

To complement the government's efforts, GoldenLay Limited procured Kafubu Farm No. 9424 formerly Kafubu Dairy Farm. The farm is located 16Km from the Ndola CBD and about 2.5Km off the Ndola –Kitwe highway.

GoldenLay Limited intends to revamp and develop the farm into a commercial farm to grow Soya beans, Maize and Wheat. The farm will utilise summer (rain fed) and winter (irrigated) cropping systems. The harvested crops will be used as raw materials for the production of stock feed at GoldenLay for the table eggs production.

The Kafubu farm project will also involve the construction of 6 poultry houses for layers and 2 for rearing houses. It will also incorporate cattle ranching for beef animals.

Revamping and rehabilitation of the existing infrastructure will be undertaken by the developer as part of the project implementation plan.

The proposed project will include installation of centre pivots, sinking of boreholes and extension and distribution of the existing ZESCO power line and construction of fuel storage tank, chemical/fertilizer store, staff housing compound and other support infrastructure.

The farm is an existing operation with 1800Ha of used arable land that will be utilized for cropping operations. Farm operations will involve land clearing, cultivation, planting, pest control systems and harvesting. Other operations will involve rearing of birds (pullets), feeding and medication to point of lay chicken, production of eggs and rearing of beef cattle for commercial purposes including dairy animals. The eggs produced will be distributed throughout the region for sale.

In the event that farm operations cease, GoldenLay Limited will implement the decommissioning and closure plan which will be part of the Environmental Impact Statement of this proposed project.

In line with the Environmental Management Act No. 12 of 2011 read together with the Environmental Impact Assessment Regulations of 1997 and other relevant pieces of legislature, GoldenLay Limited intends to submit the terms of reference (TOR) before undertaking the Environmental Impact Assessment process. This is in order to incorporate all critical issues from interested and affected parties (stakeholders) into the Environmental Impact Assessment of the proposed cropping, poultry and cattle rearing project.

The Environmental Impact Assessment shall be undertaken by Greenline Environmental Consultants. The study team will comprise of the following team members;

1) **Seveliano Phiri**: Seveliano holds a Bachelor of Engineering in Agricultural Engineering (UNZA) and a Master of Science in Water Resources Engineering. He has in the past worked for the Ministry of Agriculture and Co-operatives as a Senior Agricultural Specialists and Agricultural Officer (09 Years). He has more than six years in consultancy. He has vast experience in environmental impact assessments, water supply and sanitation, water resource, water conservation, soil fertility, farming in general and conversation farming. He is going to be the agricultural and water resource expert in this study. He shall also handle soil issues in the proposed project. He shall also be involved in developing the decommissioning and closure plan for the fields.

2) **Dickson Kabwe**: Dickson holds a Bachelor of Science in Ecology (UNZA) and a certificate in Environmental Management (London, UK). He has vast experience in environmental monitoring and environmental impact assessment as he has been involved in a number of EIA studies. He is going to handle the fauna, flora and ecology.
3) **Mwansa Mubanga**: Mwansa holds a Bachelor of Engineering in Environmental Engineering (CBU) and he has vast experience in Environmental Management, Environmental Monitoring and Environmental Impact Assessment. He is going to handle Public Consultations, Noise and Air Quality Studies, He will also work with the Team leader in Impact identification, putting mitigation measures and devising a decommissioning & closure plan. He shall also make contributions towards decommissioning and closure of social issues.
4) **Lewis Tumbama**: Lewis holds a BSW (Social Work)/Development Economics/Studies (UNZA) and is currently doing a Master of Science in Sustainability/Environmental Sustainability (London South Bank University, UK). Lewis has more than six years' experience in conducting environmental impacts and has since been involved in more than 45 environmental impacts assessments as a social scientist. He shall be the social scientists and shall also participate in public consultations. He shall carryout the socio-economic baseline, identification of socio-economic impacts, suggestion on mitigation measures for socio-economic impacts and formulate a social management plan.
5) **Agabu Shane**: Agabu holds a Bachelor degree in mineral sciences (UNZA) and a Master of Science in Environmental Engineering (North-eastern University, China). He has vast experience (more than 06 years) in environmental impact assessment, environmental auditing, environmental monitoring and management. He will be the team leader. His other roles will be to conduct public consultations, characterise and identify environmental impacts, suggest mitigation measures, do an EMP and monitoring plan, and do a decommissioning and commissioning plan.

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Acronyms and abbreviations

ASL	-	Above Sea Level
TORs	-	Terms of Reference
EPB	-	Environmental Project Brief
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EMP	-	Environmental Management Plan
SMP	-	Social Management Plan
ZEMA	-	Zambia Environmental Management Agency
EMA	-	Environmental Management Act
UNZA	-	The University of Zambia
Mt	-	Metric tonnes
IAP	-	Interested and affected parties
N/A	-	Not applicable
Ha	-	Hectares
RHC	-	Rural Health Centre
ZESCO	-	Zambia Electricity Supply Company
NEAP	-	National Environmental Action Plan
NCS	-	National Conservation Strategy
GRZ	-	Government of the Republic of Zambia
GLL	-	GoldenLay Limited
ECZ	-	Environmental Council of Zambia
EPPCA	-	Environmental Protection and Pollution Control Act
SI	-	Statutory Instrument
ZAWA	-	Zambia World Life Authority
ZADL	-	Zambia Agriculture Development Limited
CRB	-	Community Resource Board
CBU	-	Copperbelt University
GMA	-	Game Management Area
WRMA	-	Water Resources Management Act
CBD	-	Convention on Biological Diversity
FAO	-	Food and Agricultural Organisation
HIV	-	Human Immune Virus
AIDS	-	Acquired Immune Deficiency Syndrome
FRA	-	Food Reserve Agency
JCCL	-	Joko Commodities and Contractors Limited

1.0 Introduction

The Kafubu farm project located 16Km from Ndola Central Business District and 2.5Km

off the Ndola-Kitwe dual carriage way is a wholly owned subsidiary of GoldenLay Limited located on plot Number 3031 Baluba area in Luanshya. Kafubu farm formerly Kafubu Dairy Farm was acquired in 2012 from a Mr. Ernest Mutamboh who obtained the farm through the privatisation process of 1996.

Golden Lay Limited produces 11000 trays of eggs per day from its poultry operations at Baluba. It is the largest supplier of eggs on the Copperbelt and in Zambia. It also exports to countries like Congo DRC and Zimbabwe when possible. The company has wide experience in the cropping, poultry and in the table egg business for the last 12 years.

The background to the project undertaking is the increased demand for stock feed production raw materials especially maize and soya beans. This is attributed to the increase in edible oil refineries and stock feed manufactures in Zambia. Further, in line with the development and growth of Golden Lay Limited, the proponent acquired Kafubu Farm which was used as a dairy farm prior to privatisation in 1996 and up to the time of purchase. Golden Lay Limited acquired the farm from Mr. Ernest Mutamboh in 2012 for purposes of poultry, cropping and cattle rearing operations.

In view of all this, Golden Lay Limited engaged Greenline Environmental Solutions Limited (An Environmental Consulting Company) to carry out an environmental impact assessment and produce an environmental impact statement as required by the Environmental Management Act of 2011 read together with the environmental impact assessment regulations of 1997. The process of conducting an environmental impact assessment cannot commence unless terms of reference have been submitted to the Zambia Environmental Management Agency (ZEMA) and approved.

In line with these provisions, the consulting team identified relevant stakeholders in the project area, organised consultative meetings to get the views from the affected and interested parties in Ndola District. A project scoping meeting was also held on 5th July 2013.

The contributions that were obtained from the identified stakeholders consultative and scoping meetings have been included under section 7.0 and the minutes under section 13.0 as appendices. The issues/ concerns raised during these meetings plus many other issues identified by the developer/ consulting team and issues/ concerns to be raised by the Zambia Environmental Management Agency will form terms of reference that will guide the consulting team in the carrying out of the EIA of the proposed project.

1.1 Objectives of the Project

a) Revamping the existing 2,964 Ha of land on Kafubu farm formerly Kafubu Dairy Farm and transform it into commercial farm land to grow 675 Mt Soya beans, 450 Mt Wheat and 1200 Mt Maize respectively.

b) To demarcate an area to be used for lairage (cattle pen) and feedlot for beef and dairy cattle to be introduced on the farm.
c) Construction of six (6) chicken houses for point of lay birds (pullets) and two (2) breeding houses. The houses will have the combined capacity of 240,000 birds.
d) Installation of 6 centre pivots for irrigation of the winter crop to supplement rain fed agriculture on the farm.
e) Preparation of the farm land by clearing disturbed vegetation and plough the soil in a well-planned manner.
f) Sink 10 water boreholes for both domestic water supply and for irrigation purposes. Further consider the use of the nearby water body for abstraction of water for irrigation purposes.
g) Construction of a 10,000m^3 water reservoir for winter cropping irrigation operations.
h) To use the soya bean, wheat and maize to produce stock feed for the poultry and table eggs operations at Golden Lay Limited in Baluba area.
i) Rehabilitation and upgrading of the existing farm infrastructure to meet the operation demands of the proposed development.
j) To construct all other relevant infrastructure such as a fuel storage tank, farm house, workers compound, sewage management system, mini workshop, fertiliser storage shade, chemical storage area, fencing around the farm and a security guard check point.
k) To improve the economic standing of farm area as the project implementation will increase the revenue base of the area, creation of employment (both seasonal and permanent).
l) Increased revenue for the central government through co-operate taxes and license fees.

1.2 Objectives of the Terms of Reference

a) To incorporate all critical issues from interested and affected parties (stakeholders) into the Environmental Impact Assessment of the proposed Soya Bean, Wheat and Maize farming project.
b) To comply with legal requirement in the EIA Regulations for submitting a Scoping Report for approval before proceeding with other stages of the EIA process.
c) To comply with internationally accepted best practices in environmental management.
d) To provide the initial information of the project in order for a legal opinion to be made regarding the EIA process.
e) To set out the extent (scope) and key elements of the EIA study.
f) To place limits on the information that must be collected, thereby optimizing the use of resources during the study.
g) To provide names and skills of the EIA study team for Environmental Management Agency (ZEMA)'s approval.
h) To facilitate efficient utilization of the time, money and expert knowledge on issues of environmental significance to the project.

i) To avoid presenting irrelevant information in the EIS that may cause the report not to be a working document.
j) To facilitate early consultation with the Zambia Environmental Management Agency and other Interested and Affected Parties (IAPs).
k) To facilitate effective planning and smooth implementation of the EIA process by the consulting team.
l) To eliminate chances of disagreement in terms of the EIA process and the detail of information and consultations required to complete the process.

1.3 Contact Details of the Developer

Proponent:	GoldenLay Limited
Contact Person:	Mr. Mohamed Bushary
Designation:	Director
Telephone Number:	+260 212 515 044
Mobile:	+260 977 719 540
E-Mail:	mohamed.bushary@goldenlay.co.zm
Postal Address:	P.O. Box 90749
Physical Address:	Plot No.3037, Baluba Road, Luanshya.

1.4 Project investment

The total project investment budgeted for the revamping, development, implementation and operation of the Kafubu farm project by GoldenLay limited is Nine Million United States Dollars **(US $ 9,000,000).** The project proponent has a valid investment licence obtained from the Zambia Investment Centre in 2006.

GoldenLay limited, established and incorporated in Zambia in 2007 has wide experience in the agricultural sector as regards cropping, livestock rearing and poultry farming. The company is the largest producer of table eggs in Zambia at 11000 eggs a day with an export market via the DRC.

The Kafubu farm project will be implemented in accordance with the cost estimates given in the table below.

Table 1: Breakdown of proposed investment

ITEM DESCRIPTION	No./QTY	RATE/UNIT COST($)	ESTIMATED COST($)	SUPPLIER/ COMMENT
1. IRRIGATION				

A. Centre Pivot	6	75,000	450,000	Pivot 360 (PTY) ltd
B. Irrigation lines	12	7,000	84,000	Amiran ltd
C. Reservoir lining	1	25,000	25,000	Amiran ltd
D. Pumps/Fittings	6	4,200	25,200	KZN Irrigation
E. Electricity/ transformers	3	65,000	195,000	ZESCO LTD
F. Borehole Drilling	10	25,000	250,000	Gallant Drilling
G. Borehole Flashing *	2	4,000	8,000	Gallant Drilling
Subtotal A			**1,037,200**	
2. CONSTRUCTION & REHABILITATION				
A. Housing Units*	1	50,000	50,000	GoldenLay limited
B. Workshop	1	50,000	50,000	GoldenLay limited
C. Chemical Store	1	40,000	10,000	GoldenLay limited
D. Sewerage Facility*	2	8,000	8,000	GoldenLay limited
E. Fuel(diesel)	10,000L	1.6	16,000	GoldenLay limited
F. labour cost	-	-	12,000	GoldenLay limited
G. Fuel tank & pump station	1	6,000	6,000	GoldenLay limited
H. Gravel Haul roads	22Km	1000/Km	22,000	Zambia National Service
I. Cattle Feedlot	5625m^2	-	10,000	GoldenLay limited
J. Reservoir excavation	10,000m^3	-	12,500	GoldenLay limited
K. Feed store	-		6,000	GoldenLay limited
L. Boundary wire fence	22km		19,000	GoldenLay limited
M. Layer houses	6	750,000	4,500,000	Facco, Italy
N. Rearing houses	2	750,000	1,500,000	Facco, Italy
O. Dairy cow parlor	1		10,000	GoldenLay limited
Subtotal B			**6,231,500**	
3. EQUIPMENT & MACHINERY				
A. Planter	1	85,000	85,000	Kanyenda farming
C. Grader	1	25,000	5,000	hired
D. Excavator	1	50,000	50,000	JCCL
E. Boom Sprayer	1	30,000	20,000	owned
F. Tractors	2	55,000	110,000	owned
G. On site Equipment repair & service	-	1,000	10,000	
H. Egg laying equipment	6	150,000	900,000	Facco, Italy
I. Combine harvester	1	120,000	120,000	JCCL
4. OPERATING COSTS				

Poultry	8 houses		25,000	
Cropping	1800Ha		65,000	
Cattle ranching	450Ha		45,000	
5. ENV. & SOCIAL MONITORING		50,000	50,000	Throughout project lifecycle
6. CONTIGENCY			246,300	Resettlements, licenses etc.
Subtotal C			**1,485,000**	
GRAND TOTAL(US $)			***9,000,000***	

2.0 Site Location

Kafubu Farm (formerly Kafubu Dairy Farm) is located midway between the towns of Ndola and Luanshya in the Copperbelt and 16Km from the Ndola Central Business District. The farm is approximately 2.5Km off the Ndola-Kitwe dual carriage way on the

western side in the Kitwe direction. The farm No. 9424 is 2,964 Ha in extent and is on title No. 22607 with a 99 year lease from the Zambian government. Kafubu farm lies between 1285m and 1241m AMSL and consists of gentle slopes with broad interfluves which are mostly drained by small streams in a West, South Westerly direction.

The farm is bordered by Battledore Farm (Cool Bananas) on the eastern boundary and Kasongo Primary School on the western side. The northern boundary has Simpito's farm near beacons C and D while on the southern end is Miriam's farm located between beacons B and C.

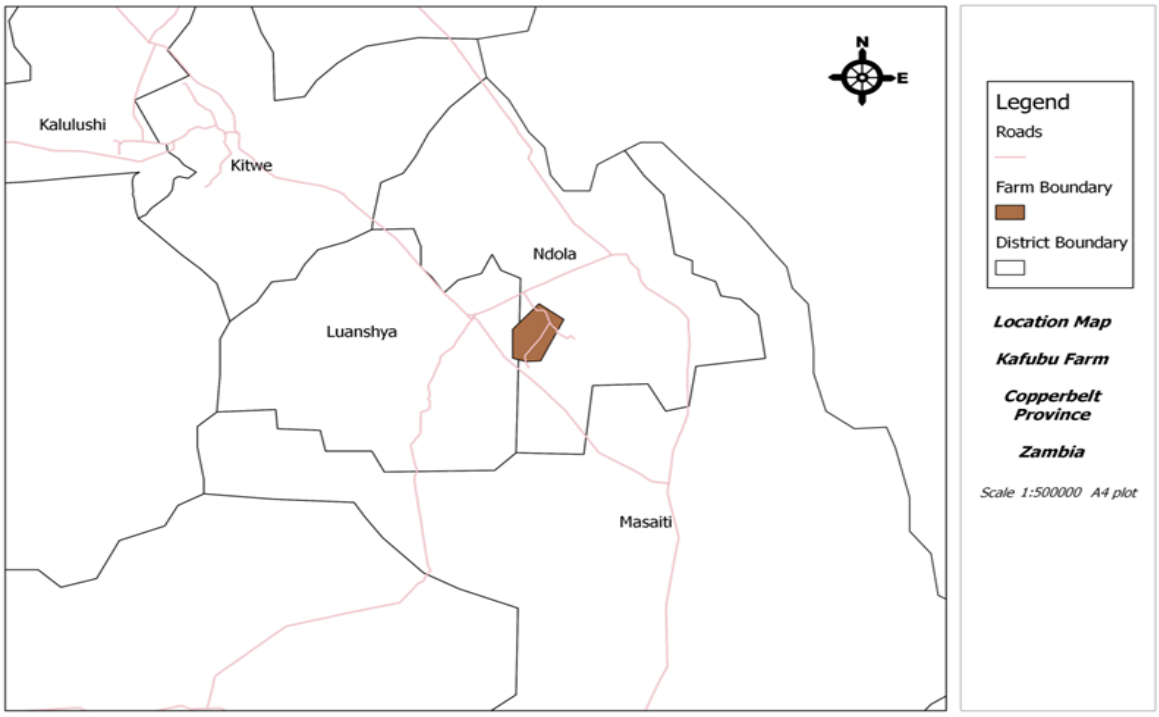


Figure 1.0 Location Map of Kafubu Farm

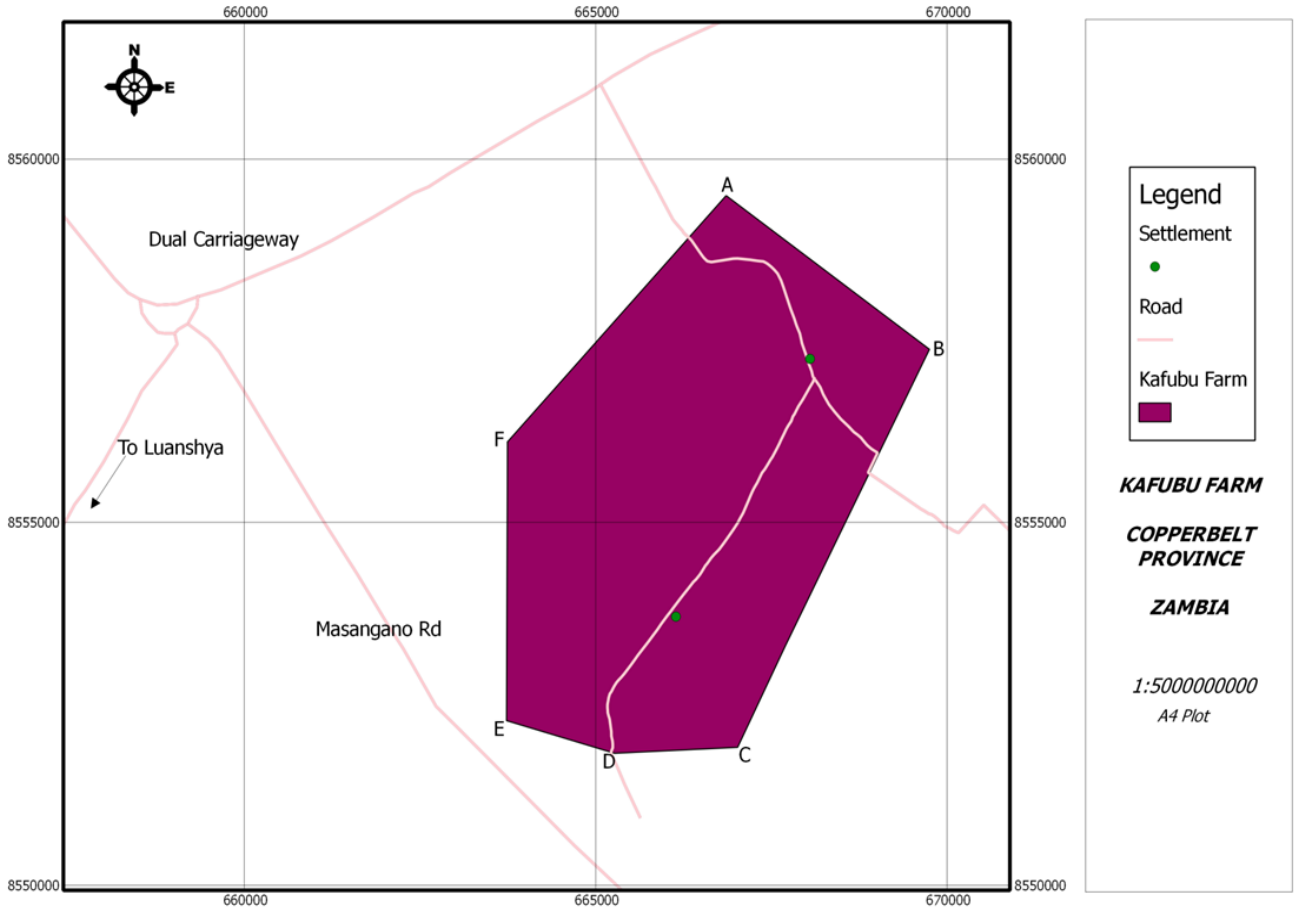


Figure 2.0: Map showing beacons A, B, C, D, E and F.

3.0 Description of the Project

GoldenLay Limited intends to develop Kafubu farm in order to conduct three forms of agricultural related activities:

(d) Arable agriculture (rain-fed and winter cropping) operations.
(e) Livestock farming (beef & dairy cattle).
(f) Poultry farming (egg layers).

The proposed Kafubu Farm project will involve as a primary purpose, the growing of Soya beans, Wheat and Maize. The crops will be grown both through rain fed agriculture and irrigation by the use of centre pivots (winter cropping). The harvested crops will be used as raw material for the production of feed for the poultry (broilers and layers) operations at GoldenLay limited.

The farm will also incorporate poultry houses for layers that will house 40,000 point of lay birds each in eight (8) houses. These houses will be constructed within the farm at designated distances from the cropping operations. The birds will be fed with feed produced at Goldenlay. Of the eight poultry houses, six (6) will be used for layers while two (2) will be used for rearing the birds. Each poultry house will be 12m by 100m in dimension. The poultry operation will therefore have the capacity to accommodate 240,000 point of lay birds at a time and 80,000 as rearing pullets.

The farm will also incorporate livestock (beef and dairy cattle). Two hundred (200) reproductive age beef animals and fifty (50) dairy animals will be introduced on the farm. These animals will be reared through free range grazing methods and the use of the feedlot in order to maintain their nutrition through the feed to be produced at GoldenLay. The animals will be for commercial (sale) purposes to the ready beef and dairy markets in Zambia.

The project success will also depend on the construction of various support structures on the farm for ease of project implementation and operations. The table gives a summary of the proposed land usage and activity allocation for Kafubu farm.

Table 2: Land allocation and activity for Kafubu farm

Proposed Activity	Land allocation (Ha)	Detail description
Cropping operations	1800	Summer cropping *(30% maize, 70% soya beans)*. Winter cropping *(60% soya beans, 40% wheat)*.
Poultry operations*	250	6 layer houses (dimensions: 12m X 100m, capacity 40,000 birds each). 2 breeder houses (dimensions: 12m X 100m, capacity 40,000 birds each).
Cattle ranching *	450	200 initial beef and 50 dairy animals to be introduced. Construction of lairage, feedlot, holding pens, deep tanks, dairy cow parlour and free grazing land.
Housing and office operations	120	Includes existing housing units, new construction and rehabilitation of dilapidated infrastructure.
Resettlement	200	Resettlement of people occupying certain portion of the farm in accordance with conditions of land purchase agreement.
Other infrastructure	144	Roads, fencing, farm clearance, Zesco power lines, distances between operations etc.

NB:* to incorporate future expansion.

Once operational, the farm will implement an effective Environmental Management Plan (EMP) to mitigate the short and long term impacts of the project on the environment and the social economic standing of the area and the surrounding communities.

Project background

The proposed project site, Kafubu Farm formerly Kafubu Dairy Farm was established in the late 1960s by the Zambian government and was managed through the Zambia Agricultural Development Limited (ZADL). The farm was later privatised and sold to Mr. Ernest Mutamboh through competitive tendering in December 1996.

In 2012, Mr. Mutamboh sold "Kafubu Dairy Farm" to GoldenLay limited. The increase in demand for raw materials for feed production at GoldenLay attributed to the increased in production of eggs and the growth of its poultry business made way for the company to purchase the farm in order to help meet the demand for their products (eggs) by increasing the raw material production.

Further, due to the increase in the number of edible oil refineries in Zambia and the region, acquisition of raw materials for feed manufacture such as Soya beans, Maize and

Wheat has become extremely competitive and expensive thus GoldenLay limited decided to invest in the project to plant and harvest its own raw materials in order to sustain its business.

Kafubu farm project will further help to supplement the Zambian beef industry through the rearing and keeping of livestock (beef cattle) which are in short supply.

The above aligned projects are in line with the efforts of the Zambian government to shift the main economic earner from mining to agriculture through the contribution of private sector investments of this nature.

Existing farm infrastructure

Kafubu Dairy Farm had during its operation times consisted of 2,964 Ha of land on title which has since been acquired by GoldenLay Limited. The farm has existing infrastructure that was used prior to acquisition. The farm infrastructure is as outlined below:

The farm encompasses 1,800 Ha of arable disturbed land that was used for grazing and cropping activities under the occupancy of Mr. Mutambo and Zambia Agriculture Development Limited (ZADL). The farm also has a number of housing units that were used by workers, office block, machinery and equipment yard.

The farm also has small poultry houses that were used for poultry farming. Other structures include, milking parlour, cattle lairage, banana plantation, electricity power lines, and 2.5 Km water irrigation line from the Kafubu dam and various access roads within the farm land.

The farm also has about 47 households that according to the previous land owner are illegally occupying part of the 2,964 Ha of land. The occupants have been informed of the change of ownership and the new owner's plans of developing the land.

Plates 1 & 2 showing existing offices and machinery yard at Kafubu farm.

Existing infrastructure on acquisition of Kafubu Farm are summarised in the table below:

Table 3: Kafubu farm acquired infrastructure

Item No.	Infrastructure Description	Status
1	Main farm house	Dilapidated
2	Carport and store	Dilapidated
3	Assistant manager's house	Dilapidated
4	Deputy assistant manager's house	Dilapidated
5	Dairy foreman's house	Occupied
6	Office block, cooler room and workshop	Dysfunctional
7	Detached carport	Dysfunctional
8	Farm tuck-shop	Dilapidated
9	Machine milking parlour	Dilapidated
10	Hand milking parlour	Dilapidated
11	Poultry house	Dilapidated
12	Stock feed store	Dilapidated
13	Dairy manager's house	Dilapidated
14	Farm worker's quarters	Occupied
15	Boreholes and water tanks	Only 2 existing
16	Underground fuel tank and pump station	Dysfunctional
17	Water lines	Dysfunctional in some areas
18	11KV ZESCO power line	Active but needs revamping

GoldenLay limited intends to implement the project in phases upon satisfying all the necessary regulatory requirements. Implementation activities lifecycle will be from preparation, construction, operational and decommissioning & closure phases.

3.1 Preparation phase activities

The preparation phase prior to the commencement of this project will include but not limited to the following activities:

- Identification of the infrastructure on the farm that will need rehabilitation and upgrade. Estimation of the Bill of Quantities for the rehabilitation and new construction works to be conducted on site.
- Obtaining relevant authorization and documentation from regulatory bodies including ZEMA and Ndola City Council and other relevant stakeholders that will be affected by the project implementation.
- Acquisition and delivery of construction material and farm machinery to site.
- Hiring of onsite local labour for the construction phase.
- Acquisition and delivery of construction raw materials to site.
- Communication with relevant stakeholders on project commencement.

3.2 Construction Phases Activities

The following activities will be undertaken during the construction and rehabilitation phase of the project:

- Site clearing to facilitate rehabilitation and construction of operations offices, machinery workshop, fuel facility and oil storage room.
- Construction of 6 poultry layer (point of lay) houses and 2 breeding houses.
- Fencing off total distance of 22Km of the area to demarcate the farm boundaries and avoid animal and human trespass into the farm area.
- Levelling of the construction area to facilitate civil works and digging of foundations for buildings.
- Rehabilitation of the existing workers houses and construction of new ones if necessary.
- Re-commissioning of the existing sewage management facility.
- Construction and /or upgrade of the fuel storage tank and a lubricant store.
- Construction of a chemical storage area including fertiliser storage shed.
- Construction of the mini machinery workshop.
- Construction of a used oil storage area incorporating a sump and oil/water interceptor.
- Siting and sinking of irrigation/ Domestic water supply boreholes.
- Revamping of the existing surface water storage tank at the farm office block.
- Access roads and drainage along the main road to alleviate historical flooding problems.
- Security facilities including check points and fencing off access areas around the farm.
- Clearing of vegetation on the previously used arable land.
- Installation of poles and power lines within the farm for extension of power to the relevant structures.
- Installation of centre pivots for winter cropping activities.
- Clearing of vegetation and stamping to prepare the land for farming.
- Maintenance of grazing land to prepare for cattle grazing.
- Construction of feedlot, lairage, deep tanks and feeding facilities for the cattle.

3.3 Operational Phase Activities

Poultry

- Introduction of chicken (layers) breeding stock in poultry houses.
- Breeding of the stock.
- Delivery of feed and medication for the birds.
- Feeding of the birds to reach point of lay and administering of all necessary medication.
- Collection and grading of the eggs from layer houses and transport to GoldenLay Limited for sorting and sale.

Cropping

- Ploughing and preparation of the fields for summer (rain fed) and winter (irrigated) cropping.
- Delivery and storage of farming Inputs (seed, fertilizer and agro chemicals).
- Pumping of water from the water source to storage reservoir.
- Planting and growing of Soya Bean, Maize and Wheat
- Harvesting of Soya Bean, Maize and Wheat
- Temporary Storage of Soya Bean, Wheat and Maize at the Farm
- Transportation of Soya beans, Wheat and Maize to Goldenlay.

Cattle rearing

- Introduction of cattle breeding stock.
- Delivery of feed and medication for the cattle.
- Grazing of cattle, feedlot and lairage management.
- Introduction of dairy animals using the existing dairy facilities.

General operations

- Obtaining of all environmental licences relating to the operation of the farm.
- Generation and management of domestic waste and hazardous waste.
- Fuel storage and use of lubricant on machinery.

Waste generation

During the construction and operational phases of the project, various types and classes of waste will be generated by the farm. This will include as detailed below:

- Solid waste (empty containers & chemical packaging)
- Liquid effluent (sewer waste).
- Hazardous waste (obsolete and expired chemicals, used batteries, used oil, filters, fluorescent tubes, & electronic waste).
- Domestic household & office waste.
- Animal waste

3.4 Decommissioning and Closure Phase Activities

- Notification of the closure and decommissioning of the farm and ceasing of farming activities.
- Demolition of the farm house, workers houses, poultry houses, feedlot and all other related farm infrastructure.
- General Cleaning, grading and levelling of areas demolished.
- Enhancement of Soil fertility in the areas graded and levelled.
- Enhancement of Soil fertility on land used for growing crops.
- Removal of the above ground fuel storage tank for alternative use.
- Rehabilitating all contaminated sites such as the workshop area and the surrounding for the fuel storage facility.
- Un-installation/ Removal of the Centre Pivots
- Removal of Pumps and burying of boreholes

- Installation of necessary warning signs around the pit and dump sites.
- Re-vegetation of the areas which had buildings and any other infrastructure.
- Re-vegetation of the land used for growing of crops
- Post closure sampling and analysis of borehole water (some boreholes will be left for this purpose) and soil.

3.5 Project Alternatives

3.5.1 Proposed site Vs other sites

The land considered for the Kafubu Farm project is under a 99 year lease from the Zambian government in the name of GoldenLay Limited. The total area covered by the title deed is 2964 Ha. The farm was previously used for crop farming and dairy cattle operations by ZADL and Mr. Mutambo Upon assessment of the area in terms of farming viability and environmental suitability, consideration will be made for alternative sites for the project undertaking. The *"No alternative site"* option will be also be considered during the EIA study.

3.5.2 Labour intensive Vs. Mechanised farming methods

Non-use of machinery during stumping, tillage, planting, weeding and harvesting will be considered as an alternative to the mechanised farming method proposed by GoldenLay. This option will be considered during the EIA study given the extent of the land to be cultivated. Assessments will be conducted to determine the feasibility of cultivating 1800 Ha of land without the use of machinery to yield the desired quantities of the harvest.

The rearing of birds, beef and dairy animal alternative methods will also be considered in terms of enabling animals to grow on traditional methods (grazing dependent) or using applicable and acceptable feeding methods in order to meet production targets especially for the production of eggs from point lay hens (pullets).

3.5.3 Waste Management alternatives (own dump site Vs. Council dump site)

Considerations will be made by the developer to manage solid waste by way of either transporting it to a designated dumpsite operated by Ndola City Council or operation of a dumpsite within the farm land considering the distance to the council dumpsite. Solid waste generated at the farm will be managed by the installation of waste bins/skips. These will be stationed at the farm houses and other sources of solid waste for collection of waste. The developer will then obtain licences for transportation and operation of dumpsite respectively.

Sewage from the farm house and workers complex will be channelled through a septic tank then to a soak away. The system will incorporate inspection manholes for monitoring the sewage management system.

The following waste management options will be considered depending on the type of waste and how feasible the option might be. The best options will be adopted.

10. Incineration
11. Encapsulation
12. Bioremediation
13. Settling/ Sedimentation
14. Septic tank - Soak Away System (effluent)
15. Decomposition
16. Landfill and/or dumpsite
17. Composting (organic waste)

3.5.4 Other Alternatives

Irrigation with rain Vs. irrigation with water from boreholes

To maximise the land usage by the developer, considerations will be made to incorporate winter cropping (irrigated farming) in addition to the summer (rain fed farming) cropping.

Conservation farming Vs. conventional farming

Conservation farming will also be critically looked into and the probability of using it determined. Conservation farming's capability of meeting the crop yield targets will be determined in comparison to conversional farming methods using inorganic fertilizers. The cost benefit analysis and suitability of the method for growing Soya beans, maize, wheat and barley on a large scale will be conducted before and during project implementation.

4.0 Policy, Legal and Institutional Framework

This section briefly describes laws, regulations, treaties and or conventions that have a relevant and have a bearing on the proposed project.

4.1 History of the Environmental Regulatory Framework in Zambia

Due to the need for balancing environmental requirements, economic activities and social needs, the Government of the Republic of Zambia (GRZ) adopted the National Conservation Strategy (NCS) in 1985. This was upgraded to the National Environmental Action Plan (NEAP) in 1992 with the same aim of fostering sustainable development. The NCS and NEAP are the foundation pillars of environmental laws in Zambia.

The NCS facilitated development of the Environmental Protection and Pollution Control Act (EPPCA) in 1990 which also facilitated formulation of the Environmental Council of Zambia (ECZ) in 1992. The EPPCA was repealed in 2011 into the Environmental Management Act No. 12 of 2011, which is the current supreme environmental management law. Consequently, the name of the mother environmental regulatory body changed from ECZ to Zambia Environmental Management Agency (ZEMA).

4.2 The Environmental Management Act

This Act was immediately preceded by the Environmental Protection and Pollution Control Act No. 12 of 1990. Provisions of the Environmental Management Act require that all new projects begin with an Environmental Impact Assessment (EIA) and thereafter, licensing, auditing and compliance inspections follow.

Applicable Regulations under the Environmental Management Act No. 12 of 2011 are described below.

h) **Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, SI No. 28 of 1997**. These Regulations provides the main framework under which EIAs are conducted, submitted to ZEMA and considered for either approval or rejection.
These regulations are relevant as a guide to GoldenLay Limited as to what is supposed to be done at every stage of the EIA process. The requirements of conducting an EIA are all stipulated under these regulations and the developer shall ensure compliance at every stage. The EIA regulations also gives a guide line as to how much review fee will be paid to ZEMA for the purpose of reviewing the EIS for the proposed project and that development shall not be undertaken by a developer without an approval letter from ZEMA.

i) **Air Pollution Control (Licensing and Emissions Standards) Regulations of 1996 (SI No. 141)**. These Regulations provide air quality standards and guidelines

for mitigating air pollutants. The guidelines are for ambient air and point source emissions.

The construction and rehabilitation and operation phases of the project will generate dust and will finally end in ambient air and cause dust fallout within and outside the proposed project site. The air pollution control regulations will help the developer to put up appropriate measures to curb this dust generation.

Also the air control regulations prohibit open air burning *(section 15)*.For this reason, the developer will ensure no open air burning is practiced at the farm. No open air burning will be extended to farming activities at operational phase. The biomass that will be generated after harvest will be ploughed back into the soil to enhance soil fertility.

j) **Water Pollution Control (Effluent and Waste Water) Regulations, 1993 (SI No. 72)**. These Regulations provide for control of water pollution by providing standards for managing water pollutants and effluent discharge. The standards stipulated under these Regulations are for industrial effluent. The Regulations also provide requirements for licensing all effluent discharge points and they have a provision for monitoring criteria in terms of analytical methods.

The relevance of water pollution regulation to this project is that chemicals, fertilisers and hazardous waste might pollute both ground and surface water. GoldenLay Limited will adhere to these regulations to avoid contamination of ground and surface water during and after the operations.

The proposed project will comply with this regulation by proper transportation, storage and handling of chemicals and hazardous waste at the proposed project site. The chemicals, fertilisers and hazardous waste once it has mixed with irrigation and or storm water it will cause contamination of water. The developer will make sure none of these get into surface and ground water.

k) **Waste Management (Licensing of Transporters of Waste and Waste Disposal Sites) Regulations, 1993 (SI No. 71)**. Under these Regulations, activities relating to waste management such as waste generation, collection, storage and disposal are regulated.

GoldenLay Limited will dispose of the waste generated on the farm using ZEMA licensed transporters at a designated dumpsite within Ndola town as it located 8Km from the farm site.

l) **Hazardous Waste Management Regulations, 2001 (SI No. 125)**. These Regulations make provisions for management of hazardous wastes such as used oil, used fluorescent tubes and used oil filters. The Regulations provides for management activities such as generation, storage, transportation, treatment, recycling, importation, exportation and disposal.

m) **Pesticides and Toxic Substances** Statutory Instrument No. 20 of 1994 Pesticides and Toxic Substances Regulations – provides for licensing of importation,

transportation, distribution and storage of pesticides and toxic substances. The proposed project will use Pesticides, herbicides and fungicides in controlling pests and weeds. There will be a possibility of contaminating the soil and or ground water from the use of these chemicals. GoldenLay Limited will follow the guidelines according to this act in the use of these chemicals.

n) **Ozone Depletion Substances Regulation of 2000**
These regulations state provisions for the transpiration, use and storage of ozone depletion substances in the environment. Activities and or equipment that might contribute to ozone depletion at the farm will be conducted, transported, used and stored in accordance to these regulations.

The provisions of the EMA will be adhered to by GoldenLay Limited and is currently being used for the preparation of the TOR's and the follow up EIA for the Kafubu farm project.

4.3 The National Heritage Conservation commission Act

The National Heritage Conservation commission Act CAP 173 of 1989 stipulates preservation and protection of ancient cultural and natural heritage resources and objects of aesthetic, historical and archaeological value. In this Act, "Ancient Heritage is defined as being among other things, any structure, settlement previously inhabited, land mark, burial place or any other item designated by the commission which is known or believed to have been erected, constructed or used before 1st January 1924. The Act also provides for the formation of the National Heritage and Conservation Commission which is the responsible institution.

This act is relevant since the clearing of vegetation, construction of the farm infrastructure may damage heritage sites if there are any. This act will guide the GoldenLay Limited on what to do in case such sites are found on the proposed project site on how to protect the site.

4.4 The Forest Act Cap 199 of 1973

The Forest Act of 1999 has not yet been enforced hence the 1973 Forest Act is still active. The legislation provides for establishment, gazetting and de-gazetting of forests. It also provides for monitoring, management and regulation of forest areas and forest products, nationwide, and particularly in National and Local Forests.

This Act provides for protection of Six (6) tree species in Zambia whether in a protected area or outside. These tree species are:

g) Afzelia quanzensis (Pod Mahogany);
h) Baikiaea plurijuga (Teak);
i) Entandrophragma caudatum (Mountain Mahogany);
j) *Faurea saligna* (Beech wood);
k) *Khaya nyasica* (Red Mahogany); and
l) Pterocarpus angolensis (African Teak).

The area under consideration for the development of Kafubu farm is a brownfield that has been disturbed by the previous anthropogenic (farming) activities that were undertaken by Kafubu Dairy Farm prior to acquisition by GoldenLay limited. However, the developer will endeavour to act within the provisions of this law in the implementation of the project to protect forest resources.

4.5 The Zambia Wildlife Act No. 12 of 1998

The Zambia Wildlife Act No. 12 of 1998 provides for establishment of the Zambia Wildlife Authority (ZAWA) and provides the enabling legislation for the sustainable management of wildlife resources in Zambia. The Act also provides for regulation of all wildlife activities such as hunting, poaching and keeping of wild animals. The local management of wildlife resources and habitats is partly delegated to Community Resource Boards (CRBs) in designated Game Management Areas (GMAs). The CRBs in turn are given commission for the income generated from GMAs.

Although the proposed project site does not fall in a GMA, the ZAWA Act is relevant in that the area is habitant to animal and bird spices which may or may not be endangered. GoldenLay Limited will follow the requirements of this Act in order to conserve the animal and bird life within the vicinity of the farm.

4.6 The Fisheries Act, No. 22 of 2011

The Act provides for the appointment of the Director of Fisheries and fisheries officers and provides for their powers and functions. It promotes sustainable development of fisheries and a precautionary approach in fisheries management, conservation, utilization and development. It establishes fisheries management areas and fisheries management committees and provides for the regulation of commercial fishing and aquaculture. It establishes the Fisheries and Aquaculture Development Fund. It has replaced the Fisheries Act, 1974.

The implementing institution for this Act is the Ministry of Fisheries and Livestock. The Act regulates all fishing activities in Zambia undertaken in any kind of aquatic ecosystem. This includes lakes, rivers and streams. It also regulates activities that may interfere with fisheries.

Although there are no streams and or rivers within and in the vicinity of the proposed project site, contamination of surface water runoff may eventually contaminate surface water after travelling for kilometres. GoldenLay Limited will follow the guidelines in this Act to achieve sustainable development.

4.7 Employment Act Cap 268

This Act provides conditions under which employees should work in Zambia. The Act covers both temporary and permanent employees. Generally, this Act talks about employee protection and social security requirements. Major provisions include:

f) Minimum contractual age;
g) Establishment of employment contracts;
h) Settlement of disputes arising from such contracts of employment;
i) The appointment of Labor Officers and other staff for the administration of the Act; and
j) Certain conditions of employment such as ordinary leave, sick leave, maternity, redundancy and welfare of employees.

GoldenLay Limited will comply with this act by employing the required age, establishing contracts, conditions of service and settling disputes in accordance with this act. The relevance of this Act to the project will serve as guide to equal and formidable employment conditions.

4.8 Workers Compensation Act No. 10 of 1999

This is a social security Act which has provisions for employee compensation in case of injury or death of an employee whilst at work. It is a requirement under this Act that all employers register their employees with the Workers Compensation Fund and make periodic subscriptions for compensation of their employees.

The employer (GoldenLay Limited) will remit subscriptions and will reward compensation to its workers in accordance with this act. The Act is relevant to the project in that GoldenLay Limited will employ people that need to be rewarded in accordance to the Act.

4.9 The Water Resources Management Act of 2011

The Water Resources Management Act (WRMA) of 2011 regulates the use of surface and ground water for any of the following purposes; environmental, training and research, municipal, agriculture, industrial, hydro-electric, mining, navigation and any other activity that may be specified by the water resources management board.

Activities under theses purposes may include but not limited to the following;

k) Use water for purposes specified under section sixty, other than for domestic purposes specified under section seventy of the Water Resource Management Act No. 21 of 2011;
l) Construct, acquire any water works, impound, supply or distribute water from any water or borehole to any other person;
m) De-water any mine, quarry or water works;
n) Drain any swamp, marsh, dambo, wetland, re-charge area or other land;
o) Construct or acquire any water works for the purpose of draining into, conserving or utilizing, in any manner whatsoever, water from a water resource;
p) (Construct water works necessary to restore the course of a water resource that has changed its course;
q) Harvest of any rainwater by means of a dam, weir or barrage that is on a water resource;
r) Conduct any operation that would interfere with the bank or course of a watercourse;

s) Sink, deepen or alter any borehole for any purpose in a water shortage area; or
t) Carry any activity in relation to a water resource as may be prescribed.

The relevance of this act is that it will regulate how GoldenLay limited will utilise the ground water resources, protect both surface and ground water from contamination. Being a new act, Kafubu Farm will extensively consult with the newly established Integrated Water Resources Management Board to make sure all the requirements are met and the environment and water resources are protected.

4.10 The Water Supply and Sanitation Act No. 28 of 1997

The Water Supply and Sanitation Act provides for the regulation and standards applied in the provision of public water and sanitation services. It also provides for permitting of water supply and sanitation service provision. Water supply and sanitation at the farm will follow the guidelines and standards as stipulated in this act. The farm house and the workers compound will be supplied with potable water from boreholes and sanitation will employ septic soak way arrangement. Water quality of the portable water will be monitored as required by the water supply and sanitation act to make sure quality water is supplied to the workers and livestock.

Sanitation of the area will depend on the management of sewer waste and GoldenLay Limited will at all cost follow the guidelines and requirements of this act to make sure that the health of the workers and the communities around the farm are safe guarded.

4.11 Public Health Act Cap 295 of 1978

This Act provides for prevention and suppression of public health hazards. It regulates all matters and activities that are connected to outbreak of diseases. Local Authorities, in this case Ndola City Council is the custodian of the Public Health Act. Provisions of the Act are implemented by Councils through licensing and inspections. Activities such as sanitation, health and safety that border on public health at the farm will be dealt with in accordance with this act.

The Public Health Act is important to the project in that the farm will produce raw materials (Wheat, Soya beans and Maize), beef and dairy animals and Eggs that will be consumed by the public. Thus the Act will provide guidance in the production and handling of such products to safe guard the consuming public.

4.12 Lands Act Cap 29 of 1995

The Lands Act controls all matters pertaining to the management/use of land and land tenure systems. The process of acquiring the mining license exhausts part of the applicable land acquisition laws. Kafubu Farm formerly Kafubu Dairy Farm was once a government owned operation that was privatised and sold to Ernest Mutamboh. The farm land was acquired from Mr. Ernest Mutamboh by GoldenLay Limited in 2012. The 2,964

Ha land is on a 99 year lease title from the Zambia government. The developer has so far complied with this act and it will strive to comply with any provisions under this act.

4.13 The Local Government Act

The Local Government Act CAP 474 of 1991 provides for a system of local government administration in Zambia at city, municipality and district Council levels. Each local governance level has delegated statutory functions with respect to development planning. The Act also allows Councils to implement environmental protection and natural resources management functions which include prevention of pollution of water supplies and has some control in undertaking of mining operations. The act is relevant as issues of environmental protection and natural resource management will be affected by this developmental project. GoldenLay Limited will follow the provisions of this act.

4.14 The Petroleum Act Cap 439 and the Energy Regulation Act Cap 436

The Petroleum Act provides for control of conveyance and storage of petroleum products such as diesel and petrol. The Act provides further provides for control measures regarding production, transportation, handling, distribution, re-sale and use of energy.

The Energy Regulation Act of 1995 makes provision with respect to the production and distribution of energy in Zambia and establishment of the Energy Regulation Board (ERB) for purposes of control and licensing of energy undertakings. In accordance with this Act, ERB shall, in conjunction with other Government agencies, formulate measures to minimize the environmental impacts of transportation, storage and use of fuels and enforce such measures by attachment of appropriate conditions to licences held by such undertakings.

GoldenLay will handle all petroleum related products on the farm in accordance with the Act. The developer will also follow the requirements of this act when transporting, storing and using petroleum products.

4.15 Animal Health Act Cap No. 27 of 2010

An Act to provide for the appointment of the Director responsible for veterinary services and other staff and define their powers and functions; provide for the prevention and control of animal diseases; provide for the quarantine of animals; regulate the importation and exportation of animals, animal products, animal by-products, articles and animal feed; establish the Animal

Disease Control Fund; repeal and replace the Stock Diseases Act, 1961; and provide for matters connected with, or incidental to, the foregoing.

The Kafubu Farm project will involve movement of animal stock; thus GoldenLay Limited will follow the provisions of this Act in management of animals on the farm.

4.16 Food and Drugs Act Cap 303

An Act to protect the public against health hazards and fraud in the sale and use of food, drugs, cosmetics and medical devices; and to provide for matters incidental thereto or connected therewith.

The project will involve the production and sale of directly edible food (eggs) thus GoldenLay Limited will follow the provisions of this act in the production of table eggs and all necessary regulations pertaining to production facilities that ensure edible and safe food.

4.17 The Noxious Weeds Act, Cap 231

The Noxious Weeds act gives provisions for the regulation of weeds declared noxious in an area or agricultural lands. The relevance of this act is that GoldenLay Limited will not import, distribute, convey and or sale any noxious weed or any part thereof or of any seed with which the seed of any particular noxious weeds has become mixed with as provided in the act.

The Act is relevant to avoid the introduction of noxious weeds in the agriculture area since the farm will be involved in cropping activities. GoldenLay Limited will remove any noxious weeds as identified and instructed by an authorizing officer acting legally and in accordance with this act.

4.18 The Plant, Pests and Diseases Act

The plant, pests and diseases act cap 233 has provisions for eradication and prevention of spread of pests, control of importation of growing media, injurious organisms, invertebrates and plants, cured tobacco and miscellaneous.

In the farming process, pests will also come up and GoldenLay limited will take all necessary measures within the provisions of this act to eradicate and prevent the spread of pests within and outside the proposed project site. Importation of any growing media, injurious organisms, invertebrates and plants will be controlled in accordance with the provisions of this act.

4.19 Plant Variety and Seeds Act (Amended by Act 21 of 1995)

The plant, pests and diseases act gives provisions on administration, registration of seed importation and cleaning, seed certification, inspection of seeds, prescribed seeds, import and export of seed, offences related to seeds and miscellaneous issues regarding seeds.

GoldenLay Limited will only plant seed that has been certified by authorised agencies in Zambia. Only prescribed seeds inspected by authorities officers acting legally will be planted at the farm. In an event that Kafubu Farm may require to import seeds, it shall be done in accordance with this act. There will be no exportation of seed from the farm.

4.20 Agriculture (Fertilizers and Feed) Act 13 of 1994

The act provides for the regulation and control of the manufacture, processing, importation and sale of agricultural fertilisers and farm feed. It also provides for minimum standards of effectiveness and purity of such fertilisers and feed.

GoldenLay limited will strictly follow the requirements and provisions in this act. It shall make sure that the purity of fertilisers and feed conform to stipulated standards. It shall import and or locally buy fertilisers and feed from recommended and registered fertilisers and feed dealers/ companies.

4.21 International Conventions

Zambia is a signatory to a number of international conventions. Conventions of significance to the proposed project are briefly described below.

i) **Ramser Convention: -** The general objective of the Ramser Convention is to curtail the loss of wetlands and to promote wise use of all wetlands. The convention addresses one of the most important issues in Southern Africa, namely the conservation of water supplies and use of the natural and the human environments in an intergenerational equitable manner.

j) **African Convention on the Conservation of Nature and Natural Resources (Algiers,1968), (Maputo, 2003):-** The objective of the convention is to encourage individual and joint actions for the conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind. This must be done from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.

k) **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):-** The objective of this agreement is to ensure that international trade of wild flora and fauna does not endanger their existence. The convention is customized through the Zambia Wild Life Act No. 12 of 1998 and the implementing body is Zambia Wildlife Authority.

l) **Kyoto Protocol to the United Nations Framework Convention on Climate Change: -** The aim is to further reduce greenhouse gases by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries.

m) **Convention on Biological Diversity (CBD):-** The major aim of the CBD is to effect international cooperation in the conservation of biological diversity and to promote sustainable use of living natural resources worldwide. It also aims at bringing about sharing of the benefits arising from utilization of natural resources. A number of plans in this convention fall under the Department of Agriculture, Forestry, Fisheries and ZAWA.

n) **Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal: -** The objective is to control import and export of hazardous wastes. It also aims at ensuring that any trans-boundary movement and disposal of hazardous waste, when allowed, is strictly controlled and takes place in an environmentally sound and responsible manner.

o) **Convention on Migratory Species and the African –Eurasian Water Bird Agreement: -** Like other migratory species, water birds cross several international borders during their migration, facing a wide range of threats. Without international cooperation, conservation efforts of one country can be meaningless if these birds are not protected in another country.

p) **The United Nations Framework Convention on Climate Change (UNFCCC):-** It was signed by Zambia in 1992. The main objective is to achieve stabilization of greenhouse gas concentrations in the atmosphere. Zambia recognizes that the largest source of one of the main greenhouse gases, carbon dioxide, is from burning wood fuel and the use of coal and oil.
GoldenLay Limited will take all precautions to make sure that the contributions to greenhouse gases from the farming and poultry operations are minimal. The closure phase will involve re-forestation.

5.0 Scope of the Environmental Impact Assessment Work

The Environmental Impact Assessment work to be done will include stakeholder identification (screening, scoping, incorporate concerns/ critical issues from the affected/ interested parties into the Terms of Reference). Once finalised, the draft TORs will be submitted to ZEMA and await comments. Upon receiving comments and incorporating them into the TORs, submission of final copy to ZEMA will be done then await approval and or further incorporation of issues into the TORs.

Once approved, the consulting team will conduct project impact assessment, EIS draft report writing and project disclosure to the relevant and affected stakeholders. Concerns, vies and comments from the stakeholder disclosure of the project will be incorporated in the draft Environmental Impact Statement to be submitted to ZEMA for review and comments. On receipt of comments, the consulting team and developer will address the comments and incorporate appropriate changes in the final EIS for submission to ZEMA for review and payment of review fees.

The table below describes the activities and particular tasks that will be undertaken in the process of conducting the Environmental Impact Assessment for the proposed development of Kafubu Farm (cropping, poultry and livestock operations). For example the activity "scoping" has the following tasks to be accomplished;

1. Identify stakeholders and affected/and or interested parties to the project development considering that is being implemented on already existing farm land (brownfield) previously used for farming activities.
2. Deliver invitation letters for stakeholder meeting to interested and affected parties.
3. Hold stakeholder and scoping meeting for the project.
4. Get views (As minutes) of the affected and interested parties as regards the proposed project.

Table 4: Environmental Impact Work/ Tasks to be undertaken

Activity	Task	Comments	Status
Screening	• Consultant to discuss with developer and ZEMA to determine whether a full EIA or a less detailed study is required. • Consult from ZEMA, the category or schedule in which the proposed project falls under.	Kafubu farm is an already existing farm on title and has 1800Ha already cleared and was being used by previous for rain fed farming. The other portions were used for grazing dairy animals and contain other infrastructure. The farm has approximately a total of 2,964 Ha. The farm has various infrastructure used for dairy operations, poultry and cattle grazing. Therefore, development of Kafubu Farm requires a full EIA for all proposed operations. This will be done as a single document.	Done
Scoping public consultation	• Identify stakeholders and affected/and or interested parties to the project development considering that is being implemented on already existing farm land (brownfield) previously used for farming activities • Deliver invitation letters for the scoping meeting to interested and affected parties. • Hold scoping meeting. • Get views (As minutes) of the affected and interested parties as regards the proposed project.	Key stakeholders were identified and written to concerning GoldenLay Limited's acquisition and intention to develop Kafubu farm. Stakeholders included: ministries of agriculture & livestock, land, natural resources & environmental protection. Others were poultry association of Zambia, Zesco, Kafubu Water & sewerage, Cool bananas, forestry department, Kasongo primary School and local residents of the project area. **Scoping meeting** was held on **5th July, 2013** in respect of the project.	Done
Scoping report	• Compile a scoping meeting report.	This is the outcome of the Scoping	In progress

Activity	Task	Comments	Status
	• Screen critical issues to include in the TORs. • Submit the scoping meeting report as draft terms of reference for conducting the EIA to ZEMA. • Await for comments from ZEMA. • Incorporate comments into the scoping meeting report (TORs) and resubmit to ZEMA. • Await for approval or further comments by ZEMA.	Activities and it is the current stage. ZEMA will comment on the Scoping Report and advise what other critical issues should be included when conducting the EIA.	
Conducting the EIA specialist studies	• Collect any necessary and relevant data from the developer concerning the proposed document. • Review the laws and regulations that have relevance to the proposed project. • Conduct baseline studies for both the biophysical environment and the social economic. • Carry out specialized studies. • Explore and describe the proposed project in detail. • Explore and describe the project alternatives in detail in terms of location and processes. • Characterize all identified impacts. • Identify both the potential positive and negative impacts. • Suggest possible mitigation measures against the potential impacts. • Document environmental management plan and the social management plans for the project. • Draw or come up with the closure and	To establish the baseline of the area, specialist studies shall be conducted using primary as well as secondary information.	Not done

Activity	Task	Comments	Status
	decommissioning plan. • Draw or come up with an environmental monitoring plan for both operational and closure & post closure periods.		
Preparation of the draft EIA report	• Each expert to write a report on findings during the EIA study. • Compilation (putting together) of the reports into a draft EIS report.	The report shall be prepared in accordance with the format in this Scoping Report as well as comments from ZEMA.	Not done
Public disclosure of the draft EIA report	• Disclosure of the draft document to the affected and/or interested parties. • Deliver invitation letters for the disclosure meeting to interested and affected parties. • Get the concerns/ issues from the affected and interested parties which may have been left out in the draft EIS report	All stakeholders will be informed of the progress and stage of the EIA process and obtain their views on the project undertaking by GoldenLay Limited.	Not Done
Revising the draft EIA report to include concerns from the public and Submission to ZEMA	• Asses and evaluate the concerns/ issues about the project. • Include the concerns/ issues that are critical and had been omitted in the EIS report. • Submitting the draft EIA report to ZEMA for internal review.	The EIA team shall revise the draft report to ensure that necessary concerns from the public are included and addressed. The report shall be submitted to obtain further regulatory advice on the quality and adequacy of the report as indicated by ZEMA.	Not Done
Preparation of final EIA report	• Receive comments on the EIS report from ZEMA • Incorporate the comments in accordance with ZEMA requirements and recommendations Submit final EIS report to ZEMA.	The EIA team shall revise the report to ensure that comments from ZEMA are addressed Once comments from ZEMA are addressed,	Not Done

Activity	Task	Comments	Status
		final copies of the EIA report shall be prepared and 12 hard copies and an electronic copy shall be submitted for review	
Decision making and issuance of a Decision Letter by ZEMA	• Developer awaits decision from ZEMA • Developer receives decision letter.	After review in accordance with legal provisions, a decision shall be made by ZEMA.	Not Done
Implementation, Monitoring and Auditing	• Developer implements, monitors and audits the proposed project in accordance with ZEMA's conditions of approval (if the project is approved).	If approved the proposed project shall be implemented in accordance to the decision letter and conditions given. The commitments in the Environmental Management Plan and the Social Management Plan shall be adhered to. Environmental monitoring and auditing shall follow to ascertain compliance.	Not Done

The process of writing the EIS will constitute two major activities;

1. Preparation of the draft EIS report and preparation of the final EIS report.
The tasks involved in these activities have been outlined in the table above. Each expert, after conducting their respective areas of study will compile specialized reports which shall be used to prepare the draft EIS report. The preparation of the EIS report will be done in accordance with the guidelines and formats required by ZEMA.
A disclosure meeting with identified stakeholders will be held in respect of the project after preparation of the draft EIS report. The meeting will address concerns and comments raised in the stakeholders submissions prior to submission of TOR's and also determine if these concerns have been adequately addressed by the developer and consulting team. When fresh comments have been incorporated, the draft report will then be submitted to ZEMA for internal review.

2. Submission of final EIS.
After receiving the comments, issues raised by ZEMA will be addressed and incorporated into the report. A final report will then be submitted upon satisfying the comments resulting from the ZEMA internal review.

5.1 Spatial extent of the EIA work to be undertaken
The EIA study will be undertaken to cover primarily the environmental, socio-economic and cultural impacts of the project undertaking on the immediate environment in Kafubu Farm area.
The consulting team will study the social and cultural impacts of the development on the local people as well evaluate the positive impacts of revamping Kafubu farm to a full scale agricultural undertaking. The study will also determine the impacts of the project on social amenities located in the area such as Kasongo Primary School and Fisenge Health Centre resulting from the likely influx of population seeking employment. This may also extend to the impact of the spread of HIV/AIDS as result of the creation of employment at the farm.
During the operation of the farm, chemical and fertilizer application impacts on the air quality, soil and ground water will be studied and reported on by the consulting team especially effects on the surrounding farms and settlements.
The study will also consider the extent of ecological disturbance during previous farming activities considering that the farm is a brownfield with already disturbed farming land.
Prior to project implementation, the consulting team together with the developer, will hold a disclosure meeting with relevant identified stakeholders to obtain views, concerns and questions regarding the project to be undertaken.

6.0 Methodology in Analysis of Environmental Impacts

6.1 Summary of baseline data and information required

The data and information on climate, air quality, ground water quality, noise & vibrations, geology, hydrology, topography, land use, soil, land tenure, fauna, flora, social economic and cultural set up shall be collected by respective expert team members. Baseline climatic data is presented below. The other baseline data will also be described once the studies are conducted.

6.1.1 Climate

Kafubu Farm is located in Ndola District which lies on an altitude of 1269m ASL. Generally, Ndola experiences a sub-tropical climate that is strongly seasonal, with three distinct seasons. Climatic conditions are characteristic of the second agro-ecological region of Zambia with a pronounced dry and rainy season. The rainy season start in November ending in April with a total annual rain fall ranging from 1000 to 1200 mm. Majority of the rainfall is distributed over a single rainy season lasting approximately 6 months, with December and January typically being the wettest months. The dry season is divided into the cool dry season (May – July) with temperatures ranging between 8ºC and 21ºC and the hot dry season (August – October) with temperatures ranging between 21ºC- 32ºC . The rainy (hot wet) season is generally warm with temperatures ranging between 16ºC to 24ºC. Summary climatic conditions of the area are given in the tables below.

Table 5: Geological and Agro-ecological location of Kafubu Farm-Ndola

PROVINCE	AGRO-ECOLOGICAL ZONE	PLUVIOMETRY
Copperbelt	II {Medium rain fall zone}	1000mm and above per annum

Pluviometer = Total rainfall regardless of distribution

Table 6: Seasons and Associated Temperatures

SEASON	MONTHS	Min Temperature{ºC}	Maxi Temperature{ºC}
Cool dry season	May to July	8	21
Hot dry season	August to October	21	32
Hot wet season	November to April	16	24

Table 7: Average Precipitation (84 Year Period)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
cm	28.6	24.3	17.8	3.7	0.4	0	0	0	0.2	2.5	13	27.8

(Source: www.weatherbase.com)

6.1.2 Geology

The geology of the area as taken from the Geological map of Copperbelt (Northern Rhodesia, Scale1:500,000,Geology survey of Zambia dated 1961) compiled by J.A Bancroft shows that the Kafubu area has sedimentary sequence comprising conglomerate and Aeolian sandstones succeeded by argillates, dolostones and arenites. Generally, the area is characterised by the Katanga super group. The overlaying upper roan formation is predominantly dolomites-argillite sequence overlain by carbonaceous shales, argillite and minor carbonate rocks of the mwashia formation. A tillite unit the 'grand conglomerate' forms the top of the mwashia formation. Units belonging to the mines group are found in the Ndola area.

The Kundelungu group of rocks is found to be overlaying the mines group and consists of thick sequence dominated by dolomitic lime stones.

6.1.3 Topography

The Copperbelt regional topography comprises of a plateau that slopes gently from 1,370m in the north-west to 1,130 Masl in the south east. The province has the Kafue River as the main river basin that drains the Copperbelt in a wide arc from north to south. The principal tributary rivers of the Kafue River are Lufwanyama, Luswishi, Kafubu, Mwambashi and Kafulafuta.

The Ndola local topography slopes gently at 10o at an average altitude of 1,200masl with isolated hilly outcrops such as Dola and Kaloko Hills.

The general terrain of the site is generally gently sloping with a bi-directional slope averaging between 1% - 1.5% and towards the North-Eastern direction (slopping in the direction of the Kafubu River).

6.1.4 Land tenure and land use

Land tenure in Zambia is governed by State and Customary ownership. There are two Land tenure systems found in Ndola District: (1) Leased land tenure system and (2) Traditional land tenure system.

The Local Authorities through the Commissioner of Lands allocate land to applicants for development on leaseholds basis. The Local Authorities recommend applications for residential, commercial and agricultural plots. Kafubu Farm is on a lease hold basis from the Zambian government.

The entire 2964 Ha of land making up Kafubu farm was fully utilised by the previous owners for agricultural purposes which included Dairy cattle rearing, milking operations, cattle grazing and cropping operations. The previous owner (Mr. Mutambo) acquired the farm in 1996 who later sold it to GoldenLay. The land is on a 99 year title lease hold in the name of GoldenLay Limited. The farming operations will be conducted through the lease period and consideration for renewal will be made when it expires.

6.1.5 Built Environment

Kafubu farm (formerly Kafubu Dairy farm) has a number of infrastructure that was used by the previous owners before take over by GoldenLay. Most of the structures will be rehabilitated while others will be completely raised down to pave way for construction of new structures in line with the developer's plans. The built environment of the farm comprises the following infrastructure:

Built environment
Main farm house
Carport and store
Assistant manager's house
Deputy assistant manager's house
Dairy foreman's house
Office block, cooler room and workshop
Detached carport
Farm tuck-shop
Machine milking parlour
Hand milking parlour
Poultry house
Stock feed store
Dairy manager's house
Farm worker's quarters
Boreholes and water tanks
Underground fuel tank and pump station
Water lines
11KV ZESCO power line

6.1.6 Social Economic environment

Most of the local people in the area surrounding the project site are small scale peasant farmers practising seasonal farming of crops such as maize, cassava, ground nuts and sorghum.

During the existence of Kafubu Dairy Farm, most of the local people were dependent on the farm as main source of employment. Employment was the major economic earner of the local.

6.2 Baseline Data and Information collection

Data and information on climate will be collected through review of historical data from different sources. These sources may include internet, available literature and data collected over a long period of time from established weather stations. The nearest meteorological station is based in Ndola District of the Copperbelt province. Historical climatic information will be obtained from this source and cited.

(a) Air Quality

To collect data on ambient air quality measurements, the Accuro dragger pump will be used to determine the presence and quantitative levels of gases. If historical data is also present it shall be reviewed and used *(Sources shall be quoted accordingly)*.

(b) Ground and surface water quality

For ground water quality and hydrology of the area, ground water samples will be collected from the two existing boreholes and analysed by recommended laboratories. Ground water flow regimes & rates and quantities will be studied by the water resource expert of the consulting team.

(c) Noise measurement

The noise level meter *(toptronic T325-IEC651 type II*) will be used to measure noise levels within and around the proposed project site to determine the noise levels and the noise buffer zone.

(d) Geological data

Available data and information on the geology of the area will be reviewed and studied by the lead consultant who is also a mining /environmental engineer.

(e) Soils

Soil studies will be conducted by the water resource expert who is also an Agricultural expert. A physical inspection and soil laboratory test will be conducted to determine the necessary soil parameters that shall be vital and necessary to this study. The developer had engaged a consultant to carry out a soil analysis and survey of the farm and consequently a soil survey report has been produced and submitted to the developer by the consultant.

(f) Ecology

The team's ecological specialist will carry out an ecological study of the proposed project site and its vicinity. This shall be done by a physical inspection of the area to determine the flora and fauna species available. He shall identify all the species and single out the endangered and non-endangered species.

A Floristic Survey will be conducted to determine the flora type and population by making transects in the proposed site area to cover 30% of the area this will help the ecologist to assess the following:

(i) Population of trees still available given that the land is a brownfield and anthropogenically disturbed.
(ii) Density and determine the shrub cover of the vegetation in the proposed project site area.

This methodology will help determine the type of vegetation and trees in the project area and possible calculation by estimate of how many trees were cut during the lifespan of the farm under the previous owner. The Fauna assessment will be done to check if there is any disturbed and endangered species due to the proposed project.

These fauna species will be captured by different methods for identification, insect pit-fall traps, and Lamp traps will be set up. Flora and fauna assessment will include desk study of relevant information, habitat characterisation, interviews with local people and actual findings in the proposed project site area. Vegetation structure, composition due to

historical land use practices, farming will be used to assess and identify endangered, non-endangered species and invasive species.

For land use, cultural set up and socio-economic activities, the social scientist will use questionnaires, checklists and personal interviews to collect the necessary data and information in these areas. The social component of the EIA study will incorporate population census and characteristics of the project area, socio- economic activities of the people the area and cultural setup. The impacts (both negative and positive) resulting from the project undertaking will be determined and evaluation made of the positive impacts against the negative ones. Mitigation measures of the negative impacts will be recommended and positive impacts enhanced.

6.2.1 Use for Baseline Data and Information

To compare the data and information with standards established by ZEMA and any other relevant laws regarding the Environmental Impact Assessment in particular and the entire proposed project in general.

To know, establish and document the current status of the proposed project site and its vicinity.

6.2.2 Goals for the Baseline Data and Information

To evaluate compliance to the EIA after the project is implemented. To relate how the proposed project site and its vicinity will be impacted by the activities of the proposed project.

To relate as to what measures could be implemented to mitigate against the potential impacts.

6.3 Cultural setup and heritage

Kafubu Farm formerly Kafubu Dairy farm is located 16Km from Ndola CBD and about 2.5Km off the Ndola –Kitwe dual carriage way. The project site has no cultural or heritage sites of significant nature likely to be negatively impacted by the project undertaking. However, the consulting team and developer will inform the relevant authorities should any historical, cultural or heritage sites be found within the project area during the baseline study and subsequent construction and operation phases of the project. The nearest cultural sites are the Mofu mahogany tree located 3.5Km from the site in Chichele national forest along the Ndola-Kitwe highway and the Dag Hammarskjold crush memorial site 6Km from the site. The identified sites will not be affected by the project undertaking at Kafubu Farm.

6.4 Impact Evaluation and Analysis

6.4.1 Environmental Inventory

The first step in evaluating the environmental impacts that the proposed project will have will be to establish an inventory of factors that may be affected by the proposed action. Such an inventory may include but not limited to;

- Hydrology, geology, climatology, and archaeology.
- Land/ soil, surface and ground water, air, noise and transportation.
- Plant and animal life.
- Socio-economics of the surrounding community.
- Risks to both animals and the environment from accidents that may occur as a result of implementing the proposed project.

6.4.2 Environmental Assessment

This is the process of estimating the effects that a proposed action (Soya Beans, Wheat and Maize cultivation, poultry rearing and egg production and cattle ranching) will have on both the biophysical and socio-economical environments. This process was methodical, reproducible and reasonable to both effects of the proposed action and its alternatives. A number of semi quantitative approaches, among them the checklist, the interaction matrix, and the checklist with weighted rankings, have been used.

In this study the interaction matrix shall be used. Interaction matrixes are interactions of the proposed actions and the existing environment and are used to predict potential environmental impacts, both primary and secondary. Primary effects occur as a direct result of the proposed project, such as the effect of applying fertilisers and pesticides on aquatic life. Secondary effects occur as an indirect result of the action. For example, the proposed project may not directly affect the socio-economic pattern of all the people in that area, but indirectly it will result into an improved welfare.

Two key terms from the categories are direct or indirect, and cumulative; their definitions are as follows *(Council on Environmental Quality 1987):*

Direct or Indirect Effects (or impacts): These terms can be considered as synonymous.

Two broad categories of effects are direct and indirect. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and occur later or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether

direct, indirect, or cumulative. Effects also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Cumulative impact: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Based on these categories of impacts, several simple to more structured options can be used to determine impact significance.

The interaction matrix that was used to assess the impacts for this proposed project was divided into four phases:

- Preparatory/ Planning Phase
- Construction Phase
- Operational Phase
- Decommissioning and Closure Phase

During planning, consideration was given to the environmental effects of the proposed action involving acquisition and transportation of raw materials to the proposed project site. The construction phase checklist will include, noise, soil erosion, air and water pollution, and energy use. Finally, the operation phase will list direct impacts owing to noise, water pollution resulting from runoff, energy use, etc., and indirect impacts owing to regional development, housing, lifestyle, and economic development.

The interaction matrix technique is a two-dimensional listing of existing characteristics and conditions of the environment and detailed proposed actions that may affect the environment. The interactions are measured in terms of magnitude and importance. The magnitudes represent the extent of the interaction between the environmental characteristics and the proposed actions and typically may be measured. The product of the magnitude and importance defines the significance of impact associated with that magnitude and importance *(Ruth Weiner & Robin Matthews, 2003)*.

The matrix method developed by Leopold et al. 1971, is good example of an interactive matrix. The method involves the use of a matrix with one hundred specified actions and eighty-eight environmental items. Where an impact is anticipated, the matrix is marked with a diagonal line in the interaction box. The second step in using the Leopold matrix is to describe the interaction in terms of its magnitude and importance. The magnitude of an interaction is the extensiveness or scale and is described by assigning a numerical value from one to ten, with ten representing a large magnitude and one a small magnitude.

Values near five on the magnitude scale represent impacts of intermediate extensiveness. Assigning a numerical value for the magnitude of an interaction is based on an objective evaluation of facts. The characterisation of impacts will be done in terms of defining the magnitude, geographical extent, frequency, duration and likelihood of these impacts. Further, social and environmental impacts shall be identified prioritising them according to the associated environmental risk.

Table 8: Definition of Impact Analysis Factors

Impact Factor	Meaning
Magnitude	Refers to the strength with which an impact will have on the receptor.
Likelihood	The probability of the impact taking place.
Extent	The scope in space or geographical cover of the impact.
Frequency	The number of times or how often the impact shall occur.
Duration	The extent in terms of time.

Table 9: Impact Significance Analysis Scale

Scale	Magnitude	Likelihood	Extent	Frequency	Duration
1	Negligible	Impossible	Activity specific	Annual	6 months
2	Minor	Highly unlikely	Project Site	Bi-annual	1 year
3	Marginal	Unlikely	District	Monthly	3 years
4	Significant	Possible	Province	Weekly	6 years
5	Catastrophic	Definite	National	Daily	>6 years

Table 10: Significance Analysis Matrix table

	(Magnitude) X (Extent) X (Duration)														
(Likelihood) X (Frequency)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 11: Impact Significance Rating

Significance	Matrix Value	Negative Impact Measure	Positive Impact Enhancement Measure
Very Low	1 - 30	Propose mitigation measure	Enhance
Low	31 - 60	Propose mitigation measure	Enhance
Medium	61 - 90	Propose mitigation measure	Maintain
High	91 - 120	Propose mitigation measure and pay more attention	Maintain
Very High	121 - 150	High risk area, propose mitigation measures and have high monitoring frequency	Maintain

A scale of 1 – 5 will be used to score each of the environmental impacts in terms of magnitude, extent, duration, likelihood and frequency. The figures shall then added and multiplied as shown in the table below.

Table 12: Example of how the matrix was used

Air Pollution Due to Dust Generation from Access Roads on the Farm	
Magnitude (M)	Significant (4)
Duration (D)	>6 years (5)
Extent (E)	Local (1)
Frequency (F)	Daily (5)
Likelihood (L)	Definite (5)
Total Score (M x D x E) + (F x L)	45
Proposed mitigation measures	
➢ Water shall be sprayed using a water bowser ➢ Appropriate dust masks, goggles and work suites shall be provided to workers operating machinery on dusty roads ➢ New employees shall be inducted on safety requirements when working in dust prone areas and safety talks shall be conducted frequently. ➢ Signs shall also be installed to educate workers about the health dangers of inhaling small particles of dust.	
Air pollution after applying mitigation measures	
Magnitude (M)	Marginal (1)
Duration (D)	>6 years (5)
Extent (E)	Local (1)
Frequency (F)	6 months (1)
Likelihood (L)	Definite (5)
Total Score (M x D x E) + (F x L)	10

7.0 Stakeholders and affected parties contributions

A number of stakeholders were identified both at local and district level that may have interest in the project undertaking. Formal letters were sent to the stakeholders informing them of the developer's intention to undertake the project at Kafubu Farm. Responses from the stakeholders included written feedback letters and oral interviews with local stakeholders to obtain their views. Summary of the responses are presented in the table below. Actual responses are presented in the document appendices.

Table 13: Concerns Obtained from the Stakeholders

No.	Question/Concern/Contribution	Section of the EIA that shall address the concern/contribution
1	What irrigation method shall be used on the farm?	Description of the project, Section 4.2: Operation Phase Activities
2	Will Feed processing be done at the farm?	Description of the project, Section 4.2: Operation Phase Activities.
3a.	What is the company's commitment towards the corporate social responsibility especially for Kasongo primary School being near the project site?	Description of the project, Section 4.1: Construction Phase Activities. Environmental and Social impacts, Sections 7.1.1, 7.2.1: social economic impacts.
b.	Since the farm will be fenced off, this will affect pupils who use the farm as short route to Kasongo primary school. How is Kafubu going to address this issue?	Description of the project, Section 4.1: Construction Phase Activities. Environmental and Social impacts, Sections 7.1.1, 7.2.1: social economic impacts.
4	Are there any social economic benefits of the project for locals?	Environmental and Social Impacts, Section 7.1.1: Positive social economic impacts of the project.
5	Has the developer compensation the former occupants of the proposed project site? What form of compensation was done? Has the previous owner addressed the issue of illegal land occupants?	Environmental and Social Impacts, Sections 7.0; 7.1.1 and 7.2.1 and Appendices of verified compensation records.
6	Will the upgrade of the farm require increased power consumption and requirement from ZESCO?	Project Description, Section 4.1 Construction phase activities. Project Description, Section 4.2 Operation Phase activities.
7	What is the developer's track record and experience of similar project undertakings?	Introduction and project background, Section 1.0: track record of project proponent.
8	What measures shall be take regarding HIV/AIDS prevention and spread?	Environmental and Social Impacts, Sections 7.1.1 and 7.2.1: positive and negative social economic impacts. Social Mitigation Measures, Section 8.0

9	Will the developer build housing units and support infrastructure at the farm?	Project Description and Socio-economic impacts, Section 4.1 and 7.1.1: Construction phase and positive social economic impacts.
10	What gender based employment policy will the developer adopt to employ more women at the farm?	Socio-economic impacts, Section 7.1.1: positive social economic impacts.
11	Will project be labour intensive of machinery based?	Project Description, Sections 4.1 and 4.2: Construction and operation phase activities. Socio-economic impacts, Section 7.1.1
12	What disposal methods will be used for cut down trees during land clearing?	Mitigation measures, Section 8.0 : Environnemental Management Plan (EMP).
13	Will the developer consider the formation of an out-grower scheme as exist in other farms?	Socio-economic impacts, Section 7.1.1: Positive social economic impacts
14	What will the developer do to mitigate against population increase / formation of illegal settlements near farm?	Socio-economic impacts, Sections 7.1.1 and 7.2.1: positive and negative social economic impacts. Mitigation Measures, Section 8.0: EMP & SMP
15	What waste management system will be implemented at the farm?	Project Description and Mitigation measures, Sections 4.2 and 8.0: operation phase activities and Environmental Management Plan (EMP).
16	What measures will be taken to remedy contaminated soils and water after the decommissioning phase?	Environmental Impacts, Mitigation Measures, Closure & decommissioning, Sections 7.2.3, 8.0 and 9.0: Negative biological impacts, EMP and Decommissioning and closure phase
17	How much is the developer's investment in the proposed project and what's the project's duration?	Sections 1.1 and 1.5: Project background and total project investment cost.
18.	How many people will the farm employ and will the developer take up workers from the previous operations?	Socio-economic impacts, Section 7.1.1: positive social economic impacts.
19.	The revamping of the farm will increase crime and theft. Is Kafubu farm going to build police post in the area for security?	Socio-economic impacts, Section 7.1.1: positive social economic impacts.
20.	How does Kafubu farm intend to deal with the squatters in the farm that have been	Socio-economic impacts, Section 7.1.1: positive social economic

	there in times of the previous farm owner?	impacts.

8.0 SPECIALIST STUDIES

Various specialist studies shall be conducted and consultations with the affected people shall also be conducted through a public disclosure meeting with the community.
From the stakeholder responses through written submissions and oral interviews/consultation conducted, the need to undertake some specialist studies was identified and others studies shall be done by secondary information.

The scope of specialist studies is presented in the table below as developed through scoping consultation and review of relevant EIA guidelines.

Table 14: Scope of Specialised Studies

No.	Specialist study	Scope of study
1	Topography, soil survey and land evaluation	➢ Physical characteristics of soil. ➢ Chemical characteristics of soil. ➢ Topography.
2	Noise and Vibration	➢ Baseline vibration in the area. ➢ Baseline noise levels in the area. ➢ Sources of vibration in the area. ➢ Sources of noise in the area
3	Air quality	Baseline air quality in terms of pollution and potential pollutants and their sources in the area.
4	Socio-economic studies	➢ Population and distribution. ➢ Existing social facilities and services. ➢ Sanitation services and facilities in the area. ➢ Identification of major economic activities.
5	Flora and fauna study	➢ Ecological assessments to evaluate potential for wild animals. ➢ Tree species diversity and distribution. ➢ Classification of vegetation types
6	Ground water quality and availability	➢ Ground water quality and availability. ➢ Hydrology and drawdown

9.0 Potential Impacts

The proposed project will have both positive and negative impacts that may occur once the project is implemented. From experience, preliminary analysis of the project and information gathered from the scoping and consultative meetings that have been held, the following are potential impacts;

- Ground water contamination as a result of the use of fertilizers and pesticides.
- Ground water contamination from Hazardous Waste (used oil).
- Contamination of water run offs during the rainy season.
- Flooding of other subsistence farms as a result of drainage blockages along the boundary of the farm and the road.
- Dust during the construction phase.
- Dust during ploughing of land every ploughing season.
- Effect of the draw down on the water table as a result of ground water extraction.
- Generation of noise.
- Soil contamination by fertilizers, herbicides and pesticides.
- Loss of fauna and flora.
- Damage to Cultural, historical and heritage sites (if any).
- Employment creation.
- Introduction of an out grower scheme for Soya Beans and Maize.
- Malaria outbreaks if the weeds are not removed in the proposed farm.
- Enhanced Standard of living resulting from increased socio-economic activities in the area.
- Mushrooming of illegal settlements.
- Access to electricity by locals in the vicinity of the proposed project site.
- Increased Crime.
- Increase in HIV/AIDS prevalence.
- Sexually Transmitted Diseases (STD's).
- Solid waste generation (Hazardous and non-hazardous).
- Waste water generation.
- Enhanced use of organic fertilizers (chicken manure from poultry houses).

10.0 The EIA Outputs and Deliverables

A draft copy of the EIS shall be prepared for consideration by ZEMA before preparation of the final report. The draft shall simply be a single hard copy that shall be submitted with a cover letter. Deliverables for the final EIS shall be twelve hard copies bound using durable material and an electronic copy on a Compact Disk.

The EIS report shall comprise the Sections and Sub-sections presented below.

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FORMAT

EXECUTIVE SUMMARY

- Briefly describe the project background, objectives, location, shareholders, investment cost, project description, technology, project alternatives, potential impacts, mitigation/enhancement measures and lifespan.
- The executive summary should be signed by the developer and the study team.

NON TECHNICAL SUMMARY (In English and a local language commonly understood in the project area).

A **summary (not detailed)** description of the proposed project in a layman's language including:

- the project
- location
- investment cost
- major potential impacts
  - Positive: e.g. Employment opportunities, boosting of local economy, infrastructure development,
  - Negative: e.g. damage to land, plants and animals; pollution of water & air; displacement of people;
- mitigation for negative impacts and enhancement measures for positive impacts

TABLE OF CONTENTS

12.0 INTRODUCTION

12.1 Background of the project
12.2 Summary description of the project including project rationale
12.3 Objectives the project
12.4 Brief description of the Location
12.5 Particulars of Shareholders/Directors
12.6 Percentage of shareholding by each shareholder
12.7 The developer's physical address and the contact person.

12.8 Track Record/Previous Experience of Enterprise Elsewhere
12.9 Total Project Cost/Investment
12.10 Proposed Project Implementation Date

13.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

13.1 Policy, legal and institutional framework relevant to the project

- Policy, legal and institutional framework relevant to the project
- Specific sections of the cited policy, legal and institutional framework relevant to the proposed project.
- Relevance of cited sections to the proposed development
- Compliance (how the development complies/will comply to the cited sections)

13.2 International agreements and Conventions

- International agreements and conventions relevant to the proposed project.
- Specific sections of the agreements and conventions relevant to the proposed project.
- Relevance of cited sections of the agreement or convention to the proposed development
- Compliance (how the development complies/will comply to the cited sections)

14.0 PROJECT DESCRIPTION

14.1 Location

- Provide the spatial extent of the proposed project site(Province, City/Municipality/district, specific site)
- Provide land marks and their distances from the proposed site to help identify proposed project site
- Identify surrounding developments
- Provide coordinates of the proposed site where applicable

14.2 Nature of the Project

- Raw materials (including hazardous materials and their storage on site)
- Process and technology (including flow diagrams)
- Products and by-products
- Production capacity
- Schedule and life time of the project

14.3 Main activities

- Site preparation phase
- Construction phase
- Operation phase

15.0 Project Alternatives

15.1 Identification of alternatives such as but not limited to:

i. Product/service
ii. Site
iii. Design
iv. Technology
v. Process
vi. Raw materials

15.2 Analysis of each of the identified alternatives

15.3 List of chosen alternatives in order of preference

15.4 Reasons for choosing the preferred alternatives and rejecting the other alternatives

16.0 Environmental Baseline Study

Description of the site and the surrounding environment especially those aspects that are relevant to the project including evaluation of the sensitiveness of the environment. Baseline data should include but not limited to the following:

16.1 Climate
- Rainfall, Temperature, Humidity, Sunshine, etc.

16.2 Air quality
16.3 Geology
16.4 Hydrology
- Surface water quality
- Groundwater quality

16.5 Hydrogeology
16.6 Topography
16.7 Soils
16.8 Land use and land tenure
16.9 Built Environment
16.10 Noise and vibration
16.11 Fauna
- Terrestrial species (Include common names and respective scientific names)
- Aquatic species (Include common names and respective scientific names)
- Identification of rare or endangered species (Include common names and respective scientific names)

16.12 Flora

- Terrestrial species (Include common names and respective scientific names)
- Aquatic species (Include common names and respective scientific names)
- Identification of rare or endangered species (Include common names and respective scientific names)

16.13 Birds

- Field survey of bird species (Include common names and respective scientific names)
- Identification of rare and endangered bird species

16.14 Archaeological and cultural environment

- Identify and discuss cultural practices
- Identify and provide location for significant historical or archaeological features

16.15 Social-economic set up

- Population
- Growth rate, population density and distribution
- Administration
- Social services and amenities
- Market availability on various commodities
- Literacy levels, health and gender equity
- Traditional and religious practices and rites
- Assess vulnerability and/or need for resettlement and compensation

17.0 Impacts

17.1 Biophysical Environment

- Positive – direct, indirect, short term, long term, reversible and irreversible, local, regional
- Negative – direct, indirect short term, long term, reversible and irreversible, local regional

17.2 Socio-economic and cultural

- Positive – direct, indirect, short term, long term, reversible and irreversible, local, regional
- Negative – direct, indirect short term, long term, reversible and irreversible, local, regional

17.3 Evaluation of impacts **significance** should combine:

- the **frequency** of occurrence of the impact
- the **duration** of the impact
- the **severity** of impact
- the **spatial extent** of the impact
- the **sensitivity** of the element being impacted.

18.0 Environment and Social Management Plan

(Management Commitments for mitigating negative Environmental Impacts identified and evaluated in Section 6.0 and measures for enhancing positive impacts)

18.1 Environment and Social Monitoring Plan (These should include environmental management cost estimates, responsible personnel and the frequency of monitoring)

18.2

Aspect *	Impact	Mitigation/ Enhancement measure	Frequency of Monitoring	Time frame	Performance indicator	Responsible person	Cost

***NOTE:** Aspect is an activity, service or product that is likely to cause an impact due to interaction with the environment.

19.0 Decommissioning and Rehabilitation Plan

State environmental management commitments and associated costs

20.0 Bibliography

Full references of the main documents cited in the report should be given

21.0 Declaration of authenticity of report contents

22.0 Appendices

- Letter of approval of ToRs;
- Approved ToRs with respective attachments (including the scoping report, Minutes of the consultative meeting/s and signed list of meeting attendees);
- Maps and satellite images;
- Figures (tables, charts, graphs, models, photographs);

- Proof of Public consultation (Minutes and comments from the public during disclosure) and adverts;
- Specialised study Reports (e.g. water, soil, air, flora, fauna, archaeology, geotechnical)
- Raw data for the studies of baseline information gathered (water, soil, air, flora, fauna)
- Any relevant legal documents (title deeds or lease agreements, certificates of Incorporation, agreements, asset valuation reports, approval documents, Investment License etc);
- Bibliography
- Any other relevant supporting documents or information that cannot be presented in the main report

11.0 The EIA Study Team

The table below presents the EIA team of experts who shall work together to ensure that the information requirements are met and presented accordingly. The table below presents names of the EIA team and their responsibilities. The curriculum Vitae of the EIA team members are attached in the Appendices.

Table 5: EIA Study Team

Name	Responsibility
Agabu Shane	Team leader, EIA advisor, Public Consultation, Impact Characterisation, Impact Identification and analysis, Drawing Up the EMP
Lewis Tumbama	Socio-economic expert: Social economic baseline study, Social Impacts characterisation, identification, evaluation and analysis, draw up the Social management Plan and or RAP if need be.
Seveliano Phiri	Agricultural and Water Resources Expert: Project Description, Ground Water Quality and Quantity Assessment, Hydrology and drawdown
Kabwe Dickson	Ecologist: Fauna and Flora baseline
Mwansa Mubanga	Public Consultations, Noise and Air Quality, Decommissioning and Closure Plan

12.0 Planned Activities

Table 16: Planned Activities

No.	Activity	Time
1	Conducting stakeholder identification, scoping consultation meetings within the project site	Within two weeks from the date the contract was signed. This period facilitated consultations and necessary announcements
2	Preparation and submission of the Scoping Report to ZEMA	Within Six days from the date of the stakeholder meeting and obtaining views and/or concerns.

3	Approval of the Terms of References	Dependant on ZEMA
4	Draft Report and holding a public consultation meeting before submitting the draft report to ZEMA	Within three weeks from approval of the Scoping Report by ZEMA
5	Preparation of comments on the Draft Report by ZEMA	Dependant on ZEMA
6	Revising the draft report to incorporate comments from ZEMA	Depending on the gravity of comments, but tentatively within two weeks from date comments received from ZEMA
7	Public review of the final EIA report	Dependant on ZEMA
8	Decision Making on the project by ZEMA	Dependant on ZEMA. Maximum of 90 working days within which they should make a decision.

13.0 Declaration of the authenticity of the report contents.

To the best knowledge of Greenline Environmental Solutions Limited (consultant) and GoldenLay Limited, the content of this report is the work of the consulting team and any work done by others have been quoted and referenced accordingly.

…… .....

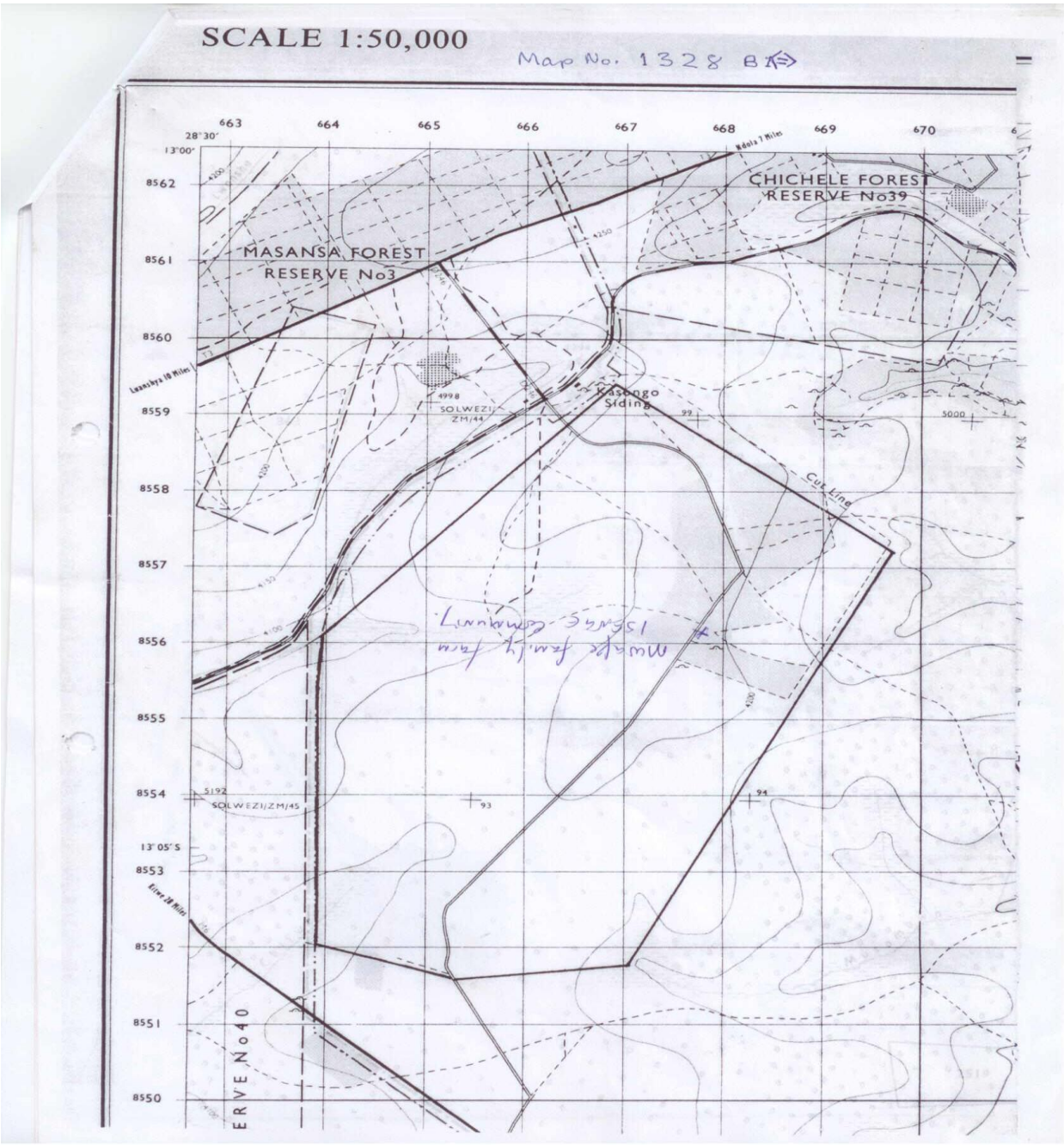
Mubanga Mwansa **Mohammed Bushary**

Managing Consultant *Director*

Greenline Environmental Solutions ltd *GoldenLay Limited*

14.0 Appendices

1. Kafubu Farm geographical Map



2. GoldenLay Limited Investment Licence.

P.O. Box 34580
Lusaka, Zambia

Licence No.: 2613/09/2006

ZAMBIA INVESTMENT CENTRE

Investment Act (No. 39) 1993

INVESTMENT CERTIFICATE

This is to certify that GOLDEN LAY LIMITED

of Plot No. 3037 Street/Road BALUBA

P.O. Box 90444

Town LUANSHYA Telephone No. 02515044

has this 26TH day of SEPTEMBER 20 06

been duly registered to invest in Zambia in the area(s) specified below:

AGRICULTURE SECTOR: PRODUCTION OF EGGS.XXXXXXXXXXXXXXXXX

"GENERAL INCENTIVES"

CHARLES MULENGA
BOARD SECRETARY
Official Stamp

CHALIMBA C. PHIRI
Director-General

Foreign Exchange brought into the country:

In form of Machinery/Equipment US$ 8,738,371.00

In Cash US$

TOTAL US$ 8,738,371.00

LOCAL

Machinery/Other US$

In Cash US$

TOTAL US$

This certificate is not transferable. Non negotiable for loans and contract agreements.

3. GoldenLay Limited Certificate of Share Capital

Republic of Zambia

REPLACEMENT CERTIFICATE OF SHARE CAPITAL

(Section 74 and 79)

This is to certify that

GOLDEN LAY LIMITED

....

....7,500,000.00 .... (name of company)

has the nominal share capital of K..

divided into:, 1,500 .... .share of K 5,000 ....each

....share of K...each

.... share of K... each

Having varied its nominal share capital from a nominal share capital of K 5,000,000.00 ....

divided into 50,000 .... shares of K 100 .... each

.... share of K...each

.... share of K... each

Given under my Hand and seal in Lusaka, Zambia this 6th ....

day of July ...., 20 07 ....

N.J. Moola

....

Acting Assistant Registrar of Companies

s not valid unless the official seal of the Register of Companies has been affixed]

4. Kafubu Farm sale agreement and certificate of title

Law Association of Zambia
Contract and Conditions of Sale

THIS AGREEMENT made the 01st day of NOVEMBER Two Thousand and Twelve **B E T W E E N ERNEST MTAMBOH** of Farm No. 9424 Ndola, in the Copperbelt Province of Zambia (hereinafter called the "Vendor") of the one part and **GOLDEN LAY LIMITED** of Plot No. 3037 Baluba Road, Luanshya in the Copperbelt Province of the Republic of Zambia (hereinafter called the "Purchaser") of the other part

WHEREBY IT IS AGREED that the Vendor will sell and the Purchaser will purchase the property referred to in the accompanying particulars at the price of **Ten Billion Kwacha (ZMK10,000,000,000.00)** on the accompanying terms and conditions and the Vendor and the Purchaser do on their respective parts agree to complete the said purchase on the said terms and conditions

AS WITNESS the hands of the parties hereto or their duly authorised agents the day and year first before written

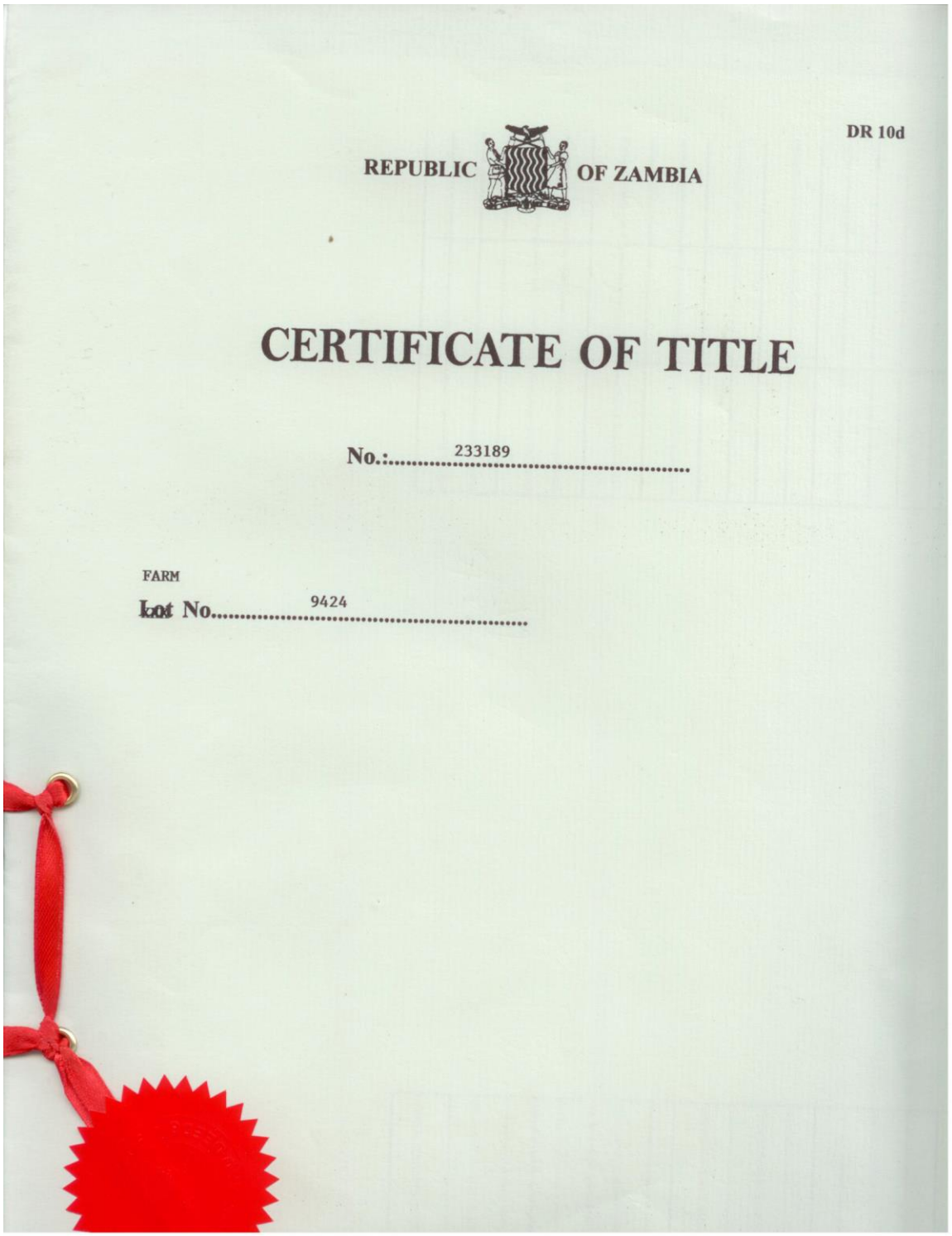
SIGNED by **ERNEST MTAMBOH**) ....
In the presence of:
WITNESS

Name:....CHRISTINE S.K. SINGINE.......

Address:....P.O. BOX 71568, NDOLA

Occupation:....SECRETARY......................

SIGNED by **MOHAMED BUSHARY**)
For and on behalf of GOLDEN LAY LIMITED) ....



DR 10d

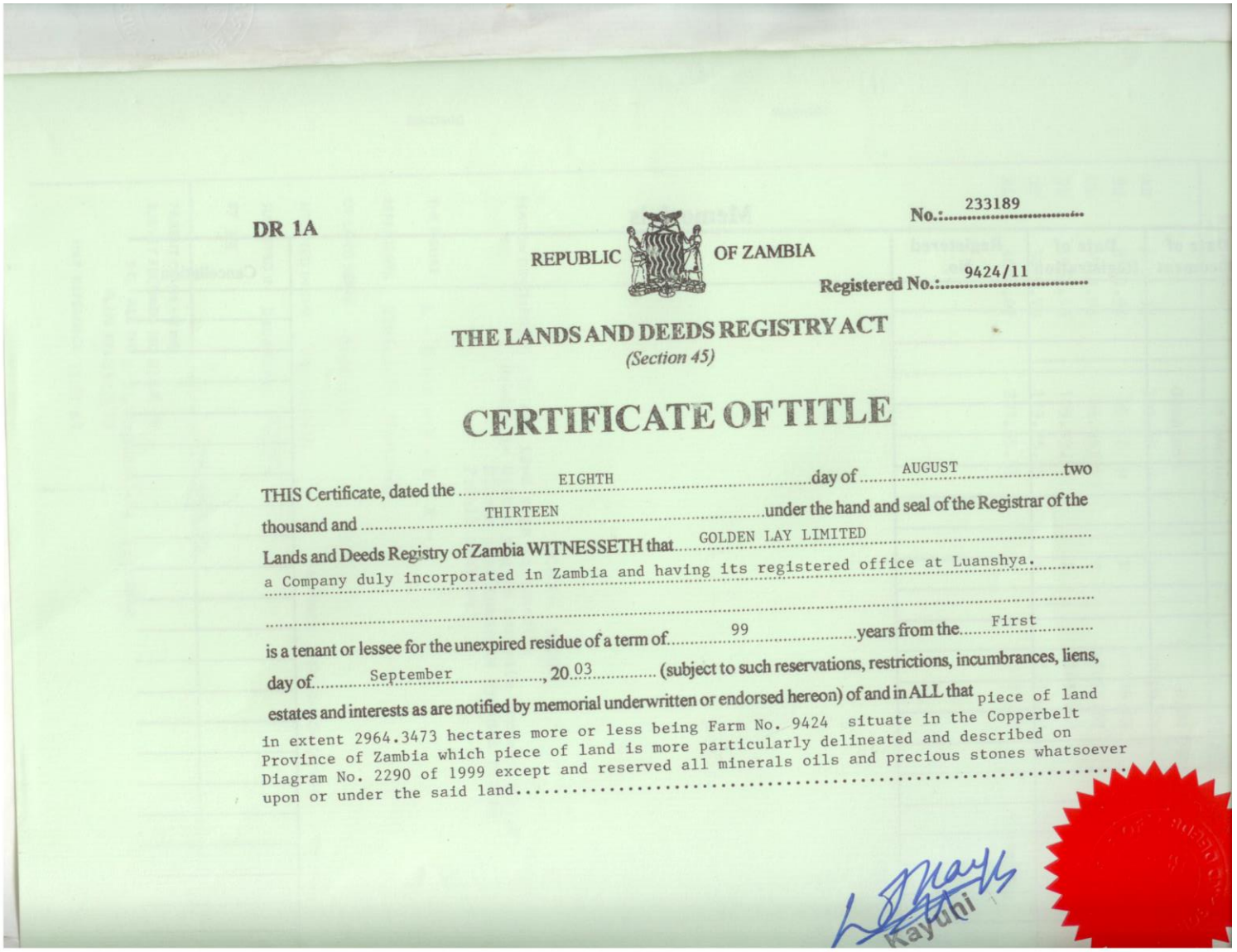
REPUBLIC OF ZAMBIA

CERTIFICATE OF TITLE

No.: 233189

FARM

Lot No. 9424



DR 1A

No.: 233189

REPUBLIC OF ZAMBIA

Registered No.: 9424/11

THE LANDS AND DEEDS REGISTRY ACT

(Section 45)

CERTIFICATE OF TITLE

THIS Certificate, dated the EIGHTH day of AUGUST two thousand and THIRTEEN under the hand and seal of the Registrar of the Lands and Deeds Registry of Zambia WITNESSETH that GOLDEN LAY LIMITED a Company duly incorporated in Zambia and having its registered office at Luanshya.

is a tenant or lessee for the unexpired residue of a term of 99 years from the First day of September, 20 03 (subject to such reservations, restrictions, incumbrances, liens, estates and interests as are notified by memorial underwritten or endorsed hereon) of and in ALL that piece of land in extent 2964.3473 hectares more or less being Farm No. 9424 situate in the Copperbelt Province of Zambia which piece of land is more particularly delineated and described on Diagram No. 2290 of 1999 except and reserved all minerals oils and precious stones whatsoever upon or under the said land.

Kayuhi

Memorials

Date of Document	Date of Registration	Registered No.		Cancellation
07.10.2003	07.10.2003	9424/5	Subjcet to the exceptions reservations restrictions restrictive covenants and conditions mentioned contained or referred to in a Lease (a copy of which is attached hereto) made between The President of the Republic of Zambia of the one part and **ERNEST MTAMBOH** of the other part.	

PTO

SIDES METRES		ANGLES OF DIRECTION	SYSTEM	CO-ORDINATES Y METRES	Lo 29 X
		Constant		± 0.00	+ 1440000.00
AB	3591.33	305.48.41	A	50098.68	615.36
BC	6135.53	26.12.19	B	47186.29	2716.71
CD	1743.96	86.05.37	C	49895.67	8221.61
DE	1561.16	105.53.51	D	51635.58	8340.42
EF	3870.70	179.25.05	E	53137.04	7912.79
FA	4606.07	221.55.35	F	53176.35	4042.29

MARGIN

BINDING

SCALE 1: 50000

BEACON DESCRIPTION All are iron pegs in concrete
Except :- C:Iron peg in concrete Pyramid Piller
D:Iron pipe in concrete Pyramid Piller
F:Rail Section

THE FIGURE A - B - C - D - E - F - A

REPRESENTS 2964.3473 Hectares

OF LAND BEING Farm 9424

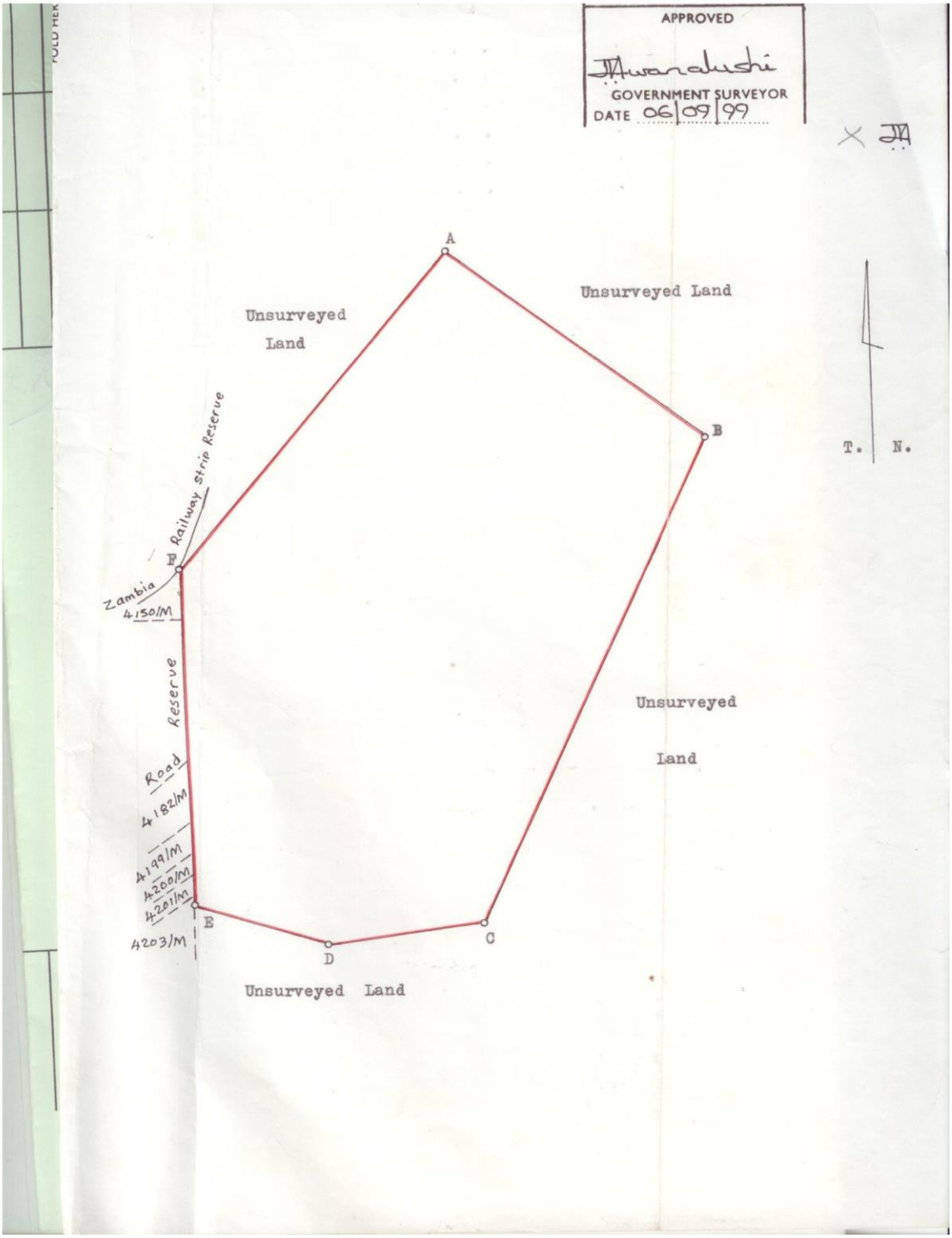
SITUATED IN THE Copperbelt PROVINCE REPUBLIC OF ZAMBIA

SURVEYED IN December, 1998

BY ME

LAND SURVEYOR

PARENT DIAGRAM NO
SURVEY RECORDS NO D348/99
S.G. FILE NO S/34/Copperbelt Province
PLAN NO D348/99


APPROVED
GOVERNMENT SURVEYOR
DATE 06/09/99
A
B
C
D
E
F
Unsurveyed Land
Unsurveyed Land
Unsurveyed Land
Unsurveyed Land
Railway strip Reserve
Zambia
4150/M
Reserve
Road
4182/M
4199/M
4200/M
4201/M
4203/M
T.
N.

LF/1
Stocked by Lands
10m M593 12/84 S&T

C. O. T. 22607
Reg. NO. 94241/5
Date 07/10/03

REPUBLIC OF ZAMBIA

Lease No. 68680

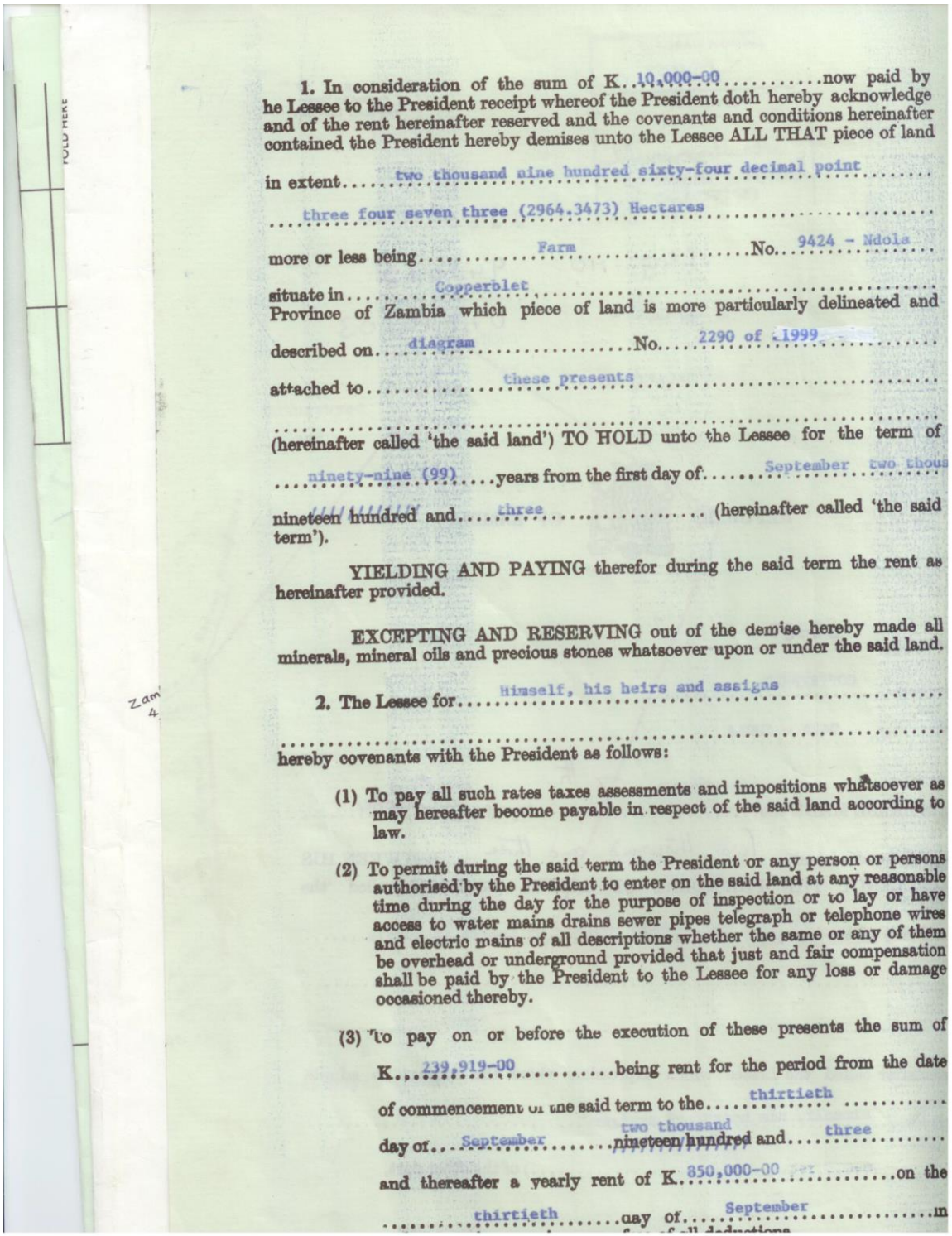
Province COPPERBELT

FARM No. 9424 – NDOLA

THIS LEASE MADE the 7th day of October

nineteen hundred and Two thousand and three BETWEEN HIS EXCELLENCY THE PRESIDENT OF ZAMBIA (hereinafter called 'the President') of the one part and ERNEST MTAMBOH of Lusaka in Zambia

(hereinafter called 'the Lessee' which expression where the context so admits includes Himself, his heirs and assigns) of the other part.



1. In consideration of the sum of K..10,000-00.....now paid by he Lessee to the President receipt whereof the President doth hereby acknowledge and of the rent hereinafter reserved and the covenants and conditions hereinafter contained the President hereby demises unto the Lessee ALL THAT piece of land

in extent.....two thousand nine hundred sixty-four decimal point.....

.....three four seven three (2964.3473) Hectares.....

more or less being.....Farm.....No..9424 - Ndola...

situate in.....Copperblet.....

Province of Zambia which piece of land is more particularly delineated and

described on...diagram.....No....2290 of 1999.....

attached to.....these presents.....

.....

(hereinafter called 'the said land') TO HOLD unto the Lessee for the term of

.....ninety-nine (99).....years from the first day of.....September two thous

nineteen hundred and.....three..... (hereinafter called 'the said term').

YIELDING AND PAYING therefor during the said term the rent as hereinafter provided.

EXCEPTING AND RESERVING out of the demise hereby made all minerals, mineral oils and precious stones whatsoever upon or under the said land.

2. The Lessee for.....Himself, his heirs and assigns.....

.....

hereby covenants with the President as follows:

(1) To pay all such rates taxes assessments and impositions whatsoever as may hereafter become payable in respect of the said land according to law.

(2) To permit during the said term the President or any person or persons authorised by the President to enter on the said land at any reasonable time during the day for the purpose of inspection or to lay or have access to water mains drains sewer pipes telegraph or telephone wires and electric mains of all descriptions whether the same or any of them be overhead or underground provided that just and fair compensation shall be paid by the President to the Lessee for any loss or damage occasioned thereby.

(3) To pay on or before the execution of these presents the sum of K...239,919-00.....being rent for the period from the date of commencement of the said term to the.....thirtieth..... day of...September.....two thousand nineteen hundred and.....three..... and thereafter a yearly rent of K..850,000-00.....on the .....thirtieth.....day of.....September.....in

(18)

(4) Within a period of twenty-four months from the date of the Certificate of Title to erect on the said land good and substantial buildings to the approval of the Planning Authority and to the value as assessed by the local authority of not less than K. 500,000-00.....and to complete the foundations thereof within twelve months from the date of the Certificate of Title.

(9)

(5) At all times during the said term well and sufficiently to repair, cleanse, uphold, maintain and keep any messuage or buildings which may be erected on the said land and all additions thereto and the wall fences, sewers drains and amendments and to execute at the Lessee's own cost all such sanitary and other works as may from time to time be lawfully required by the local authority.

(6) Except with the prior written consent of the President not to assign sublet mortgage charge or in any manner whatsoever encumber or part with possession of the said land or any part thereof or interest therein or concerning the same or attempt so to assign sublet mortgage charge encumber or part with possession of the said land.

(7) Except with the prior written consent of the President not to use the said land or the buildings thereon or to be erected thereon or any part thereof for any purpose other than for.....

Agricultural purposes and purposes ancillary thereto.....

.....

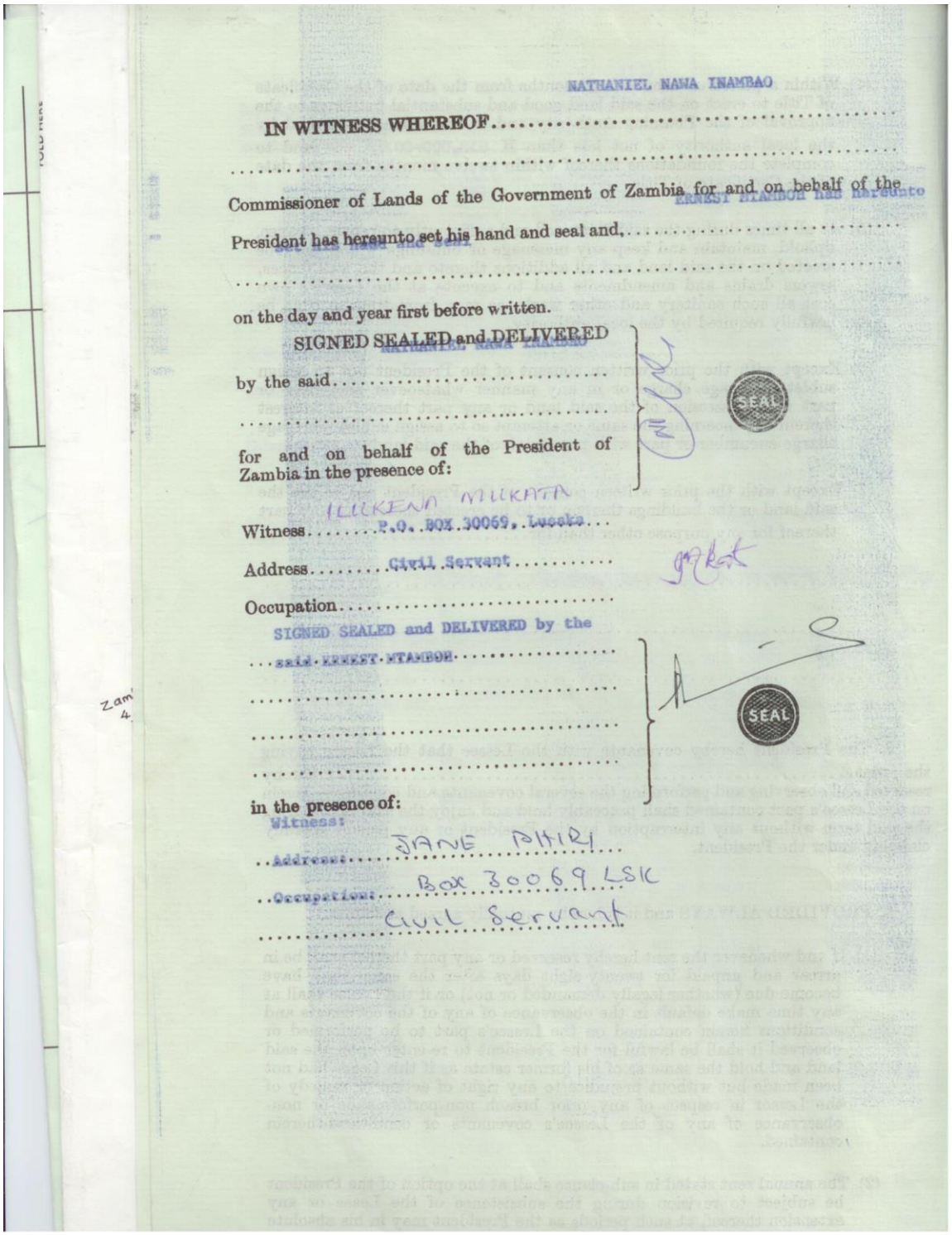
.....

3. The President hereby covenants with the Lessee that the Lessee paying the rent of K850,000-00 per annum.....hereby reserved and observing and performing the several covenants and conditions herein on the Lessee's part contained shall peaceably hold and enjoy the said land during the said term without any interruption by the President or any person lawfully claiming under the President.

4. PROVIDED ALWAYS and it is hereby mutually agreed as follows:

(1) If and whenever the rent hereby reserved or any part thereof shall be in arrear and unpaid for twenty-eight days after the same shall have become due (whether legally demanded or not) or if the Lessee shall at any time make default in the observance of any of the covenants and conditions herein contained on the Lessee's part to be performed or observed it shall be lawful for the President to re-enter upon the said land and hold the same as of his former estate as if this Lease had not been made but without prejudice to any right of action or remedy of the Lessor in respect of any prior breach non-performance or non-observance of any of the Lessee's covenants or conditions herein contained.

(2) The annual rent stated in sub-clause shall at the option of the President be subject to revision during the subsistence of the Lease or any extension thereof, at such periods as the President may in his absolute discretion decide.



NATHANIEL NAWA INAMBAO

IN WITNESS WHEREOF.....

.....

Commissioner of Lands of the Government of Zambia for and on behalf of the ERNEST NTAMBOH has hereunto

President has hereunto set his hand and seal and.....

.....

on the day and year first before written.

SIGNED SEALED and DELIVERED

by the said.....

.....

for and on behalf of the President of Zambia in the presence of:

SEAL

Witness.....P.O. BOX 30069, Lusaka...

Address.....Civil Servant.....

Occupation.....

SIGNED SEALED and DELIVERED by the

...said ERNEST NTAMBOH.....

.....

.....

.....

SEAL

in the presence of:

Witness:

..Address:.....

..Occupation:.....

.....

5. Construction and lay out drawings for Kafubu Farm

Poultry Association of Zambia

An affiliate of Zambia National Farmers' Union
ZNFU Stand, Showgrounds, P.O. Box 30395, Lusaka, Zambia
Telefax: 260-211-256354, E-mail: paz@zamnet.zm

16th May, 2013

TO WHOM IT MAY CONCERN

REVAMING AND DEVELOPMENT OF KAFUBU FARM (FORMERLY KAFUBU DAIRY FARM) IN NDOLA

Reference is made to the above subject in which the company (Golden Lay Ltd) intends to conduct an **environmental impact assessment** (EIA) for the purpose of revamping the cropping operations and developing poultry and beef operations on the farm which might be relatively new in the area. It is important to note that over the past decade, the poultry sector growth and trends have skewed towards intensification and concentration which may give rise to a number of environmental concerns. This has become imperative that such operations before commencement undertake an assessment of the possible positive or negative impacts that a proposed project may have on the environment, consisting of the environmental, social and economic aspects.

We believe that Golden Lay Ltd being an experienced poultry company has what it takes to ensure that decisions made with regard to methods of industrial farming, intensification and concentration of these mixed farming operations consider the ensuing environmental impacts the project might bring forth. We are confident that the exercise will assist the company in identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development prior to major decisions and commitments to be made. We are content that the company will adherence to a predetermined environmental outcome accountable for environmental values of their decisions and will justify those decisions in light of detailed environmental studies and public comments on the potential environmental impacts of the project without difficulties.

However, we are also alive to the fact that such developments may cause a multitude of indirect effects through consumption of goods and services, production of building materials and machinery and additional land use for activities of various nature but we believe that after the EIA, the company because of vast experience and expertise will apply precautionary and polluter pays principles to prevent and limit the likely harms that may arise from the project.

We therefore recommend to the consultant undertaking this assignment to consider all the raised concerns and provide a clear and concise environment package for the successful implementation of this project which we support without reservations.

Yours Sincerely

POULTRY ASSOCIATION OF ZAMBIA

Mathews Ngosa

PAZ EXECUTIVE MANAGER

REPUBLIC OF ZAMBIA
MINISTRY OF EDUCATION
HEADTEACHER'S OFFICE
14 MAY 2013
KASONGO BASIC SCHOOL
P.O. BOX 90032
LUANSHYA

MINISTRY OF EDUCATION

KASONGO PRIMARY SCHOOL

LUANSHYA DISTRICT.

The revamping and development of Kafubu Farm in the three areas namely Cropping, Poultry operations and beef cattle ranching as a school we have the following Comments:

1. Our local people will be employed, hence, they will be able to bring their children to school.

2. Once the production of eggs becomes operational as a school we are looking towards to benefit because we have a feeding programme for our pupils which is currently not running well due to erratic funding as this will enhance pupils attendance.

3. If your company can put up a police post, the school, the community and your company will greatly benefit in terms of security wise in our area.

4. If the company, Golden Lay Ltd, can assist to electrify the community which include the school and the clinic will be of great relief to the local people.

CONCERNS

As a school we have the following Concerns:

1. If the Company closes in and out gates, what will happen to our school children who come from far places?

2. How is the Company going to Control pollution from Chicken manual once production begins.

3. As a school we have an ambition of building 1 x 3 classroom block since the number of pupils is increasing almost everyday and also six (6) units of teachers houses.

REPUBLIC OF ZAMBIA
MINISTRY OF EDUCATION
HEADTEACHER'S OFFICE
14 MAY 2013
KASONGO BASIC SCHOOL
P.O. BOX 90032
LUANSHYA

SUBMISSION ON PROPOSED DEVELOPMENTS ON RECENTLY ACQUIRED FARM NO. 9424 - GOLDEN LAY LIMITED

Pursuant to the letter dated 3rd May, 2013 requesting for comments on potential positive and negative environmental and socio-economic impacts of proposed developments by Messrs Golden Lay Limited on Farm No. 9424 (formerly known as Kafubu Dairy Farm) I wish to submit as follow:

1. REGISTERED OWNERSHIP

Information on the Ministry's Land Information Management System indicates that the subject farm i.e. 9424 is as at this day still the registered property of one Ernest Mtamboh though there is a caveat entered on behalf of Golden Lay Limited (as intending purchaser)

The implication of this is that no legal transaction can take place on the farm by way of assignment, transfer or otherwise until the caveat is removed by the Caveator or Court Order.

2. PROPOSED DEVELOPMENTS

Apart from "Poultry operations" the other two proposed developments i.e. cropping and ranching are in conformity with the original land use for which the farm was created and previously utilized.

In view of the foregoing, this author does not foresee major negative impacts of the proposed view developments.

3. STATUS OF ACCESS ROAD

This author is aware of a dispute that arose in or round year 2008 when the main road that passes through the farm and connects the Ndola – Kitwe high way to

the farms located South of Farm 9424. With the intervention of Central Government, Mr. Mtamboh was compelled to open the road and it has ever since

been used as a public road while it has periodically been mentained by the Government.

In view of the uncertainty that surrounded the status of the road at the time of the dispute, the would be owners will need to engage relevant authorities mainly Roads department to establish whether the subject road is a private or public (gazetted) one. This will help the developer to decide the extent and nature of farm security to be implemented, mindful of the fact that the road passes through the middle of the farm.

4. THIRD PARTY INTERESTS (SQUATTERS/SETTLERS)

This office is aware of the presence on the subject farm of a number of subsistence settlers who have either settled or have been cultivating seasonally on the farm with the full blessings of Mr. Mtamboh. It is a well-known fact that a monetary relationship has existed over the years between Mr. Mtamboh and the settlers. It is equally on record that some of the settlers have over the years lobbied Central government to secure land rights in their favour by repossessing the units they utilize from Mr. Mtamboh.

The efforts of the settlers to free themselves from their financial obligations to Mr. Mtamboh have failed to bear fruits due to the legal rights the latter enjoys as a titleholder. Needless to say, the status and future of the settlers will have to be resolved by the new land owners.

In conclusion and as mentioned earlier, this author does not foresee major negative environmental impacts arising from the proposed developments although there is anticipated social-economic repercussions on the part of squatters should

the new land owners decide to do away with the contracts that existed between them and Mr. Mtamboh.

GEORGE S. SINDILA
CHIEF LANDS OFFICER
NDOLA REGIONAL OFFICE
MINISTRY OF LANDS, NATURAL RESOURCES &
ENVIRONMENTAL PROTECTION

10th May, 2013

7th May, 2013

District Secretary
Ministry of Lands, Natural Resources and Environmental Protection
Forestry Department
Ndola

Dear Sir/Madam,

RE: REVAMPING AND DEVELOPMENT OF KAFUBU FARM (FORMERLY KAFUBU DAIRY FARM)-NDOLA.

The above subject matter refers.

Following the recent acquisition of Kafubu Dairy Farm now herein called Kafubu Farm by Golden Lay Limited in 2012, the developer intends to revamp and develop the farm for the purpose of conducting agricultural related activities as stated below:

1. Cropping (planting, harvesting of soya beans, maize and wheat). This will be done by both summer (rain fed) and winter (irrigated) cropping.
2. Poultry Operations (setting up of layer houses for egg production and a rearing facility).
3. Beef Cattle ranching.

The farm No. 9424 is located 16Km from Ndola about 2.5Km off the Ndola -Kitwe dual carriage way and spans approximately 2964 Ha.

In line with the provisions of the Environmental Management Act No. 12 of 2011 read together with the Environmental Impact Regulations No. 28 of 1997, Golden Lay Limited intends to undertake an Environmental Impact Assessment to determine the potential positive and negative environmental and socio-economic impacts of the proposed development.

In this regard therefore, Golden Lay would like to inform you of the intention to develop and invite your written or oral views, comments and concerns regarding the development and incorporating the views in the EIS to be submitted to ZEMA for review prior to project implementation. An appointed consulting team may visit you to acquaint you with the project and obtain views and concerns. For any queries and clarifications please contact the undersigned or the consultant (Greenline Environmental Solutions Limited) on 0966 656697.

Your kind consideration will be appreciated and thanking you in advance.

Yours faithfully

Golden Lay Limited

REPUBLIC OF ZAMBIA
FORESTRY DEPARTMENT
07 MAY 2013
PROVINCIAL FORESTRY OFFICE
REGISTRY SECTION
P.O. BOX 70228, NDOLA

7th May, 2013

Ministry of Education
Head teacher Kasongo Basic
Ndola District

Dear Sir/Madam,

RE: REVAMPING AND DEVELOPMENT OF KAFUBU FARM (FORMERLY KAFUBU DAIRY FARM)-NDOLA.

The above subject matter refers.

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Your kind consideration will be appreciated and thanking you in advance.

Yours faithfully

Golden Lay Limited

3rd May, 2013

District Secretary
Ministry of Lands, Natural Resources and Environmental Protection
Ndola

Dear Sir/Madam,

RE: REVAMPING AND DEVELOPMENT OF KAFUBU FARM (FORMERLY KAFUBU DAIRY FARM)-NDOLA.

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Your kind consideration will be appreciated and thanking you in advance.

Yours faithfully

Golden Lay Limited

REPUBLIC OF ZAMBIA
MINISTRY OF LANDS
NDOLA REGIONAL OFFICE
NORTHERN REGION
P.O.BOX 73759, NDOLA
07 MAY 2013

Received

7th April, 2013

District Secretary
Ministry of Agriculture and Livestock
Ndola

Dear Sir/Madam,

RE: REVAMPING AND DEVELOPMENT OF KAFUBU FARM (FORMERLY KAFUBU DAIRY FARM)-NDOLA.

The above subject matter refers.

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Your kind consideration will be appreciated and thanking you in advance.

Yours faithfully

Golden Lay Limited

B. Minutes of consultative meetings on land issues

GOLDEN LAY
KAFUBU FARM COMPENSATION

First meeting held:	2013/09/05
At:	Kafubu Farm
Time:	10:00hrs
Target Group	Group number 2 - Squatters with papers

Meeting is only for those with offer letters for land inside the Kafubu farm.
According to Ministry of Lands and Surveyors, there are 47 holding with offer letters.
Only these with this document will be allowed to be present at the meeting.

REQUIREMENT

1. A photocopy of each individuals papers must be obtained before the meeting
2. Ascertain the correct number of people with land inside the farm with adequate papers
3. A statement obtained to the whereabouts and what is found on the land in question
4. The persons land must be pinpointed on a map of the farm - Name & Location
5. A description is required of any structures found on the land
6. After obtaining the desired information a physical inspection of the individuals land is to be undertaken
7. Government Officials will warn everyone to complete this process as fast as possible
8. No planting within the farm will be tolerated, unless on newly distributed land by GLL

COMPENSATION - Options
Each household will be allowed to select ONLY one option

Option 1 Payment in monitory terms for the hectares allocated and for structures
- **a.** ZMW 1,000 per each hectare he or she owned
- **b,** Cost of the structure also will be paid after an valuation by Golden Lay

} rejected.

Option 2 Relocation to Mpongwe with an increase by 50% in allocated hectares. Structures will be compensated separately
- **a.** Same hectares plus 50% increase in hectares
- **b,** Cost of the structure also will be paid after an valuation by Golden Lay

rejected.

Option 3 Allocation of the same amount of hectares within the farm along a boundary of GLL's choice
- **a.** Same hectares
- **b,** You need to relocate your house/Structure

(Next page.)

Discussed a plan around this option with the Squatters.

OUTCOME

1. Collection of all papers from individuals
2. Identification of who and where
3. Compensation options to have catered for all and report as to who has which option
4. Minutes of the meeting to be completed by the following morning and all Gov. Departments officials to sign off

Squatters demand.
1. Govt. Official to involve in the process of settlement.
2. They must be given bigger hectarage.
3. They must be allowed to cultivate immediately.
4. GLL must shift the wire fence.
5. Compensation for the mango trees destroyed.
6.

REPORT ON THE TOUR OF KAFUBU DAIRY BY THE DISTRICT ADMINISTRATIVE OFFICER NDOLA.

BY DANIEL NKHOMA

TECHNICAL OFFICER

DEPARTMENT AGRICULTURE

REPORT ON KAFUBU DAIRY SQUATTERS

INTRODUCTION

The District Administrative Officer Under took a tour of kafubu dairy farm on 3rd September 2013 to inform the squatters of the outcome of the meeting and also to inform them pending eviction from Kafubu dairy farm. The District Administrative Officer was accompanied by Mr. Nkhoma from Department of Agriculture and members of staff of Golden Lay which included the operations Manager Mr.Musonda.

WHY THE TOUR WAS UNDERTAKEN

On the 23rd August 2013 at an Environmental Impact Assessment meeting in kafubu, squatters and the District Administrative Officer Agreed to convene a meeting at this office to access the following:

1-The size of kafubu dairy in terms of hectares

The meeting was held on 26th August 2013 at the District administrative Officer's Office and the people in attendance were the District Administrative Officer who was the chairman , The Chief lands Officer, District Agricultural Coordinator, Station Inspector Ndola Central Police, Department of Agriculture staff and the squatters representatives.

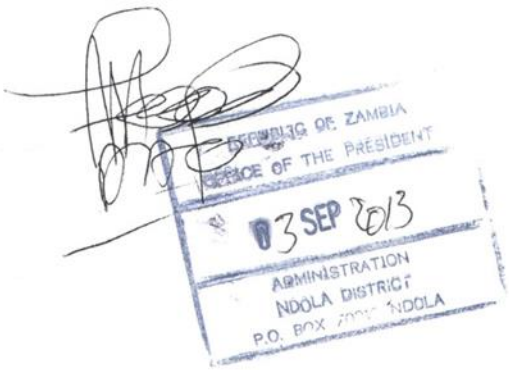
The meeting examined the land register from the Ministry Of lands, which verified that the land belonged to Kafubu dairy farm and was 2,964 hectares in extent. This Land register also showed ownership of Kafubu dairy and how it changed hands from the Zambian Government through Zambia Privatization Agency to the present owner Golden lay. After verifying the hectarage, the meeting resolved that the squatters leave the farm immediately. The meeting resolved that the squatter's representatives inform their colleagues that they vacate the farm. This would be followed by a tour by the District Administrative Officer to make sure that the massage was believed by squatter's representatives.

On 3rd September 2013 the District Administrative Officer went round the farm and informed the squatters to vacate and highlighted that it was a criminal act for them to continue occupying the land in question. They were further warned that if Golden lay Management reported the matter to the police, they will be charged a crime of criminal trespass. He emphasized that squatters observe the rule of law

The District Administrative Officer informed the squatters that they get in touch with land resettlement Department for purposes of acquiring land. He informed them that it was affordable to acquire land through this Department. He further informed them that they could engage Golden lay Management as individuals for their

continued stay for a limited period at the farm. He encouraged squatters that come from luanshya to apply for plots in the newly created resettlement area in Maposa.

The tour was concluded with a short meeting .The District Administrative Officer addressed a few farmers who have letters of offer from Ndola City Council and agreed to have a meeting with them on Thursday 5th September 2013 at Golden lay Offices at kafubu dairy at 10:00hrs. The tour ended at 16:00hrs.



REPUBLIC OF ZAMBIA

OFFICE OF THE PRESIDENT

DISTRICT ADMINISTRATION

MINUTES OF THE MEETING HELD BETWEEN GOLDEN LAY AND KAFUBU DAIRY SQUATTERS ON 26TH AUGUST, 2013. AT THE DISTRICT COMMISSIONER'S OFFICE AT 10:00 HOURS

W. SAKALA
COMMISSIONER FOR OATHS
AND CONSULTANT
-4 AUG 2013
P. O. BOX 70410
NDOLA

CERTIFIED TRUE COPY OF THE ORIGINAL

Compiled By

Chipampe Matafwali

ATTENDANCE LIST

NAME	CELL NO.	ORGANISATION
Taphen Muloongo	-	District Administrative Officer
Chipampe Matafwali	-	Dept. of Agriculture
Abraham Manda	0974516829	Farmer Representative
Jaifa Chata	0977801397	Farmer Representative
Margret Mwansa	0963233297	Farmer Representative
Catherin Ngeleshi	0964129390	Farmer Representative
Anita Malisopo	0978193503	Farmer Representative
Charles Chinak'la	0961361636	Farmer Representative
Cape Tembo	0979038788	Farmer Representative
Robson Chembe	0961026548	Farmer Representative
Wilbrod Chileshe	0978737270	Farmer Representative
Evils Mutwale	0966589875	Farmer Representative
Peter Musonda	0979536922	Golden Lay Representative
Fletcher Brad	0977366433	Golden Lay Representative
Muhamed Bushary	0977719540	Golden Lay Representative
Daniel Nkhoma	-	Department of Agriculture
Henry Matola	-	Department of Agriculture
George Sindila	-	Lands Dept
-	-	Zambia Police
Ken Silwimba	-	Lands Resettlement

OPENING REMARKS

The meeting was being chaired by District Administrative Officer Mr. Taphen Muloongo who declared it open at 10:30 hours. He welcomed everyone and went straight to the point by informing the house that Kafubu Dairy Farm has been sold to Golden Lay Limited..

The Chair further informed the house that he had facts relating to the same land. Ministry of Lands had printed out the land record which showed who had been the owners and intentions to sale which were proven by the caverts attached to it.

The total hectarage for the said land was 2, 964.347 hectors according to the official print out from Ministry of Lands. This implied there was no any other land that one would assume to have been left out. The chairman asked Mr. Manda to give his submission.

Mr. Abraham Manda, the Chairman of the Kafubu Dairy Farmers Association informed the house that after the farmers learnt about the sale of the farm, they raised some money amounting to K7, 500 to find a surveyor who would give them the correct measurements for the farm as they believed that the part sold should have been 300 hectors and not 3,000 hectors.

Mr. Manda read out a letter they had also written to the current President His Excellency Mr. Michael Chilufya Sata which stated that farmers started farming on the land eight years ago. There were about 600 squatters on the farm and were paying rentals to Mr. Mutambo amounts ranging from K20 the time they started farming and when on increasing the rentals to K200. The letter to the state house was a request to be assisted in acquiring the same land which he believed it had been repossessed. Mr. Mutambo had earlier on told him that the land was repossessed by the government and that he could go ahead in informing the farmers that they would be given 5 hectors each. He used to collect money for rentals on behalf of Mr. Mutambo.

The chairman asked the Chief Lands officer Mr. Sindila to give his submissions.

In his submissions, The Chief Lands officer commented on the same that initially On the title it was erroneous indicating 300 hectors held for 14 year lease and when he applied for a 99 years lease, the land was resurveyed and the total hectarage was 2, 900. Furthermore, when he checked the records in Lusaka for the same land it was never 300 hectors. Meaning that there was human error. The other facts were that state ranches that had been created in those days had never been less than 1,000 hectors.

He submitted further that when he learnt that the land was being sold he knew, that before the new owners could implement the project there was going to be an environmental assessment. He submitted to Golden Lay during the environmental impact assessment clearly indicating that there where squatters on the same piece of land and it would be up to Golden Lay to allow them to continue farming there or not.

and also about the hectarage. In response Mr. Manda said he was just told without proper facts to the house. The chair advised him that he should stop misleading people because it would lead him into problems, worse still collecting money from farmers without any prior permission from higher authorities and using unregistered Association. What he was doing was a criminal offence and that he could be prosecuted. It was clear that Mr. Manda and his executive had misled the farmers to believe that they would be given land.

Golden Lay representatives informed the house that they learnt about the sale of the farm on the internet and also from the electronic media in 2011. They got interested and started pursuing the same and finally bought it at K10, 000, 000.00 (Kwacha Ten Million) and changed the ownership. Their intention was to put up a project worth 40 million kwacha which would include irrigation of soya beans for feed production, poultry production, and animal production. The project will bring about employment creation to the local people.

The chairman said the new owners of the land in question were innocent because they followed the right procedure in acquiring the land. It was unfortunate that Mr. Mutambo the former owner did not inform his tenants that he was selling land. He further said following the legality of the state of affairs the land now belonged to Golden Lay as new owners and everyone should respect that fact. Failure to comply they would be asking for unnecessary problems. The other farmer representatives were asked whether they had any comments. In response they unanimously agreed to the fact that the land belonged to now Golden Lay. However, they pleaded whether they could be allowed to farm for this year 2013/2014 farming season. The chairman said only Golden Lay could permit or not permit. He further advised the farmers that they should be mindful in the case that if anything went missing whilst they were farming there, they would be the first suspects. He urged them to find other alternative apart from the said land. They could go to Land Resettlement office under the Office of the Vice President and register their names and pursue the matter for land acquisition until they were given. He was sure that they would be given as the government has continued opening more resettlements. The other office they could look at was the District Agricultural Coordinators office.

RESOLUTIONS:

1. The house agreed that the true owners of the land now were Golden lay.
2. Representatives of squatters should go back and inform the rest that the land belonged to Golden lay.
3. No one should be found on the land without prior permission from the owners apart from the 50 families with Council letters of offer
4. The District Administrative officer together with the District Agricultural Coordinator should take a tour and sensitize the squatters on the new owners of the land and how they could acquire land of their own.
5. Mr. Manda and his team should not collect money from people without permission from higher offices and also should not be using unregistered Association to get money. It had been illegal what he and his group had been doing.

LANDS REGISTER

Printed on: 23-AUG-13 15:32:08

Property Number F/9424 CHIPUNGUD

ENTRY NO. 1 DATE OF DOC 28-MAY-99 DATE OF REG.28-MAY-99
Lessor THE PRESIDENT OF ZAMBIA
Lessee MTAMBO ERNEST,BOX 32000,LUSAKA

NATURE OF DOC STATE LEASE FOR A PERIOD OF 14 FROM 01/09/97
AREA 300 HECTORS

ENTRY NO. 2 DATE OF DOC 28-MAY-99 DATE OF REG.28-MAY-99
Title Holder MTAMBO ERNEST

NATURE OF DOC CERTIFICATE OF TITLE NO. L 3814
AREA 300 HECTORS

ENTRY NO. 3 DATE OF DOC 26-JUN-03 DATE OF REG.15-JUL-03
Lessee MTAMBO ERNEST
Lessor THE PRESIDENT OF ZAMBIA

NATURE OF DOC SURRENDER DEED
AREA 300 HECTORS

ENTRY NO. 4 DATE OF DOC 07-OCT-03 DATE OF REG.07-OCT-03
Lessor THE PRESIDENT OF ZAMBIA
Lessee MTAMBOH ERNEST

NATURE OF DOC STATE LEASE 99 YEAR PERIOD FROM 01-SEP-03 WITH AREA SIZE 2964.3473 HECTARES22607
AREA 300 HECTORS

REPUBLIC OF ZAMBIA
MINISTRY OF LANDS
22 AUG 2013
NDOLA REGIONAL OFFICE
NORTHERN REGION
BOX 73799, NDOLA

LANDS REGISTER

Printed on: 23-AUG-13 15:32:08

Property Number F/9424 CHIPUNGUD

ENTRY NO. 5 DATE OF DOC 07-OCT-03 DATE OF REG.07-OCT-03
Title Holder MTAMBOH ERNEST

NATURE OF DOC CERTIFICATE OF TITLE NO. 22607
AREA 2964.3473 HECTORS

ENTRY NO. 6 DATE OF DOC 22-DEC-05 DATE OF REG.29-DEC-05
Caveator CORPUS GLOBE (MIKITA AGRICULTURAL DEVELOPMENT LIMITED)

NATURE OF DOC CAVEAT ENTERED AS INTENDING PURCHASER
AREA 3000 HECTORS

ENTRY NO. 7 DATE OF DOC 09-SEP-09 DATE OF REG.09-SEP-09
Caveator CORPUS GLOBE (MIKITA AGRICULTURAL DEVELOPMENT LIMITED)

NATURE OF DOC WITHDRAWAL OF CAVEAT AT ENTRY NO.6
AREA 2964.3473 HECTORS

ENTRY NO. 8 DATE OF DOC 09-MAY-13 DATE OF REG.09-MAY-13
Caveator CHUGANI AND CO. (FOR AND ON BEHALF OF GOLDEN LAY LIMITED)

NATURE OF DOC CAVEAT ENTERED AT 15:00 HOURS AS INTENDING PURCHASER AS PER ATTACHED COI
OF THE CONTRACT OF SALE.
AREA 2964.3473 H

LANDS REGISTER

Printed on: 23-AUG-13 15:32:08

Property Number F/9424 CHIPUNGUD

PRELIMINARY REGISTRATION

ENTRY NO. 9 DATE OF DOC 08-AUG-13 DATE OF REG.08-AUG-13
Caveator CHUGANI AND CO. (FOR AND ON BEHALF OF GOLDEN LAY LIMITED)

NATURE OF DOC WITHDRAWAL OF CAVEAT

AREA 2964.3473 HECTORS

PRELIMINARY REGISTRATION

ENTRY NO. 10 DATE OF DOC 08-AUG-13 DATE OF REG.08-AUG-13
Assignor MTAMBOH ERNEST
Assignee GOLDEN LAY LIMITED

NATURE OF DOC ASSIGNMENT OF PROPERTY AT K10,000,000,000.00.233189

AREA 2964.3473 HECTORS

PRELIMINARY REGISTRATION

ENTRY NO. 11 DATE OF DOC 08-AUG-13 DATE OF REG.08-AUG-13
Title Holder GOLDEN LAY LIMITED

NATURE OF DOC CERTIFICATE OF TITLE NO.233189

AREA 2964.3473 HECTORS

13.0 Curriculum Vitae for EIA Study Team Members

13.1 Curriculum Vitae for Agabu Shane

Name: Agabu Shane
Profession: Environmental Engineer
Nationality: Zambian
Date of birth: 05th February 1970
Education: Bachelor Mineral Science, University of Zambia, 1996
MSc (Environmental Engineering), Northeastern University, Shenyang, China.
Registration: Member Engineering Institution of Zambia and as an Environmental Protection Fund Auditor with the Mines Safety Department.
Email: agabushane@yahoo.com or Agabu.shane@cbu.ac.zm
Mobile: +260 979140945

SPECIALISATION: Environmental impact assessment (EIA), environmental auditing, strategic environmental assessment (SEA), mine production, mine planning and design, safety, health and environment, pollution control and environmental management Systems, chemicals and waste management, environmental legislation and regulation and water quality assessment

EXPERTISE:

- Environmental Impact Assessment
- Environmental Auditing
- Environmental Policy and Legislation
- ISO 14001 Environmental Management Systems
- Water quality assessment
- Stack emissions sampling
- Chemicals and Waste Management
- Safety, Health and Environment
- Mine planning/ Design
- Mine production
- Feasibility Studies

EMPLOYMENT RECORD:

07/08 to date	**Independent Environmental Consultant / Lecturer -** Copperbelt University (CBU). I lecture in environmental law and policy, environmental management, environmental control and safety, mine environment, refrigeration and ventilation practise. I also supervise final year students in research work.
08/2007-06/2008	**Environmental Inspector – Zambia** Environmental Management Agency.
02/2007-07/2007	**Environmental Officer –** Konkola Copper Mines Plc, Konkola Integrated Business Unit.

2000 -2002 **Senior Planning Engineer –** Mopani Copper Mines Plc. Mufulira Mine

1998-2000 **Senior Assistant Planning Engineer –** Zambia Consolidated Copper Mines Limited. Mufulira Division

1998-1996 **Senior Assistance mining Engineer -** Zambia Consolidated Copper Mines Limited, Mufulira Division

PROFESSIONAL APPOINTMENTS WHILE AT ZEMA

2007 – 2008 Committee Member on Bio Gasifiers (Kaputa and Ndola Gasifiers) committee

2007 – 2008 Committee Member on the energy and water supply committee in The ministry of energy and water development

PROFESSIONAL TRAINING:

- 22nd – 27th October 2007 Certificate in Environmental Auditing, Poyry Environmental Consultants/ ECZ.
- 5th – 23rd November 2007, Certificate in Rural Energy Project Planning and Environmental Management, ESAMI/SADC, ARUSHA, TANZANIA.
- 3rd – 6th December, 07, Certificate in Emergency Preparedness and Response, Poyry Environmental Consultants/ ECZ.
- 29th May 2008 to 10th June 2008: Certificate in stack emissions sampling, ECZ.

PROFESSIONAL UNDERTAKINGS

1. Kanyenda farming Limited, Environmental Impact Assessment for the proposed Soya Bean, Wheat and Maize farming Project, December 2011 to date.
2. Grizzly Investments Holdings, Environmental Impact Assessment for the proposed Chantete Mine, August 2011.
3. Zambezi Portland Cement Plc, Environmental Protection Fund Audit, June 2011 – July 2011.
4. Kagem Mining Limited, Environmental Protection Fund Audit, June 2011.
5. Gemfields Holdings (Z) Limited, Environmental Protection Fund Audit, June 2011.
6. Golden Wheel Zambia Limited, Proposed Copper Scrap Metal Smelting Furnace Environmental Project Brief, July, 2011.
7. NFC Africa Mining Plc, Environmental Impact Assessment for the proposed Southeast Copper Ore Field, Chambishi, Zambia. April 2011 – June 2011.
8. Genesis Procurement limited, Environmental Impact Assessment for the proposed katwai manganese Mine in Mansa, Zambia, March 2011.
9. Lumwana Mining Company, Independent Environmental Audit (Environmental Protection Fund Audit), Dec 2010 – Jan 2011.
10. Grizzly Mining Limited, Environmental Protection Fund Audit, April, 2011.
11. Environmental Impact Assessment for the roofing sheet manufacturing plant in Chingola by Hi-tech Status Limited, Dec 2010.
12. Environmental Impact Statement for the proposed processing of the Kakoso tailings in Konkola by Sino Metals Ltd, September 2010.
13. Environmental Impact Statement for the Mwekera Copper Project, Microlink Resources (Z) Ltd, August 2010.

14. Environmental Impact Assessment (EIA) for the cement manufacturing plant by Sakiza Spinning (Z) Ltd, August 2010.
15. Bwana Mukubwa Mine, FQML, Ndola, Environmental Impact Statement updating, April, 2010.
16. Lumwana Mining Company Limited, Environmental Protection Fund Audit, 2010.
17. Mereneh Enterprises Limited, Environmental Impact Assessment for the proposed filling station in Solwezi District, 2010.
18. Lumwana Mining Company Limited, Environmental Protection Fund Audit & the Annual Environmental and Social Audit, 2009.
19. Kushomwa (Z) Limited, Environmental Impact Assessment for the steel ball manufacturing plant in Kalulushi District, 2009.
20. Lumwana Mining Company Limited, Environmental Protection Fund Audit, 2008.
21. Luwamata Development Company Limited, Environmental Impact Assessment the copper ore beneficiation plant in Mwinilunga District, 2009.
22. Caritas (Z) Limited, Reviewed an Environmental Justice research report, 2008.
23. Grizzly Mining Ltd, Independent Environmental Audit, 2008, 2009, 2010.
24. Sino Metals (Z) Ltd, Independent Environmental Audit, 2008.

REFERENCES

Mr. Edward Zulu – Group Manager SHE
Konkola Copper Mines Plc, NIBU
Chingola
Mobile: 260 97 4770748 or 260 955 766768

E-mail: ehzulu@zamtel.zm or edward.zulu@kcm.co.zm

Dr. Peter Chileshe - Senior Lecturer

The Copperbelt University
School of Mines and Mineral Sciences
Mining Engineering Department
P.O. BOX 21692, Kitwe
Tel: 225551/222194
E-mail: peter.chileshe@cbu.ac.zm

Professor Kenneth .K. Maseka – Senior Lecturer
The Copperbelt University
School of Mathematics and Natural Sciences
P.O. BOX 21692, Kitwe
Mobile: +260 97707803
E-mail; masekak@cbu.ac.zm

13.2 Curriculum Vitae for Lewis Tumbama

1. **Family name:** Tumbama
2. **First name:** Lewis
3. **Date of Birth:** 21.03.1978
4. **Nationality:** Zambian
5. **Marital Status:** Married
6. **Education:**

Institution (Date from- date to)	Qualification(s) obtained
London South Bank University ***(2011 class- Studying)***	MSC-Edu.for Sustainability/Environmental Sustainability (By thesis/distance learning)
University of Zambia (1999 - 2004)	BSW (Social Work)/Development Economics/Studies with upper Merit
Serenje Boys Tech. Secondary School, Central Province, Zambia. (1992 - 1996)	Junior Secondary Certificate & General Certificate of Education/Grade 12 Certificate.

7. **Language skills:** Indicate competence on a scale of 1 to 5 (1 - excellent; 5 - basic)

Language	Reading	Speaking	Writing
English	1	1	1
Nyanja	1	1	1
Bemba`	1	1	1
Tonga	2	2	2
Lenje	1	1	1
Soli	1	1	1
Sala	4	4	2
Ila	1	3	3
Kaonde	3	5	4

8. **Membership of Professional Bodies:**

- Associate Member of the Water and Sanitation Association of Zambia (WASAZA),
- Full member of the Impact Assessment Association of Zambia (Housed within Environmental Council of Zambia)

9. **Other skills: (e.g., Computer Literacy etc):**

- Microsoft Office,

- Excel,
- Statistical Package for Social Sciences (SPSS).

10. Key Qualifications

Lewis holds a Bachelor's Degree in Social Work and Development Economics from the University of Zambia with concentrations in Community Development and Change, Monitoring and Evaluation, Social Planning, Social Research, Social Welfare and Development economics.

Currently, Lewis is studying with London South Bank University by distance learning MSC Education for Sustainability/Environmental Sustainability, 2011 class.

Lewis is more of a socio-economic specialist for Sustainable Development, Environmental Impact Assessment Studies and has an accumulated work experience of about **8** years in Consultancy work, particularly participating in conducting qualitative and quantitative baselines, social and Environmental Impact Assessments, Mine Environmental Audits (Surface and Underground) and Evaluative Community-Based Social Researches in both Rural and Urban Areas of Zambia.

As a Socio-Economic, Cultural, and Environmental Consultant, Lewis has been exposed to diverse cultural settings across **all the 9 provinces** and 73 districts of Zambia and has so far facilitated more than **400** different community meetings, mainly to do with social and environmental issues that are as a result of different development activities/projects taking place within their immediate environments. He is therefore very familiar with the use of different Participatory Tools.

In the past few years, Lewis was involved on a Country-Wide study on Poverty and /Socio-Economic Assessments along Feeder, Trunk and District Roads in all the 9 provinces of Zambia. In this study, Lewis has been leading in Community and other Stakeholder Consultations and had so far (on this exercise), conducted more than 70 community and other stakeholder consultations using different participatory methodologies.

Further, Lewis has been engaged (Oct 2010- January/February 2012) as a socio-economic specialist on an Integrated Development Plans Project for two (2) districts (Mufumbwe and Kabompo) in the NorthWestern Province of Zambia. In light of the Town and Country Planning Act, Cap 283 of the Laws of Zambia, this comprehensive assignment involves preparation of settlement plans that would effectively guide the growth and development of the two small towns/districts with potential of serious mining activities.

His work experience dates back to 2001 when Lewis started participating in social research projects under internship arrangements whilst studying at the University of Zambia. Since 2001, Lewis has worked with different consulting firms and individual consultants on a number of projects across Zambia. Since graduation from the University, Lewis has never worked in full time employment for a long time and is currently a free-lance development Consultant.

ACCOMPLISHED ASSIGNMENTS/ON-Going

1. 2011, (October -November) RV Ventures/METMIN LTD, Masaiti district, Copperbelt Zambia. Preparation of an Environmental Project Brief Report for Lime Stone exploration in Chief Chiwala area.
2. 2011,(October to December),Lead Consultant/Coordinator,- Xue Jiang Timber Co Ltd, Petauke District, Chief Sandwe, in Sandwe Open Forest, Eastern, Zambia. Environmental Impact Assessment for the timber Harvesting project.
3. 2011, (October to November), Socio-Economic Sub-Consultant,- ZENITH Consulting/Mazabuka Municipal Council, Mazabuka District, Southern, Zambia. Environmental Impact Assessment for the Council Housing Estate project.
4. 2011, Chantete/Grizzly Mine, Lufwanyama District, Copperbelt, Zambia. Socio-economic component of the EIS for the mine open pit.
5. 2011, Bendu Transport Ltd- Ndola district, Copperbelt Zambia. Preparation of the 3 Environmental Project Brief Reports for Waste Rock Dump Reclamation on former Bwanamkubwa Waste Rock Dumps.
6. 2011,(June to December) Dangote Industries - Masaiti District, Copperbelt, Zambia. Implementation of the Resettlement Action Plan.
7. 2011, Handman Paradise Masaiti District, Copperbelt, Zambia.Implementation of the Resettlement Action Plan
8. 2010/ 2011, GITEC/BICON Zambia. Southern Province of Zambia , Preparation of two comprehensive Environmental Project Brief Reports for the spot rehabilitation of feeder roads in Southern Province under the Rural Transport and Poverty Reduction Programme funded by the German Development Bank (KfW Development Bank)
9. 2011 JICA/NTC Intl. Lusaka Desk Review – and compilation of a report on communities and Sustainable use and management of Dambos in Zambia.
10. 2010 / 2011 ASCO Z Ltd Mufumbwe and Kabompo Districts, North Western Province Contracted to carry out a Socio-Economic study on an Integrated Development Plans Project for two (2) districts (Mufumbwe and Kabompo) in the NorthWestern Province of Zambia.
11. 2009 ,2010 Dangote/JA ConsultantMasaiti District, Copperbelt Province Subcontracted to carry out a Socio-Economic Study of the Environmental Impact Assessment including a Resettlement Action Plan
12. 2010, ASCO Z Ltd , Northern, Southern, Luapula, North Western, Central and Western Provinces Socio-economic monitoring of the impact of road improvement/development in 9 districts
13. 2010 AGRI OPTIONS Ltd, Mkushi Farm Block, Mkushi, Central Province, Zambia Preparation of an Environmental Project Brief report for the Soya and Wheat Milling Plants in Mkushi Farm Block, Mkushi
14. 2010 , HANDMAN'S PARADISE, Masaiti District, Copperbelt Province Subcontracted to carry a Socio-Economic Study of the Environmental Impact Assessment including a Resettlement Action Plan.
15. 2009 / 2010 JICA/NTC Intl. Southern, Lusaka, Central and Copperbelt Provinces Contracted to do a Strategic Environmental Assessment

(Environment and Social Considerations) among 8 Irrigation Schemes in Southern, Lusaka, Central and Copperbelt Provinces.

16. 2009/ 2010, JA Consultancy, Mulungwa, Maamba, Southern Province Subcontracted to Prepare a Resettlement Action Plan for the proposed Coal Mine.
17. 2009/ 2010 SHARMA Bro Intl. Mufumbwe District, North-Western Province Contracted to prepare an Environmental Impact Assessment for the timber Harvesting project in Mufumbwe District in North –Western Province
18. 2009 ZHONGHUI MINING, Mwinilunga District Environmental Project Brief Report for the mining exploration activities in the above District for 9 Licences
19. 2009, ZAMBIA GOLDCOMMON, Lufwanyama, Masaiti and Ndola Districts, Copperbelt Province Contracted to prepare 7 Environmental Project Brief reports for mine exploration works in Copperbelt Province
20. 2008 / 2009 ASCO Z Ltd. All the Nine (9) Provinces of Zambia Socio-economic Baseline & Monitoring Assessments of Feeder, District & Truck Roads in all 9 provinces of Zambia
21. 2008/ 2009 KAIZEN CONSULTING Lusaka – Chirundu Road Subcontracted to prepare an Environmental Project Brief for the expansion of Lusaka – Chirundu Road.
22. 2008/ 2009 KAIZEN CONSULTING Lusaka Subcontracted to prepare a Resettlement Action Plan Framework for the Japanese International Cooperation Agency (JICA) for the Ring Roads in Lusaka.
23. 2008 /2009 GOLDEN ELEPHANTS LTD, Mumbwa District, Central Province Preparation of Environmental Project Briefs for 7 Mining Licences in 4 Chiefdoms in Mumbwa District
24. 2008 KAIZEN CONSULTING, Kabwe Town,former ZCCM Mine plant area, Central Province Mine Environmental Audit for Sable Zinc Mine.
25. 2008 NGOLO MINE LTD, Mumbwa District Environmental Project Brief for the proposed Copper Mine
26. 2008 / 2009 JA CONSULTANCY/ZAMBEZI SAW MILLS Kazungula/Sesheke Districts, Southern/western Province Environmental Impact Assessment for the Timber Harvesting project in Nachitwe and Likuni Forests in Chief Moomba's area in the Mulobezi Game Management Area
27. 2008 JA CONSULTANCY Kalomo District, Southern Province Environmental Audit of Kariba Minerals in Mapatizya gemstone area
28. 2008 JA CONSULTANCY, Kitwe and Mufulira Districts, Copperbelt Province Mine Environmental Audits for the Nkana and Mufulira Mines in Kitwe and Mufulira towns.
29. 2007 JA CONSULTANCY Mufulira District, Copperbelt Province Environmental Audit for the operations of African Explosives Limited
30. 2007 JA CONSULTANCY Luanshya District, Copperbelt Province Mine Environmental Audit for the Decommissioned Luanshya Copper Mine, Baluba (operational) and the new Muliashi Mine.
31. 2007 JA CONSULTANCY Kalulushi District, Copperbelt Province Mine Environmental Audit for the Chibuluma South and decommissioned Chibuluma West Mines

32. 2007 JA CONSULTANCY Kabwe Town,former ZCCM Mine plant area, Central Province Mine Environmental Audit for Sable Zinc Mine.
33. 2007 JA CONSULTANCY, Lufwanyama District, Copperbelt Province Mine Environmental Audit for the Grizzly Emerald Mine in Lufwanyama District.
34. 2007 SEAM INVESTMENT LTD ,Lunga – Luswishi Game Management Area, Kasempa District, North Western Province Environmental Project Brief for the proposed copper mine in the Lunga – Luswishi Game management Area
35. 2007 GLOBAL ENV. CONSULT- Ndola District, Copperbelt province Environmental Impact Assessment for the 12,000Ha Jatropha/Bio-fuel plantation and the processing Factory
36. 2007 KAIZEN CONSULTING - Chingola – Solwezi districts extending to Lumwana Environmental Impact Assessment for the proposed construction of the North Western Rail line from Chingola to Lumwana in Solwezi district
37. 2007 KAIZEN CONSULTING/ZULU BARROW - Lundazi, Katete, Chipata, Chongwe and Choma districts Environmental project Briefs for about 56 Feeder Roads in the above districts
38. 2006 KAIZEN CONSULTING - 2007 Kabwe Town. Public Disclosure of the Kabwe Scoping and Design Study on Lead and Zinc Contamination in Kabwe .
39. 2006 KAIZEN CONSULTING /ASCO Z LTD - Chirundu Border, Chirundu-Siavonga District, Zambia.Conducting an Environmental Impact Assessment for the construction of the Chiawa Bridge across the Kafue River.
40. 2006 ASCO Z LTD - North Western Province. Conducting a Baseline and Monitoring assessment of the M8 Road in North-Western province.
41. 2006 KAIZEN CONSULTING - Mazabuka, Southern Province, Zambia. Environmental Impact Assessment of the expansion of the Sugar Cane plantation and the Factory.
42. 2006 /2006 KAIZEN CONSULTING /BICON Z LTD - Livingstone, Southern Province, ZambiaEnvironmental Impact Assessment of the construction of the Mosi-oa-Tunya hotel and Golf Estate in Mosio-oa-Tunya National Park.
43. 2006 KAIZEN CONSULTING- Luanshya, Copperbelt Province, Zambia Environmental project brief for the Lufubu appropriate technology pilot project /an iron processing plant in Luanshya.
44. 2006 KAIZEN CONSULTING - Chief Kopa's area, Mpika, Northern Province Environmental Impact Assessment for the 25 Hectares Muma Palm Oil Plantation in Mpika district, Northern Province.
45. 2006, KAIZEN CONSULTING - Chirundu Border town. Environmental Impact Assessment of the construction of Sewer Reticulation System in Chirundu.

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

Lewis Tumbama____Date: 01.09.11

Sign: 

REFEREES

1. **Mr. John Murphy, Director, ASCO Consulting Engineers, Box 31340 Lsk, phone +260211 256412**
2. **Dr.Augustus Kapungwe,University of Zambia,School of Humanities,Dept.of Social Development Studies, P.O.BOX 32379, Lusaka; emailkapungweaugustus@yahoo.com,cell:0979390227, +260211 290 020**
3. **Dr.Lawrence Mukuka,email: mukukacdm@yahoo.com,cell: +260 966437926**

13.3 Curriculum Vitae for Dickson Kabwe

PERSONAL DATA

Name : Dickson Kabwe

Date of Birth : 20th July, 1983

Sex : Male

Nationality Zambian

Religion : Christian

Marital Status : Married

Contact Address : C/o Peter Kabwe, Meanwood Property Development Corporation, P.O Box 31334, Lusaka.

Contact Number : 0979969837 or 0976820226

Email: docmotm@yahoo.com

PROFILE

- Proven experience in environmental monitoring.
- Knowledge on environmental pollution as a result of Effluent discharge, Gases and Dust emissions.
- Experience in preparation of Environmental Impact Assessment (EIA) and Environmental Project Brief (EPB) reports.

- Experience in measurement and analysis of Water, Gases and Dust, and preparation of monthly reports for the analysis.
- Team player and able to work under minimum supervision.
- Able to write routine reports and correspondence.
- Strong time management to ensure scheduled datelines.
- The ability to work to deadlines, and adapt a flexible approach to meet the needs of the business.
- Excellent communication skills, verbal and written, in order to deal with customers (internal and external) at all levels.

EDUCATION HISTORY

University: The University of Zambia, Lusaka.

Senior Secondary: Hillcrest Technical Secondary School, Livingstone.

Junior Secondary: Chipata Day Secondary School, Chipata.

Primary: Hillside Primary School, Chipata.

ACADEMIC QUALIFICATIONS

April 2009: B.Sc. Ecology, University of Zambia.

October (19-24) 2009: Environmental Management Certificate, Chartered Institute of Environmental Health London U.K

2001: GCE School Certificate from Hillcrest Secondary Livingstone.

1997-1998: Junior Secondary School

1990-1996: Primary School Certificate

SKILLS

Practical computer skills in Microsoft word & Excel, and Internet.

WORK EXPERIENCE

Jun 2009- up to date: Operations Manager/Environmental Officer at Hilma Limited

Duties:

- To manager all company activities both administrative and field work.
- To evaluate environmental projects
- Responsible for maintaining all company property and financial status.
- Advice clients on Environmental matters
- Negotiate with clients on large environmental projects.

- To collect samples of gases, dust and water from manufacturing companies and industries which emit such materials into the Environment.
- Assess whether these materials emitted are within the Zambian maximum allowed standards.
- Analyze the results and later write an Audit report.
- Advice Company on how to deposit their waste material into the Environment.
- To write and assess Environmental Project Briefs and Environmental Impact Assessment reports and later summit to Environmental Council of Zambia. These included large reports for Fuelling facilities and Asphalt plants for different Companies.
- Advice newly projects to done by companies Environmentally.

2008(AUG): Lecturer at Zambia Open Teachers Training College.

Duties:

- Lecturing primary school student teachers in Science related courses.
- Prepare models for the students.

2007(AUG): Data Entry Officer at Afri Company

Duties:

- To enter Accounts data from pastel to new Afri software.
- Teach staff how to use new software.

RESEARCH EXPERIENCE

2008(March): Participated in Bird ringing activity undertaken by Zambian Ornithological Society with support from the Birdlife Netherlands, to monitor migration of the Barn Swallow, *Hirundo rustica*.

Activities done:

- Investigate the nesting place of Barn swallow Birds at Huntley farms in Chisamba.
- Capture and later ring the birds which were ready to migrate to England.
- Release the Birds after ringing.
- Record weight, size length and wing length.

MAJOR PROJECTS ACHIEVED

The following are the Major **Environmental Projects Brief** Reports which I wrote and were approved by the Zambia Environmental Management Agency:

- Establishment of a Deyamus Farms Truck Inn and Service station in Chirundu, Siavonga District.
- Installation of an Asphalt Plant for Jizan Constructors in Lusaka Chinika area.
- Installation of a Fueling facility for F.R.D Investments in Ndola.
- Installation of a Lubes Bay and Car wash facility for Total Zambia. Kabulonga Service Station and Alick Nkhata Service Station.
- Installation of a Fueling facility at Phizo Quarry mine in Solwezi for Total Zambia.
- Installation of a Fueling facility for Heinrich's Syndicate Limited in Malambo road, in Lusaka.
- Establishment of a Fuelling Facility for Kazenene Investment Ltd in Chingola.
- Establishment of a Milling Plant for Kazenene Investment Ltd in Chingola.

Data analysis and report writing for the Monthly or Quarterly Environmental audit reports for various companies in Lusaka, Copperbelt and Livingstone. Companies include: Zambian Breweries, National Breweries, Oriental Quarries, Trade kings, Zambeef, Uniturtle Industries Ltd and Bidvest Zambia ltd.

AMBITION

To acquire more skills and broaden my knowledge through practical work and further studies to sharpen the already skills, in order to contribute effectively to the National development of the global economies.
All these can be achieved through hard work and perseverance.

HOBBIES

Discussing new developments, listening to music, watching soccer and playing pool.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this data correctly describes my qualifications, my experience, and me.

Dickson Kabwe

……..... **Last updated on 20th December, 2012.**

13.4 Curriculum Vitae for Mwansa Mubanga

PERSONAL DETAILS

NAME	:	Mwansa Mubanga
SEX	:	Male
DATE OF BIRTH	:	16th July 1984
PLACE OF BIRTH	:	Mufulira
NATIONALITY	:	Zambian
NRC NUMBER	:	294596/66/1
MARITAL STATUS	:	Married
CONTACT NUMBER	:	+260-966-656697 or +260-977-656697
POSTAL ADDRESS	:	Private bag 17 Woodlands, Lusaka.
EMAIL ADDRESS	:	mwansa.mubanga@yahoo.com

VISION

To develop and contribute to an insight that will help achieve sustainable development through production and to reduce pollution of the environment.

OBJECTIVES

- To contribute to sustainable economic development through efficient resource use and pollution prevention.

QUALIFICATIONS

Currently studying for Master of Science in Project Management at University of Lusaka.

Bachelor of Engineering Degree in Environmental Engineering.

Environmental Engineering involves the design, maintenance, operation, control, development and improvement of process production plants in chemical, food, and mining related industries and research organisations. It focuses on implementation of pollution control devices and programmes such as EMS, QMS and Cleaner Production programmes.

CURRENT POSITION: Area Manager-Safety Health Environment and Quality (SHEQ).

EMPLOYER: ZAMBEEF PRODUCTS PLC.

EDUCATION

Year	Name Of Institution	Qualification
2012 Class	University of Lusaka	Studying Msc. Projects Management
2005-2009	Copperbelt University	Beng. Environmental Engineering
1999-2001	Butondo High School	Senior Secondary School Certificate
1997-1998	Chankwa Junior Secondary	Junior Secondary School Certificate
1990-1996	Mutamba Primary School	Primary school Certificate

RELEVANT WORK EXPERIENCE

1. Zambeef Products Plc as Area Manager- Safety, Health, Environment and Quality (SHEQ) from January 2010 to date. Reporting to the Head of Environment and Technical Services. In charge of Zambeef group's manufacturing and processing plants.
   Responsibilities include:

- Implementation of Zambeef Products Plc's Policies, Procedures, and Systems to maintain and enhance Safety, Health, Environmental and Quality performance.
- Implementation of General and specific IFC guidelines on Environment, Health Sanitation and product manufacturing.
- Prepare and submit required Environmental status and Food Safety reports. In house training in GMP, EMS and HACCP.
- Provide professional and technical support and expertise to all Zambeef subsidiaries, including review of capital projects for environmental impacts.
- Report and act on all non-compliances and submit a statistical summary to superior.
- Monitor Water, Food Quality and Safety in compliance with prevailing food Standards.
- Monitor the quality of soil, effluent, and air emissions in line with relevant regulations.
- Assist plant management in developing, implementing and maintaining Environmental compliance measures required under State and Local regulations.
- Assist management in interpreting and applying technical regulatory requirements on the production operation.
- Auditing the Environmental, Occupational Health & Safety compliance and Food Safety status of the entities as per supplied ISO 14001 EMS Self-Assessment Checklist and other relevant regulations and conventions.

- Planning, execution and monitoring of effluent treatment and drainage systems for Zambeef manufacturing plants.

2. Zambia Environmental Management Agency (formerly Environmental Council of Zambia), Ndola as an intern from January, 2009 to April, 2009. Reporting to the Zone Manager.
Duties included:

- Inspections of industries for compliance prior to issuance of Environmental licences.
- Conducting licensing inspections for various facilities and industries. Site verification for intended proposed projects.
- Reviewing of Environmental management returns from industries to check for compliance. Comments on Environmental project briefs submitted to ECZ.
- Attending to environmental complaints from the public and hearings regarding environmental issues.
- Responding to emergencies and accidents leading to spills, pollution and contamination of the environment.

3. White Cross Investments limited Kitwe, from May, 2009 to January 2010 as a part time Assistant Environmental Officer. Reporting to the Senior Consultant.
Duties included:

- Writing of Environmental Project Brief (EPB) and Environmental Management Plans (EMP) for proposed project for submission to ZEMA.
- Site verification of Proposed projects before EPB submission to ZEMA.
- Environmental monitoring and compliance audits for clients.
- Advertising for Environmental Management Service providers through Print media.

COMPUTER PROFICIENCY

- MS excel MS power point, MS publisher, MS project and MS word.

TRAINING AND OTHER SKILLS

- Environmental Management and Occupational Health (6^{th} -8^{th} May, 2011).
- Good Manufacturing Practices workshop (15^{th} April, 2011).
- Driving (in possession of a valid Zambian driver's license).
- Occupational First –Aid and Emergency Rescue certified provider.

RESEARCH AND PUBLICATIONS

- Final year project: Relationship of Nutrients to Dissolved Oxygen in pond water.
- Inventory of packaging materials and their Environmental effects, a case of Ndola town.

LEADERSHIP EXPERIENCE AND AFFILIATIONS

- President of the Environmental Engineering Society at the Copperbelt University from May 2008 to April 2009.
- Vice president of the Environmental Engineering Society at the Copperbelt University from 2007 to 2008.
- Associate Engineer of the Engineering Institution of Zambia (EIZ). Certificate No**.01261713076.**
- Member of the Zambia Red Cross Society.
- Founder member of the EIZ-CBU student chapter in 2008.
- Prefect at Butondo High School from 1999 to 2000.
- Head boy at Chankwa Junior Secondary School in 1998.

HOBBIES

- Travelling and adventure
- Interested in reading books of varying subjects and playing football.

REFEREES

1. Mr Cliff Ngwata (Principle Inspector)

   Zambia Environmental Management Agency

   Northern Region Office

   P.O Box 71302,

   Ndola.

   Contact number: 0976 009 495

   E-mail: cngwata@zema.org.zm

2. Mr. Kayawe C. Jones

   Head- Environment, Food safety and Technical Services.

   Zambeef Products Plc.

   Private bag 17, woodlands.

   Lusaka.

   Contact number: 0977 999 221

   Email: joneskc@zambeef.co.zm

3. Prof. Nkonde G.K.

   Lecturer- Chemical Engineering department

   Copperbelt University

P.O Box 21692,

Kitwe.

Contact number: 0977 879 986

Email: glasswell.nkonde@cbu.ac.zm

13.5 Curriculum Vitae for Seveliano Phiri

PERSONAL DETAILS

Name: Seveliano Phiri
Nationality: Zambian
Religion: Christianity
Date of birth: 2nd January, 1969
Marital status: Married with three children
N.R.C number: 524654/11/1
Email: seveliano.phiri@cbu.ac.zm, uphiris@yahoo.co.uk
Telephone number: 0976340133/0966660600
Office phone: 02-229038
Residential address: 5 Kasalanga, Kalulushi.

Profile

- Experienced and innovative water resources engineer with excellent problem solving skills.
- Strong ability to prioritise tasks effectively, able to manage varied workloads and meet appropriate deadlines
- Dependable and reliable in supporting and enabling team effort to produce genuine long-term sustainable development.
- Adaptable and enthusiastic researcher, able to work independently using initiative or as part of a team to tight deadlines.
- Friendly-get on well with other people
- Dedicated, hardworking, sensitive and thorough

EDUCATIONAL BACKGROUND

Period of study		**Study Program**	**Institution**
From	To		
1985	1989	Secondary School Certificate	Munali Secondary School
1990	1995	Bachelor of Engineering degree (Agric.)	University of Zambia
2002	2003	Degree in Complementary Studies in Water Resources Engineering	Katholieke Universiteit Leuven and Vrije Universiteit Brussels
2003	2004	Master of Science in Water Resources Engineering	Katholieke Universiteit Leuven and Vrije Universiteit Brussels

PROFESSIONAL QUALIFICATIONS

Period of study		Course	Institution
From	To		
14/06/99	2/07/99	Basic land surveying techniques	University of Zambia
5/12/99	18/12/99	Soil fertility initiative national trainers	Kasama Farm Institute
17/01/2000	28/01/2000	Soil and water conservation	Embu, Kenya
24/09/2001	28/09/2001	Training workshop in facilitation of community based development	ZAMSIF

WORK EXPERIENCE

Period of engagement		Positions held	Organisation/Institution
From	To		
2006	Present	Lecturer (Department of Civil Engineering)	Copperbelt University
2005	2006	Senior Agricultural Specialist (in charge of *Irrigation Engineering, Land Husbandry and Farm Power Sections* at Provincial level)	Ministry of Agriculture and Co-operatives
1998	2005	Acting District Agricultural Co-ordinator, Acting Senior Agricultural Officer, Agricultural Specialist (in charge of *Irrigation Engineering*, *Land Husbandry* and *Farm Power Sections* at district level)	Ministry of Agriculture and Co-operatives
1992	1992	Trainee Engineer	Zambia Bottling Company
1990	1990	Workshop helper	National Milling Company

MAJOR DUTIES AS LECTURER/CONSULTANT

- Lecturer of Fluid mechanics, Hydraulics and Soil Mechanics/Materials testing
- Providing consultancy services
- Coordinating students projects/thesis
- Conducting research in water related fields

MAJOR DUTIES AS SENIOR AGRICULTURAL SPECIALIST

- Design of irrigation systems
- Design of storage structures, rural water supply systems
- Design of soil conservation structures
- Promoting use of sustainable farming practices
- Supervision of Technical Services Branch staff in the 10 districts of the Copperbelt province as well as those based at the provincial offices.
- Compiling technical reports for the province.
- Controlling funds for activities

MAJOR DUTIES AS ACTING SENIOR AGRICULTURAL OFFICER (A/SAO)

- Supervision of staff under Field Services (Technical Services Branch and Extension) in Kalulushi District
- Supervision of Food Security Programme in the district (Selection and identification of beneficiaries of Programme Against Malnutrition (PAM) packs, promotion of use of post-harvest structures e.g. storage sheds, promotion of food processing)
- Responsible for organising field days and agricultural shows
- Controlling funds for Field Services in the district
- Coordinating all activities under Field Services
- Compiling financial and technical reports for Field Services

MAJOR DUTIES AS ACTING DISTRICT AGRICULTURAL COORDINATOR

- Coordinating all agricultural activities in the district
- Officiating at field days and other agricultural related functions
- Controlling all funds for the district

MAJOR DUTIES AS AGRICULTURAL SPECIALIST

- Design of irrigation systems
- Design of storage structures and rural water supply systems
- Design of soil conservation structures
- Promoting use of sustainable farming practices
- Team Leader for Technical Services Branch in Lufwanyama and Kalulushi i.e. Supervising technical staff in the two districts
- Compiling technical reports for the district.

MAJOR ACHIEVEMENTS/CONSULTANCY

- Designed and supervised construction of three storage sheds in Kalulushi(Rural investment Fund Project under Ministry of agriculture) :– 1999-2000
- Surveyed and designed a dam for RPS company in Mbala :- 1997
- Designed and supervised construction of Musakashi Bridge in Kalulushi (Rural Investment Fund Project under Ministry of agriculture) :- 1999-2000.
- Planned and surveyed land for CARE International and ZATAC project in Chibote :- 2005
- Contributed in the compilation of the district situation analysis as well as the 5th National Development plan :- 2005.
- Conducted an environmental impact assessment for Copperbelt Forestry Company :- 2008
- Provided consultancy in sanitation and water supply projects funded by Devolution Trust Fund in Ndola and Masaiti :– 2010 - 2011

AREAS OF EXPERTISE

- Water resources analysis (Flood and drought mitigation, statistical analysis and prediction of extreme events)
- Aquatic ecology
- Water quality and treatment

- Design of sewer and domestic water supply systems
- Hydrologic and hydraulic modelling
- Integrated river and sewer modelling
- Design of irrigation systems and structures
- Environmental impact assessment
- Water and soil conservation in agriculture
- Design of farm structures
- Crop handling, conditioning and storage
- Application of GIS and remote sensing in water resources engineering

COMPUTER APPLICATIONS

- Proficient in Microsoft Office tools (i.e. Excel, Power Point, Word, Access, Frontpage, Microsoft Projects and Outlook)
- Immense knowledge in the use of modelling tools (e.g. Autocad, HEC-RAS, WaterCad, Epanet, Matlab, ArcView G.I.S, Idrisi, Surfer, Drainmod and Modflow)

MEMBERSHIP AND AFFILIATIONS

- Member Engineering Institute of Zambia
- Kalulushi District Business Association
- Lions Club International

THESES

- Bachelor's degree thesis topic: **Estimation of irrigation efficiencies at Nakambala Sugar Estate**
- Masters thesis topic: **Conceptual water quality model for combined sewer overflow emissions.**

REFEREES

Chewe Kambole
Head of Department (Civil)
Copperbelt University
P.O. Box 21692
Kitwe

Collins Nzovu
Civil Engineer
ZESCO
Email: cnzovu@hotmail.com
Cell: +260966844119/ 0977583588

Mrs J.A. Chintu
Principal Agricultural Coordinator
Ministry of Agriculture and Co-operatives
P.O. Box 70232

Ndola
Zambia
Cell: 0977828995

11.3 Minutes and comments of Scoping and Disclosure meetings

Minutes of the Project Scoping meeting held on 5th July,2013 at 10:00hrs at Kafubu Farm in respect of the proposed development of Kafubu Farm in Ndola District by GoldenLay Limited.

Venue:Kafubu Farm (No. 9424 Ndola)

Attendance: A total of 171 participants attended the scoping meeting comprising of governemnet officials, NGO and Civil society groups and local residents of the project area. The lists of attendees are appended to the minutes.

Welcoming remarks:

The meeting was conviened at 10:37 hours upon arrival of all the invited and/or interested stakeholders including the local residents by the meeting Chairman Mr. Mubanga Mwansa (Greenline Environmental Solutions Ltd). An opening prayer was presented by Mr. Sianemba after which the printed agenda of the meeting was distributed to the participants. The chairman also explained how the meeting will be conducted in line with the agenda set.

Self introductions of the key invited stakeholders representiung government departments were made beginning with the District Administrative Officer for Ndola Mr. Taphen Mulongo followed by other officials and GoldenLay management.

Mr. Sianemba was the interpretor of the meeting from English to Bemba and viceversa in order to have a full understanding from both local and other stakeholders.

Scoping Meeting Agenda

DATE: 5th JULY, 2013

VENUE: KAFUBU FARM-NDOLA.

TIME: 10:00 HRS.

AGENDA ITEMS

1. Arrival of invited guests and all stakeholders/interested parties.

2. Opening prayer and welcoming all stakeholders.
3. Introduction of the purpose of the meeting-Consultant (Greenline Ltd).
   -Description of the EIA process in Zambia and the role of the scoping exercise -Consultant (Greenline Ltd).
4. Detailed description of the project, cost and rationale-GoldenLay Limited
5. Obtain new views/questions/contributions and concerns from stakeholders concerning the project undertaking.
6. Any other business.
7. Conclusion and closing prayer.

The meeting was called to order at 11:00hrs by the Chairman and urged all stakeholders to be free to air their views and concerns over the project. He emphasized to the members in attendance to pay particular attention to the details of the project especially on issues bordering on the people's social-economic status as well as the environmental aspects and impacts related to the project. The stakeholders recognized that the contentious issue of land was not to be discussed in the meeting as the issue was being handled by the court of law and that the case was between the local residents and Mr. Mutambo (previous owner of Kafubu Farm).

Purpose of Disclosure Meeting

The facilitator (Mubanga Mwansa) explained that the meeting was in fulfillment of the requirements of the Environmental Management Act; Environmental Impact Assessment regulations in Zambia. Following the submission of the draft Terms of Reference by GoldenLay to undertake the said EIA for Kafubu Farm, ZEMA required GoldenLay to conduct such a meeting to obtain views and concerns regarding the proposed development. He emphasized that the comments made at this meeting and all questions and concerns by the stakeholders will form part of the final EIS to be submitted to Zambia Environmental Management Agency (ZEMA) for review and subsequent approval/disapproval. It will incorporate all environmental, cultural and socio-economic aspects and impacts of the project.

Project Description

Mr. Fletcher Broad (Operations Director-GoldenLay) explained to the stakeholders the background of the company (GoldenLay) that it took over from Flamingo Farms and since then have been involved in the table Egg business in Zambia for a long time and that in line with Governments wish to create employment, the company has grown to employ up to 180 workers at GoldenLay.

The following points were given by Mr. Broad regarding the development and revamping of Kafubu Farm.

- Golden Lay intends to develop 2964Ha of land at Kafubu Farm acquired from Mr.Mutambo in 2012.
- GoldenLay intends to invest US$9,000,000 (equivalent to K49, 000,000 rebased) for the entire operations including infrastructure development of the farm.
- The project will incorporate poultry operations (320,000 birds), Beef cattle rearing, Dairy Cattle rearing and Milk production and cropping operations.
- Cropping operations will include planting and harvesting of Soya Beans, Maize and Wheat on crop rotation basis in summer (rain fed) and will also include the installation of 6 Center Pivots for winter cropping operations. The operation will try as much as possible to incorporate use of organic manure.
- GoldenLay will also drill ten (10) boreholes to help with irrigation of the crops in winter.
- Other support infrastructure will include Fuel storage tank, farm house, workers compound, sewage management system, mini workshop, chemical store, fencing around the farm and a security guard check point.
- The company will employ close to 200 people from preparation to operation phases of the project. Employment will include permanent and seasonal workers and local people will have priority in taking the jobs. Skilled, semi-skilled and non-skilled workers will be required to enhance the development of the project. GoldenLay will also employ up to 30% of women in the Kafubu project.
- GoldenLay will also conduct Out-Grower Schemes for local farmers for Soya Beans and Maize.
- In terms of Corporate Social Responsibility- GoldenLay will support the local Clinic, Kasongo Primary School and will build a Police Post in the area to enhance Security (application for a police post has been made and approval obtained from Zambia Police Service). The company has also put up boom gates at the boundaries in order to reduce the risk of thefts and trespass by monitoring traffic and reduce road traffic accidents on the main access road.
- Ms. Chikumbi Kasonde (Human Resource, Environment and Corporate Governance Manager) explained that GoldenLay Limited has an existing community and employee sensitization program in partnership with Afia-Mzuri. The program involves nutritional feeding and sensitization on HIV/AIDS matters at its Baluba operations. This will be extended to Kafubu Farm and surrounding community. The company will endeavour to assist the community in any way possible especially employment of women.
- GoldenLay will also help in grading of the main access road through the farm to the neighbouring settlements.

Views/concerns/questions/suggestions from stakeholders

Q1. Joseph Kaluba (Hope NGO) asked if the occupants of the land within Kafubu Farm have or are in possession of certificate of title for the land occupied.

Response:

Mr. Broad confirmed that the land was acquired from Mr. Mutambo by GoldenLay and was on title with clear boundaries and demarcations which has since been converted to GoldenLay limited.

Ndola District Administration Officer also further stated that for the previous owner to sale the land it was titled and that all occupants without title are occupying the land illegally hence the reasons Mr.Mutambo has taken the case to court to rule on the illegal occupations of the land.

Q2. Abraham Manda asked why the meeting of such nature was not held before and why it wasn't held at another venue.

Response:

The consulting team members explained that the meeting was in fulfillment of the EIA requirements and that the EIA process required the meeting to be held at or near the project site so that stakeholders can appreciate the site and understand the project as they discuss issues concerning the development.

Q3. Martin Kifwabantu (Kasongo Area) asked if they will be mployment opportunities for youth like him and if so, is the employment temporal or permenent?

Response:

Mr. Broad responded by saying that GoldenLay will employ a toatl of 200 people in the phases of the prooject and as the practice is at the Baluba operations. Emploment will be on permanent basis although there will be seasonal workers as well in the total 200.

Q4. Fridah Mubambe asked when GoldenLay will commence employment because people where being turned away that jobs were not yet created?

Response:

Mr. Broad and Ms.Chikumbi said that the project was still considering getting approvals from relevant authorities before recruitment can commence. Once approvals are obtained, recruitment will commence. Mr. Broad further said that they are open to receive applications from interested parties for varoius jobs that will be created.

Q5. Clement Phiri of Twapya area asked whether they will be occurences of relocation and resettlement of the people sorrounding the farm as the land is their only source of livelihood?

Response:

Ndola District Administration Officer Mr. Mulongo responded to the concern by stating that the developer cannot relocate or resettle people outside of the titled land and that any occupants within the land will await the ruling of the court regarding the court case between the local people and Mr.Mutambo. He futher said that the issue of land did not involve GoldenLay as they only purchased titled land from Mr. Mutambo.

Q6. Mr. Cape Tembo asked why GoldenLay was fencing off the farm area. Won't this restrict access to outlying areas?

Response:

Mr. Broad responede and said due to the nassive investment planned for the farm and because the land is on title, GoldenLay found it fit to fence off to protect the area. However, the access road passing through the farm will not be blocked but boom gates will be provided as an access means through the farm. This will help with security of the area.

Q7. Joseph Luwanga: What is the meaning of the Environmental Impact Assessment and why is it important for the local people to know about it?

Response:

Mr.Mubanga(Greenline) responded and explianed that the Environmental Impact Assessment in Zambia was law requiring all development taking place in Zambia to conduct the assessment to determine the potential negative and positive environmental and social impacts of the project to be undertaken by a developer. It is imprtant for local people to understand this as theya er important stakeholders who may be affected by the project either directly or indirectly postively or negatively. He futher said the scoping meeting was a part of the EIA process to obtain views regarding the project because they are important stakeholders in development.

Q8. Mr. Maximillian Chibesa (teacher at Kasongo primary): if the farm is fenced off how will school going children from other areas around the farm have access to Kasongo Primary School?

Response

Mr. Broad responded that the road will not be closed as it is the main access road for most local people and other farms in the area. The fencing off of the farm leaves some areas open where boom gates have been provided as access routes to the school. Pupils and other people will still have access through the road in the farm. He further said that the road will graded and speed control measures put in place to protect pedestrians from road accidents.

Comments and Contributions

C1. Mr. Muhemba said that the local people accepted the developemnt brought to Kafubu farm as the area was dormant for over 10years and all the infrastructure was dilapidated due to lack of investement. Most people lost jobs and had no economic activity. He encouraged GoldenLay to speed up the development and employ local youths in the area.

C2. Mr. Nkhoma Webster emphaszied that GoldenLay must also consider setting up social recreation activities such as football pitch for the local youth to pass time as part of their Corporate Social Response. This will help reduce crime related activities as people will be busy and not engage in illicit drinking and sexual activities. He encouraged the Police to work with the community to improve security of the area.

C3. Mr. John Munthali welcomed the project and hpoed that implementation will be done within a good time frame in order to develop the area soonest.

Response:

Mr. Broad thanked the people for the welcoming remarks and encouragemnsta and emphaszied that the project will bring developemnt and revenue for the loacl people as wellas for local government. The success of the project depended on the local stkeholders positive contributions and support. He said GoldenLay will endeavour to help the community in the best way possible as it has done in othera areas where they have invested.

C4. Battledore Farm (cool Bananas) gave a written response concerning the peoject on the day of the meeting as they couldn't attend in person. The response is appended.

Closing Remarks

Ndola District Administration Officer said that development of this nature was in line with the current governments promise of job creation through Private Public Partnerships (PPP). GoldenLay must ensure that they delicer the emplyment promises and their CSR commitments.

He encouraged the local people to prove that they can work and thus they will get the jobs being promised to them. They must support this development in order for it to succeed. They must also work together with the developer and government to sort out any disputes that may arise through the life cycle of the project.

Lastly, he said GoldenLay proved to be transparent in their developent by giving the local people chance to air their views on thr developent and bringing it to the open through this meeting.

The Chairman of the meeting thanked everyone for coming and taking interest in development of the area through this project.

Closing Prayer

Mr.Muhemba gave a closing Prayer before the meeting closed.

The Chairman declared the meeting closed at 12:49hours.

Scoping meeting Photo Gallery

Plates 1& 2: Mr. Broad (GoldenLay Ltd) giving project details

Plates 3& 4: Stakeholders in attendance at the scoping meeting

Plate 5 & 6: Stakeholders submitting questions and concerns

Signed: (Chairman)

……

Signed :(Secretary)

…..……

Scoping Meeting Attendance List

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Goldenlay

SCOPING MEETING ATTENDANCE LIST

DATE: 5TH JULY, 2013

VENUE: KAFUBU FARM-NDOLA.

TIME: 10:00 HOURS.

S/N	NAME	ORGANISATION	SIGNATURE
1	OBEY MALAMBO	DWA-NDOLA	
2	Chisha Nsunge	LANDS-NDOLA	
3	DANIEL NKHOMA	AGRICULTURE DEPT NDO	
4	Chipampe Malafwali. (MRS)	MAL – NDOLA.	
5	Maybin Mutenga	Luanshya M. Council	
6	MOOMBA EUGINE	MAL – NDOLA	
7	[illegible]	Luanshya M. Council	
8	C/INSP. MWANGO PASCAL	BALUBA POLICE	
9	CHITWA DAVIES	BALUBA POLICE	
10	CHAMA YORAM	BALUBA POLICE	
11	KAMPONJE JOHN	BALUBA POLICE	
12	KATAKWE MERCY	BALUBA POLICE	
13	RABSON MWALE	LUANSHYA M COUNCIL	
14	KENNEDY .K. PHIRI	D.C.-OFFICE NDOLA	
15	CHISENGA PATHIAS	MINISTRY OF AGRICULTURE	
16	HENRY MATOLA	MIN. OF AGRICULTURE	
17	STAPHEN MULONGO	DISTRICT ADM. OFFICER	
18	STEPHEN SIANEMBA	KAFUBU FARM	
19	PETER MUSONDA	O.P (GOLDEN LAY)	
20	H. VAN ROOYEN	G.M (GOLDEN LAY)	
21	CHIKUMBI KASONDE	ESS/HR (GOLDEN LAY)	
22	Mohamed Bushary	Golden Lay LH	
23	Fletcher Broad	Golden Lay	
24			
25			
26			
27			
28			
29			
30			

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SCOPING MEETING ATTENDANCE LIST

DATE: 5TH JULY, 2013

VENUE: KAFUBU FARM-NDOLA.

TIME: 10:00 HOURS.

S/N	NAME	ORGANISATION	SIGNATURE
1	Patrick Lumbwe	Mabungula	Patrick
2	Jemes Mulopa	mabugula	Jemes
3	Cape Tembo	Kafubu Daily F.	[illegible]
4	STEPHEN KASANGA	KAFUBU DAILY F.	S.KASANGA
5	PETER MBEWE	" " "	P.MBEWE.
6	NG'ANDWE LEWANIKA	HOPE VILLAGE	Lewanika
7	DOMINIC MUKUPA	KASONGO	[illegible]
8	JUBICK KAPUTULA	KASONGO	Kaputula
9	George Chola	Farm No 6	[illegible]
10	Albert chibale	Kasongo	[illegible]
11	Winstone Mwanchenga	Mabungula	Mwance
12	AMOS Chibombo	Kasongo	
13	Kasoma Kiketa	Kasongo	
14	Robert Phiri	HOPE village	R.Phiri
15	JOHN MAKUMBA	KASONGO	[illegible]
16	MOSES MWEBELA	MABUNGULA	M.MWEBELA
17	Benard Samulopo	Kasongo	B Samulopo
18	CHILEYA SILVESTER	KAFUBU DAIRY II	[illegible]
19	JACOBS MWEWA	HOPE COUMPAND	Mwewa
20	J.K. LUWAYA	KASONGO	[illegible]
21	CHARLES PHIRI	TWAPIA.W. POULTRY	[illegible]
22	L. KABAMBA	HOPE COMPOUND	L.KABAMBA
23	MULENGA PETER	MABUNGULA	[illegible]
24	RICHARD LUNGU	MABUNGULA	[illegible]
25	Emly KALUMBA	KS 7185	[illegible]
26	CHIBWE PETER	HOPE COMPOUND	P. Chibwe
27	Jamie munthali	DAILY F	[illegible]
28	Francis M. Katongo	Daily F Two	[illegible]
29	JOHN Banda	Kasongo co	compaund
30	DERICK SINYENGA	TWAPIA	SINYENYENGA

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Goldenlay

SCOPING MEETING ATTENDANCE LIST

DATE: 5TH JULY, 2013

VENUE: KAFUBU FARM-NDOLA.

TIME: 10:00 HOURS.

S/N	NAME	ORGANISATION	SIGNATURE
1	Richard Mubongo	Kafubu (Dairy)	
2	Richard Kampamba	Kafubu Farm	
3	Godfrey Mbuya	Kafubu Farm	
4	Misheck Mbuya	Kafubu	Mmbuya.
5	Kingsley Katongo	Kafubu	
6	David Mwape	Mabumbwe ...	
7	Clement Mbasela	Kafubu Dairy	Mbasela
8	Guide Mwamba	Kafubu Dairy	
9	J Chisenga	Kafubu Dairy	
10	Cleopus Mubamba	Kasogo	
11	Peter Lipalo	Kasogo	Pelepo
12	Fredrick Mutauka	Mupopaulo	
13	Musonda Douglas	Mambulunga	
14		Dairy Farm	JACKSON
15	Edson Mumba	Mupopaulo	Mumba
16	Dhan Chibuye	Kafubu	
17	Mike P. (43)	Mabungwa...	
18	Leonard Chama	Over Spill	
19	Clement Banda	Kabushi	
20	Charles Lwanga	Chifubu	C-L.
21	Helen Zulu	Kafubu	
22	Charity Zulu	Kafubu	
23	Pricillah Mulonga	Kafubu	
24	Chibesa Kupiba	Kafu...	
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SCOPING MEETING ATTENDANCE LIST

DATE: 5TH JULY, 2013

VENUE: KAFUBU FARM-NDOLA.

TIME: 10:00 HOURS.

S/N	NAME	ORGANISATION	SIGNATURE
1	MPONDO KELVIN	DAILY	
2	BALYSA JAMES	DAIRY	
3	MOSES BANDA	MABUNGULA	
4	WEBSTER NKHOMA	FARMER	
5	MBuya TIMOTHY	DAIRY	
6	BEAUTY MUMBELWA	Kansongo	
7	Ferster Lwelya	Kasongo	
8	[illegible] Tinponti	DAIRY	
9	J. Chaba	COP	J. Chaba
10	JOSEPH NGOMA	Hope	
11	Mu[illegible] BENSON	Hope	
12	Eyden Mubambe	Kasongo	
13	Justina Mushe	Kasongo	J.L
14	Evaslyn Mbasela	Hope	E.M
15	Elya Mulsa	Kasongo	EM
16	Joshua Banyangwe	Kasongo	J.S.
17	Fred Mulsonda	Kasongo	E.M
18	Rozalia Ngosa	Hope	R.N
19	Evaristo Chibwe	Hope	E.C
20	Nderisa Masita	Kasongo	N.M
21	Juliet Mulenga	Hope	J.M
22	Grace Mukamba	Kasongo	G.M
23	Monson Kanakamo	Kasongo	WKK
24	Matilda Chansa	Mabungula	M.C
25	Patricia Kasoma	dairy	P.K
26	JOHN MUNTHALI	69 MABUNGULA	
27	Moses Kasongo	MABUNGULA	
28	Joseph Luwaya	Kasongo	
29	Peter Papusekd	Kasongo	
30	David Mumba	Kasongo	D.Mumba

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S/N	NAME	ORGANISATION	SIGNATURE
1	MUTOYA MALAKI	MABUNGULA	
2	CHILESHE DAVISON	HOPE COMPOUND	
3	PROTASIO NSOKOSHA	KASONGO RESID	
4	MAXIMILLIAN CHIBESA	EDUCATION (KASONGO)	
5	VINCENT MUYANDA	KAFUBU DAIRY	
6	EVERT KUKANDA	KASONGO	Kukanda
7	ROBERT MUSONDA	KASONGO	R. MUSONDA
8	SIMON NDHLOVU	MABUNGULA	
9	DAVAD NGOMA	MABUNGULA	
10	EMMANUEL MULENGA	KASONGO	
11	THOMAS CHISOLA	KASONGO	T Chisola
12	MUSONDA	KASANGA HOPE	Musonda
13	BY MUFANA	LUANSHYA	BY MUFANA
14	Kabole Kufuya		
15	NICHOLAS NGOMA	MABUNGULA	
16	JOHN Kunda	KASONGO	
17	CHAMA YORAM	LUANSHYA	
18	Kasoma Lalambwe	Kasongo	
19	WEBBY MWANSA	Kasongo	
20	Mushieck Simukoko	MABUNGULA	
21	Anthony Mamofenda	Kabula	
22	Kalula Dominic	TWAPIYA	
23	Richard Tembo	Mabungula	
24	SHABA DAVID	KAFUBU DAIRY	
25	Lubasi Nindola	mubungula	
26	ROBBY ILAUMBA	NDOLA	
27	MATHEWS KALUBA	Mwapona	
28	Peter Tere	Kafubu farm	Tere
29	ANDERSON CHUTA	TWAPIA	
30	SHON MANGO	TWAPIA	

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1	MAYBIN L KIFUABANTU	KASONGO	
2	GEOFFREY SANGAMBO	KASONGO	Gsangambo
3	MWEWA CHIBUYE	KAFUBU DAIRY	
4	Chinyanta Lywaya	Kasongo	
5	Chisha Abraham	Kafubu Farm	
6	Dudley Bulanga	Kafubu Farm	
7	YULO MSELE	MPOPATUKO	
8	MUKUKA KAYULA	MABUNGULA	
9	MWAMCHENSA WEBBY	KAFUBU DAIRY LTD	
10	MICHEL LUNGU	TWAPIA	
11	JAMES KAPUKO	KAFUBU FARM	
12	PATRICK MUNTHALI	KAFUBU FARM	
13	Mulenga Steven	KAFUBU FARM	
14	Lemeck Thalawa	KAFUBU FARM	
15	Dickson Mulenga	KAFUBU FARM	
16	PETER NGWENJI	Kafubu Farm	
17	KANA KAMO WENSON	KASONGO NHC.	
18	SAMUEL SINYANGWE	KASONGO	
19	Wenny Mwelwa	Mabungo Village	
20	M. KABWE	Chairman Mabungula	
21	XERXES B. MUTEMBA	RESIDENT MABUNGOLA	
22	STANLEY LUNGU	WARD 9 SECRETARY	
23	LINDA KAMATA	RESIDENT MABUNGULA	
24	GETRUDE MUSUKA	Ward Chairlady	
25	ERNEST KAMWENDO	DAIRY KAFUBU	
26	MARTIN KAPUMA	KENYATA MWAISUMI	
27	Simon Chipeya	Kafubu	
28	Kana Siamlemba	Kafubu	
29	ANGRID CHIBALE	KAFUBU	
30	ANDREW MWANZA	KAFUBU	

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3	MWEWA CHIBUYE	KAFUBU DAIRY	
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7	YULO MSELE	MPOPATUKO	
8	MUKUKA KAYULA	MABUNGULA	
9	MWAMCHENSA WEBBY	KAFUBU DAIRY LTD	
10	MICHEL LUNGU	TWAPIA	
11	JAMES KAPUKO	KAFUBU FARM	
12	PATRICK MUNTHALI	KAFUBU FARM	
13	Mulenga Steven	KAFUBU FARM	
14	Lemeck Thalawa	KAFUBU FARM	
15	Dickson Mulenga	KAFUBU FARM	
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19	Wenny Mwelwa	Mabungo Village	
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11.4 Specialised study Reports