



BASELINE STUDY OF THE MAIN EGG-LAYING FACILITIES AT GOLDENLAY LIMITED, BALUBA, ZAMBIA

PHATISA DEPARTMENT: SOCIAL AND ENVIRONMENTAL MANAGEMENT

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1. Executive summary

Overview

As part of the Due Diligence process for the Overseas Private Investment Corporation a Baseline Study was commissioned by Phatisa Fund Managers (Phatisa) to provide a comprehensive overview of the proposed investment in Goldenlay Limited (Goldenlay). Phatisa invested into Goldenlay in October 2011. Goldenlay was the second investment by Phatisa but its' first in Zambia. Goldenlay is the largest egg producer of table eggs in Zambia, however the company services mainly the Copperbelt region and exports to the Democratic Republic of Congo (DRC). As a result of Phatisa's investment Goldenlay has increased production and updated management systems to become compliant with best international practices. Goldenlay has four key members on the board of which two members are resident managers and reside on the Goldenlay site, and two are Non-Executive Directors:

Name	Position	Nationality	Resident
Mohammed Bushary	Managing Director	Sri- Lankan	Luanshya, Zambia
Fletcher Michael Broad	Operations Director	Australian	Luanshya, Zambia
Peter Macsporrان	Non- Executive Director	Zimbabwean	Lusaka, Zambia
Paul Wythe	Non- Executive Director	British	Nairobi, Kenya

Site location

The main Goldenlay site is situated in the Baluba municipality of the Luanshya district, one of 10 districts of the Copperbelt Province of Zambia. The major economic activities in the area are mining, mineral processing and commercial farming (greater than 10ha), emergent farming (area under cultivation between 2 and 10 hectares) and subsistence farmers. A small chicken farm and a defunct piggery border on the Goldenlay main site, both have been derelict for 11 years. The remaining area comprises privately owned farms for subsistence farming. The Baluba stream, a small stream that joins the Kafue River 25 kilometres downstream, lies to the northwest of the site. The main sites coordinates are given below.

Latitude	Longitude
13° 0.273'S	28° 27.494'E
13° 0.537'S	28° 27.273'E
13° 0.131'S	28° 26.743'E
13° 0.021'S	28° 26.833'E
13° 0.022'S	28° 26.050'E

Project objectives

The overall company objective is to increase the amount of available protein through increasing the production of table eggs to meet the current market demand. This will be achieved through building new egg laying houses as well as securing inputs such as chicken feed, namely soya and maize. The objective is to build Goldenlay's capacity to house one million laying chickens from their current capacity of 600,000. Goldenlay intends to increase their product reach to include all major cities in Zambia as well as increase the amount exported to the DRC.

Project activities

Goldenlay intends to increase the company's capacity of laying chickens to one million layers through the construction of new egg laying houses on the main site. This increases the biosecurity risk posed to its operations, as a result Goldenlay has improved biosecurity to ensure that the level of exposure from external factors has been minimised. Through the segregation of staff working in non egg-laying areas from staff that operate only in the egg laying houses by a security fence and walk-in showers. In particular the feed mills provide the greatest risk to biosecurity as their close proximity to the egg-laying houses results in an increase in the number of people entering and exiting the main site.

Increasing the risk of foreign pathogens being introduced to the site.

Project environmental baseline

Goldenlay is located in the Luanshya district that is located in a sub-tropical climatic region of the country, with three distinct seasonal conditions. Climatic conditions are characteristic with a pronounced dry and rainy season. The rainy season begins in November ending in April with average annual rainfall ranging from 1,000 to 1,300 mm. Ndola experiences an average of 7.22 hours of sun throughout the year.

Geology

The underlying geology of Ndola is diverse with numerous rock types. It is mainly underlain deep weathered sedimentary rock from the Katanga Super group. This group can be divided further into the Kundelungu Series, Mwashia Group and the Roan & Mine Groups. These general features include calcareous mudstone and siltstone that can be found through out the Copperbelt Province and into the DRC.

Water and effluent waste water

Due to Goldenlay's extraction of underground water from the aquifer as well as Goldenlay's generation of effluent, which contains high levels of Biological Oxygen Demand and Chemical Oxygen Demand compounds, management has been advised to implement regular monitoring of water quality at all its water sources within the site. Management monitors the effluent treatment facility to ensure that the effluent accumulated within the site before discharging into the environment is within acceptable levels, as outlined by the WHO and Zambian sewage standards.

Air quality

The main site of Goldenlay is equipped with an incinerator and two mills that emit dangerous gases and dust that can be hazardous to workers if the concentrations of certain particles are high. No historical baseline data is available for the quality of air in the surrounding area. However, due to the rural nature of the immediate surrounding area, the air quality has not been polluted by heavy industrial activities. Mining activity is located further north of Ndola and the estimated impact from mining activity can be assumed to be minimal at the Goldenlay site. The Goldenlay site has an incinerator on the premises to dispose of chicken carcasses and other burnable waste. The incinerator undergoes semi-annual emissions testing to ensure that the incinerator operates at an acceptable standard. Currently emissions from the stack have elements out of the acceptable range for stack emissions, as set out in the IFC performance standards. Hilma Limited, an external consultant who is contracted to conduct the semi-annual testing on all effluent and emissions generated by Goldenlay's operations has identified that the high levels of CO, CO₂, SO₂ and NO_x are due to poor aeration in the incinerator and poor servicing. Management has responded to these issues by purchasing new fans for the air intake inlets and having the incinerator serviced. Hilma will be conducting their next inspection on the incinerators performance during Q4 2014.

Respirable dust emitted from within the feed mill and hammer mill working areas are subjected to regular testing. During a semi annual audit conducted in Q1 2014 by Hilma, the dust limits were at acceptable limits in the hammer mill and loading area, however, the total dust concentration was above the acceptable limit in the mixing area. Management have continued to improve the dust levels emitted within the feed mills through increased ventilation within the mixer room and hammer mill working area, five new large windows equipped with fans have been installed to increase the airflow. A new maintenance schedule has been implemented to ensure that the mills are operating efficiently. The measures taken by management are considered short-term solutions, as the mill complex and associated storage facilities will be relocated to the Kafubu farm expansion to increase the level of biosecurity on the premises through the reduction of human traffic on the site. Management has budgeted for this action item for 2015 financial year and financing is in place.

Noise levels

The Goldenlay site is located away from the industrial zone and central business district of Ndola. Noise levels produced by the onsite incinerator and mills have an impact on the immediate surrounding areas. Goldenlay's management evaluates noise through external auditing conducted semi-annually. Noise levels within the milling complex and loading bays are above acceptable limits, while the noise emitted by the incinerator is below the maximum limit acceptable for noise experienced by workers. Management has addressed this issue by ensuring that all employees within these areas wear masks at all times.

Environmental management plan (EMP)

Goldenlay's management has completed compiling and is currently implementing an Environmental Management Plan (EMP). Goldenlay has compiled the EMP as well as the Social and Environmental Management System (SEMS) document. Both the EMP and SEMS documents incorporate the recommendations made by the permit conditions, local law, Phatisa's Social Environmental Due Diligence based on the IFC Performance Standards as well as ISO 14000 and the IFC EHS sector supplement guidelines for poultry production. Management has obtained baseline data for emissions and effluent generated from its operations, which will provide a suitable base comparison for future testing.

Manure management

Goldenlay produces 15,600 tonnes of chicken manure annually from their Facco houses. Goldenlay's management has incorporated manure disposal into their crop farm fertiliser programmes. As a result all manure produced from the chicken houses is transported to the nearby farms to be used as organic fertiliser.

Veterinary inspections

Goldenlay has contracted an external specialist poultry veterinarian to conduct semi-annual inspections on the Goldenlay flocks. Dr Roger Horner is a member of the South African Veterinarian Association. In the case of blood testing, blood samples are transported back to South Africa under controlled conditions and tested by Vet Diagnostics. The overall performance of Goldenlay is good, the biosecurity measures are providing sufficient protection from external elements and the flocks' mortality rates are within industry standards. Goldenlay has overcome the geographical barriers in supplying sufficient vaccinations and inoculations to its flocks.

Social community engagement

Goldenlay undertakes a variety of stakeholder engagement initiatives. The human resources manager meets with the district council member for Labour in the Luanshya area. Issues revolving around changes in labour legislation, worker grievances and union representation. Meetings happen on a quarterly basis between the parties, to date no material issues have been raised as outstanding. Goldenlay is recognised as one of the preferred employers in the region as the company is actively managing its relationship with its staff and the surrounding communities.

In addition management are actively engaging with the residence of the Baluba district, which surrounds the main site. Meetings occur annually or on an ad hoc basis when major activities are being undertaken either by the company or within the community by local government. These meetings are held either on the premises of Goldenlay if the company has called for the meeting to be held or in the focus community whom has initiated the meeting. The main purpose of these meetings is to allow community member to voice any issues they currently face. Current issues discussed include; access to water within the community, available jobs in Goldenlay, clinic construction and supply needs, school supply needs, spent hens availability, access to manure fertiliser, etc.

These quarterly meetings also provide an opportunity for local council members to highlight key areas of concern or focus as part of a development dialog within the Baluba area. To date the community member have not raised any issues regarding pollution or unfair practices from the company. However, Goldenlay is repeatedly asked if there are any new job vacancies becoming available. This highlights the critical need for economic development within the community, and the pressure the company faces to expand its operations.

Goldenlay recognises that it is one of the key employers in the area and that its social responsibility goes beyond its immediate operations. Management has funded an HIV/AIDS awareness campaign to help stop the effects of HIV/AIDS. This programme started with voluntary testing of its employees by providing counselling and treatment to the employees who suffer from the virus. Goldenlay works with local government to ensure that the stigma of HIV/AIDS is overcome and that people who require treatment obtain the medicine needed from local clinics. Goldenlay management has reported that employee turnover is lower.

Goldenlay also contributes to three food programmes local school, through the provision of broken eggs and/or discarded eggs that are not acceptable for retail selling. These eggs provide a valuable source of protein to the school children and the aged.

Project impacts

The impacts associated with the Goldenlay investment are both positive and negative. Positive impacts relate to the continuous employment and further job creation within the area. This has a positive effect on the revenue for local people and authorities. The increased security of protein supplied to the region, nationally and internationally. Through Goldenlay's HIV/AIDS community initiatives the community has a greater understanding of HIV/AIDS these Corporate Social Responsible projects provide a long-term positive impact. The negative impacts generated from this investment will result from potential environmental pollution of the underground water, air, soil and generation of noise from daily activities. The general operations of Goldenlay will result in general solid waste as well as hazardous waste from medicine bottles from chemicals used on the site. Other socio-economic impacts include an increase in crime, HIV/AIDS and pressure to existing infrastructure due to other limited commercial operations in the region. Solid waste will be collected and dumped into a Zambian Environmental Management Agency (ZEMA) licenced dumpsite and hazardous waste will be disposed of inline with hazardous waste management regulations.

In order for Goldenlay to minimise these negative impacts sufficient mitigation strategies have been developed through proper and comprehensive environmental management plans. Through regular independent monitoring management will be able to evaluate their management of negative impacts and make necessary adjustments.

2. Investment scope

On 18 October 2011, AAF approved an investment of up to US\$ 24.7 million to invest alongside the existing management team of Golden Lay Limited – Fletcher Broad and Mohamed Bushary (Management) – to acquire 100% of the shares in Goldenlay.

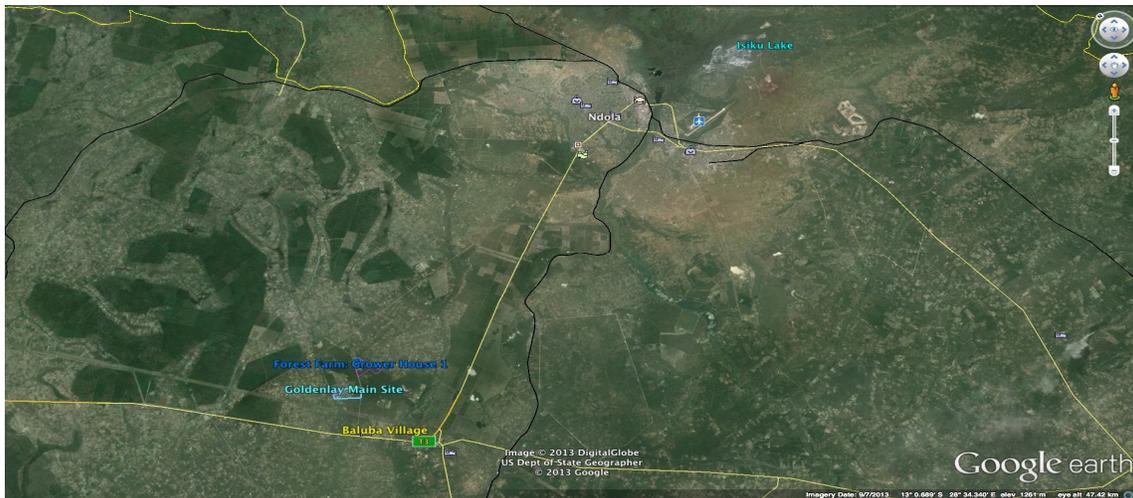
Goldenlay is a privately owned Zambian company based in Luanshya, Zambia. Aureos' Southern African Fund and a management buy-in (MBI) team, which acquired Flamingo Farms Limited, incorporated Goldenlay in November 2005. The main operations of the farm were the production, distribution and sale of chicken eggs in the Copperbelt Province of Zambia. The management team and co-investors of Goldenlay comprises Mr Mohamed Bushary and Mr Fletcher Broad, who, prior to joining Goldenlay, had a combined experience of 11 years in the poultry industry. Both members had worked for Hybrid Poultry Farm Limited.

Goldenlay is engaged in the production, distribution and sale of chicken table eggs, and is located in Luanshya in the Copperbelt Province of Zambia. It is the largest producer of table eggs in Zambia, supplying eggs nationally, but principally to the Copperbelt, as well as to traders from the DRC.

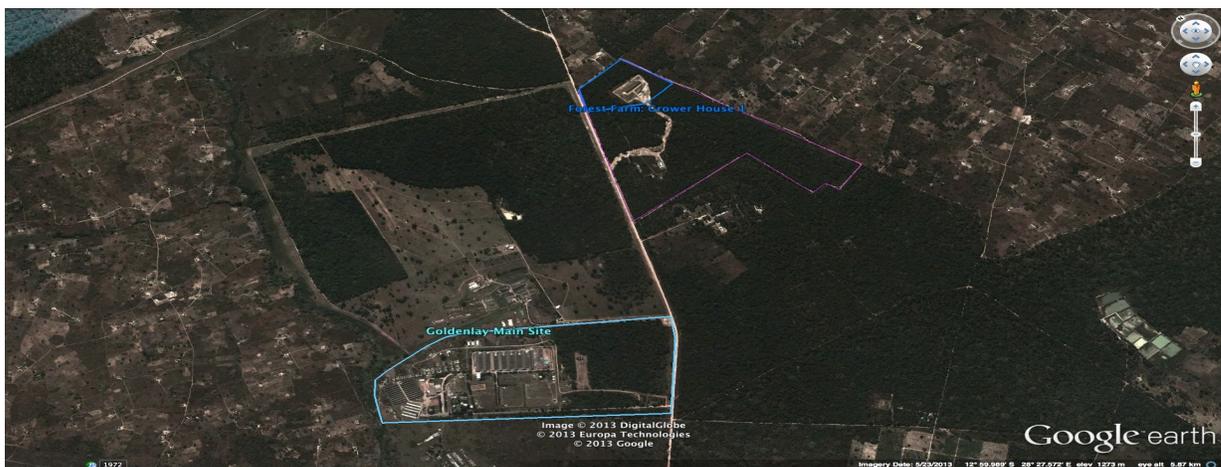
3. Company site – main site

The operations of the farm are focused around 13 chicken houses with a total capacity of 600,000 laying birds. The egg-laying houses are split between five old rudimentary open-air houses and eight new automated houses designed and built in Italy, called Facco's. The company produces 20,000 trays of eggs per day from its poultry operations. It is the largest supplier of eggs in the Copperbelt and in Zambia.

The main Goldenlay site is situated in the Baluba municipality of the Luanshya District, one of 10 districts of the Copperbelt Province of Zambia. The major economic activities in the area are mining, mineral processing and commercial farming (greater than 10ha), emergent farming (area under cultivation between 2 and 10 hectares) and subsistence farmers. A small chicken farm and a defunct piggery border on the Goldenlay main site, both have been derelict for 11 years. The remaining area comprises privately owned farms for subsistence farming. The Baluba stream, a small stream that joins the Kafue River 25 kilometres downstream, lies to the northwest of the site.



The main site comprises two plots: Plot 3037, 65 hectares and Plot 4694M, a 60-hectare piece of land, which is called Forest Farm. The main site consists of old and new chicken houses as well as staff accommodation, mill, storage rooms, workshop, showers, biosecurity dividers, canteen, offices, egg-packing room, general storage rooms, chemical containment areas, water storage tanks, etc.



The company carries out the following activities on the main site:

- receipt of day-old chicks;

- growing the day-old chicks to laying age chickens;
- egg-laying;
- egg-packing
- feed processing;
- feed packing and stacking;
- feed storage;
- feed mixing;
- manure storage and transportation;
- motor vehicle workshop; and
- chemical/vaccination storage, usage and disposal.

Receipt of day-old chicks

Day-old chicks are imported from Plumex, a company located in Holland, Netherlands. The chicks are flown to Lusaka, after which they are transported by trucked up to Ndola. The chicks arrive every 10 weeks. During transportation the chicks receive their first vaccination for Marek’s Disease, administered under the skin (subcutaneously).

Growing the day-old chicks

Day-old chicks are raised in one of the two rearing houses until laying age, approximately 16 weeks. The first housed is located on Forest Farm, which is one kilometre from the main site, and the second grower house is located on the main site. Facco Houses are climate-controlled automated structures that control atmosphere, water and electricity consumption as well as the distribution of feed. Chicks are placed in cages of approximately 18 per cage. Once the chicks are 16 weeks old they are moved into the laying houses.

Key operational procedures for the rearing houses are described below;

Day 1 is the day the chick hatches	
Day 1	<ul style="list-style-type: none"> • Goldenlay the chicks are imported from Europe. • Chicks are placed into the middle compartments, placing a maximum of 45 chicks into each individual cage. • The boxes come with 90 chicks in each box. • The chicks are left for a period of two hours to drink and re-hydrate. • After a period of two hours has passed, introduce the feed, allowing it to overflow into the cage for easy access for the chicks. • Allow 24 hours of light on the first day to ensure that all chicks have a chance to drink and eat after their stressful journey.
Day 2	<ul style="list-style-type: none"> • Reduce the light by one hour to 23 hours.
Day 3	<ul style="list-style-type: none"> • Chick fonts are refilled with more sugar and Stress Pack.(A vitamins and electrolytes concentrate replacement) solution. • While refilling the fonts, remove any mortality from the cage, recording it before disposal. • Reduce the light by one hour to 22 hours.
Day 4	<ul style="list-style-type: none"> • Remove all fonts and mortality from the cage. • Feed twice with the automatic feeding system, both in the morning and afternoon. • Reduce the light by one hour to 21 hours.
Day 5	<ul style="list-style-type: none"> • Remove dead birds from the cages. • Reduce the light by one hour to 20 hours.
Day 6	<ul style="list-style-type: none"> • Reduce the light by one hour, giving 19 hours of light to the chicks.
Day 7/1 week old	<ul style="list-style-type: none"> • Vaccinate the chicks against Newcastle Diseases (ND) using the vaccine Clone 30. • Stress Pack is administered.
Day 8	<ul style="list-style-type: none"> • Monitoring birds’ temperatures very closely, start opening windows to allow cooler air into the shed to better regulate the temperature. • Continue to give Stress Pack.

Day 9	<ul style="list-style-type: none"> • Finish administering Stress Pack.
Day 10 – 13	<ul style="list-style-type: none"> • Vitals are checked.
Day 14/2 weeks old	<ul style="list-style-type: none"> • Vaccinate the chicks against Gumboro using the vaccine D78. • Stress Pack is administered.
Day 15	<ul style="list-style-type: none"> • Monitor the vitals. • Continue to give Stress Pack.
Day 16	<ul style="list-style-type: none"> • Monitor the vitals. • Continue to give Stress Pack.
Day 17	<ul style="list-style-type: none"> • Last day administering Stress Pack.
Day 18	<ul style="list-style-type: none"> • Once the chicks have grown to a suitable size, seeing that the cage is becoming crowded and that the chicks, if placed in the cage above and below the middle cage, will not damage themselves, if they fall through the floor (if feet are not large enough to cover the gaps). The chicks must be transferred, filling and spreading them into all available empty cages, above and below the central cages. • The chicks are spread evenly from the middle cage to the top and the bottom. The ideal number in each cage is 15, as there are 45 chicks put in the middle upon receipt.
Day 19	<ul style="list-style-type: none"> • A reconciliation of the number of chicks to ascertain the correct number received and record all deaths. • Check all vitals.
Day 20	<ul style="list-style-type: none"> • Stop medicating with Triple Sulfa. (Is this a medicine name? if not LC)
Day 21/3 weeks old	<ul style="list-style-type: none"> • Vaccinate the chicks against Infectious Bronchitis using the IB HM20 vaccine.
Day 22 – 27	<ul style="list-style-type: none"> • Continue to give Stress Pack for three days after the vaccination. • Continue to monitor all vitals of the chicks and the house.
Day 28/4 weeks old	<ul style="list-style-type: none"> • Switch off the heater and the sock fans; outside atmospheric conditions are introduced • Vaccinate the chicks against ND using the vaccine Clone 30.
Five weeks old	<ul style="list-style-type: none"> • Vaccinate the chicks against Gumboro using the vaccine D78. • Continue to check vitals.
Six weeks old	<ul style="list-style-type: none"> • Vaccinate the birds with TAD IB
Nine weeks old	<ul style="list-style-type: none"> • De-beak the chickens with two groups of four people, starting with the outside lines working in. • While the de-beaking is taking place the birds are given Triple Sulfa.

Egg-laying

Chicks are placed in the Layer houses four weeks prior to egg-laying age (20 weeks old). Goldenlay has eight Facco houses imported from Italy, which are located 100 metres apart; a continuous conveyor belt runs through all the houses to the egg-packing room, this conveyor belt provides an efficient automated method of transporting the eggs to the egg-packing room with out the risk of breakage. Manure from the hens is collected on a separate plastic conveyer belt and transported to the opposite side of the Facco house (opposite to the eggs). This ensures that the risk of contact between the eggs and manure is minimal. The manure is collected at the rear end of the house and loaded onto trucks to be transported to Goldenlay’s crop farms.

Egg-packing

Eggs are transported into the egg-packing room on a single metal conveyor belt, which runs through all the laying houses. The eggs are then subjected to a manual inspection during which the cracked and deformed eggs are discarded. The eggs are then graded and separated according to sizes and then packed by an automated packing machine with a capacity of 20,000 trays per hour.

Feed processing

Feed from either one of two company-owned sites, as well as feed from external suppliers, arrives at the main site where it is stored into grain dams, before being milled by the onsite mills. The site has two mills: one mill is dedicated to processing maize and the second is dedicated to processing soy.

Feed storage

The processed feed is then bagged and stacked in the warehouses. The storage rooms are located within and adjacent to the mills on the main site. Future plans include the removal of these mills to one of the external farms. This will minimise the biosecurity risk as it will immediately reduce the flow of personnel onto the main site.

Feed mixing

Feed is mixed according to the demand and type of feed required for consumption. The chicks require different feed during the pre-laying growth phase and egg-laying phase. The onsite soya mill and the maize mill have a capacity of eight tonnes/hour each.

Manure storage and transportation

Manure produced from the chickens is moved to the 'dirty' end of the Facco houses and deposited on thrown concrete slabs outside the Facco houses. The manure is then conveyed up into a truck to be transported out to one of the crop farms owned by Goldenlay.

Main site workshops

The main site has a motor vehicle workshop, which includes a small pit and jacks. This workshop maintains the company tractors, trucks and vehicles, which are not being serviced by external dealers.

The main site also has a makeshift workshop and general storage area; this is a wooden building with corrugated-iron roofing. The workshop is not considered a permanent structure and management has committed to moving it to Kafubu farm during 2015.

Chemical/vaccination storage, usage and disposal

The main site holds the chemical and vaccination storage rooms. Management keeps a current stock of all required vaccinations and inoculations that may be required during the flocks' life. The store manager utilises a 'first-in-first-out' system to ensure that no stock is kept for prolonged periods of time. The disposal of waste bottles and medicine containers is removed from site in a biohazard container and disposed at a designated municipal waste dump.

Growing houses

Facco in Italy manufactured the two growing houses. The houses were transported and constructed on the main site and on the Forest Farm site. The houses can house approximately 55,300 chicks. There are four lines of back-to-back batteries in eight lines, which make up nine compartments, each with a maximum capacity of 16.



4. Surrounding community

Goldenlay is located in the Copperbelt province of Zambia. The main economic activities in the province revolve around the mining sector. The Copperbelt province is Zambia's greatest contributor to economic output as a result of its rich mineral deposits. The government has made it a priority to increase the contribution agriculture makes to the Zambian economy. Ndola 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 110,300 hectares with a population of about 374,757 (2010 Census).

Rural households practice subsistence farming in the 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 canola, cabbage and tomatoes.

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 leadership of the District Commissioner (DC), who coordinates all district developmental activities.

To discharge these functions, the District Administrator and the Town Clerk co-chair the District Development Coordinating Committee (DDCC), whose composition encompasses district government departments, the council, major companies in the district, community-based organisations (CBOs), non-governmental organisations (NGOs) and many other stakeholders. The local government system is composed of the elected councillors headed by the Mayor. These collectively constitute the council. The council is the highest policy making body in the district. It is composed of 25 councillors representing 25 wards, and four 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. The council discharges its functions through these committees. Six chief officers under

the leadership of the Town Clerk as the Chief Executive, with the labour force under them, support the council regarding the implementation of policies and resolutions.

The population of the Copperbelt province was 1,958,623 during the 2010 Census. Of this, 49.7% were males and 50.3% were females. The average annual population growth rate for the province was 2.2% in the 2000 – 2010 period.

District	Males (%)	Females (%)	Total (number)	Population share (%)	Population density (per km ²)
Chililabombwe	51	49	90,530	4.6	88.2
Chingola	50	50	210,073	10.7	125.2
Kalulushi	50	50	96,206	4.9	132.7
Kitwe	50	50	522,092	26.7	671.9
Luanshya	49	51	153,117	7.8	188.8
Lufwanyama	50	50	75,542	3.9	7.7
Masaiti	50	50	102,503	5.2	19.0
Mpongwe	50	50	91,765	4.7	11.0
Mufulira	50	50	161,601	8.3	98.7
Ndola	49	51	455,194	23.2	412.7
Copperbelt Province	50	50	1,958,623	100.0	62.5

Ndola represents 23.2% of the total provincial population of 1,958,623 in the Copperbelt province. The district population of 455,194 comprises 49% male and 51% female. Approximately 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 share this figure. Furthermore, Ndola Central Constituency has the largest population in the district with 112,129 and Chifubu Constituency 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.

The Baluba area predominantly has a low-income economy, with most inhabitants being local subsistence farmers and dependent on the mines and large commercial farms such as Battledore Farm for employment.

In terms of social services, the area has two primary schools, namely: Kasongo Primary at Kafubu farm and the Roma Community Primary School located near Battledore Farms.

The area has one clinic in a 10-kilometre radius: Fisenge Clinic located 3.5 kilometres off the Baluba-Luanshya Road. The area has no existing police station. Social services available include churches and community groups. Mobile networks, such as Airtel Premiere, MTN and Zamtel operate within the area and provide full coverage for telecommunications.

Market availability on various commodities

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

Literacy levels

The project area has only two primary schools offering basic education to children in the area. The schools offer up to seventh grade (12/13 years of age). 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 are able to speak English.

5. Veterinary inspections

Goldenlay has contracted an external specialist poultry veterinarian to conduct semi-annual inspections on the Goldenlay flocks. Dr Roger Horner is a member of the South African Veterinarian Association. In the case of blood testing, blood samples are transported back to South Africa and tested by Vet Diagnostics.

The flock at Goldenlay, like other poultry operations, are at risk of contracting many poultry diseases. The most common diseases that affect the Goldenlay flock are:

Avian Encephalomyelitis Virus

Avian Encephalomyelitis Virus (AEV), also known as epidemic tremor, is a Hepato virus that commonly infects chickens. AEV is of economic importance to chicken farmers because it causes a drop in egg production in laying hens, and neurological diseases in chicks less than three weeks old. Currently, no treatment is available, but chicks that survive infection are immune. Control is achieved by vaccination of the flock. The vaccine can be administered via inoculation of the wing web, by drinking water or eye drops, of which eyedropper administration is most effective.

Infectious Bronchitis

Infectious Bronchitis (IB) in chickens up to the age of four weeks. IB manifests with severe respiratory signs (sneezing, coughing, and rales). Rhinitis and conjunctivitis, depression and crowding around heat sources can be observed. The mortality in young chickens is usually insignificant in such cases. There is a moderate to severe inflammatory cell infiltration of upper respiratory tract mucosa, resulting in thickened and more compact mucosa. In layer hens infected with the IB virus, oophorites and dystrophic necrobiotic lesions affecting primarily the middle and the last thirds of the oviduct's mucous coat are observed. The consequences are a drop in egg production, appearance and increase in the number of deformed and pigmentless eggs or eggs with soft shells and watery egg white.

Mycoplasma Gallisepticum

Mycoplasma Gallisepticum (MG) infection, a common disease of poultry, is commonly designated as chronic respiratory disease of chickens. Despite success in eliminating the disease in grandparent (GP) stock and turkeys, it persists in layer, broiler breeders and broilers in many areas. MG is a respiratory disease, affecting the entire respiratory tract, particularly the air sacs, where it is localised. It is mainly characterised by respiratory rales (crackles), coughing and nasal discharge.

MG is controlled by medication or vaccination, which is the most effective method of combating the disease. Use of bacterin vaccines produces a reduction of airsacculitis in broilers, higher egg production, a greater percentage of eggs graded large and over, a smaller percentage of undergrades, a better feed conversion in layers and protection against transmission of MG through the eggs in breeding stock.

Mycoplasma Synoviae

Mycoplasma Synoviae may be seen in chickens in association with synovitis and/or airsacculitis. It occurs in most poultry-producing countries, especially in commercial layer flocks. Infection rates may be very high. Spread is generally rapid within and between houses on a farm, while illness is variable and mortality less than 10%. Infection occurs via the conjunctiva or upper respiratory tract with a long incubation period of 11 – 21 days following contact exposure.

Eradication of this infection is also possible using similar techniques as described for Mycoplasma Gallisepticum. In some circumstances preventative medication of known infected flocks may be

beneficial. Vaccines are not widely used, though they are available in some countries. Infected birds do develop some immunity to the effects of repeated inoculation.

Below are extracts of the Veterinary Inspection Reports:

2012	
Rearing	<p>Eight-week-old pullets are performing well and are growing at predicted rates, with body weight reaching acceptable standards. Post-mortem examination on a random sample of pullets show:</p> <ul style="list-style-type: none"> • no respiratory tract lesions; • fair to moderate bursal condition; • normal livers, spleens; and • leg bone strength.
Laying	<p>During mid-2012 a viral disease problem that resulted in a small drop in egg production, some changes to the quality of eggs and a small mortality number have been attributed to an ND challenge. The virus was probably brought onto the farm by the return of crates from the processing plant that was used during a depopulation exercise when culling hens from Facco 4.</p> <p>A vaccination programme was employed, together with checks on birds' positive response to vaccine to ensure maximum levels of flock protection.</p> <p>At the time the biosecurity showers had not been completed and management has committed to making this a priority to be finished.</p> <p>Flocks continue to test MG negative, which is an excellent achievement.</p>
February 2013	
Rearing	<p>Random samples of pullets in Grower 1 at seven weeks of age were performing well, being on target for body weight.</p> <p>Smaller pullets are removed early and placed on the old farm where the lower stocking density allows them to put on weight faster and catch up reasonably well.</p> <p>Post mortem examination showed no respiratory tract lesions, good bursal condition and normal livers, spleens and leg bone strength. This relocation has resulted in an increase in mortality to 4% at three weeks of age. The mortality rate was notably higher within the first week of relocation. The mortality rate has been negligible four weeks following the relocation.</p> <p>Grower 2 pullets were being transferred at 17 weeks of age. This flock was on targeted body weight for its respective age.</p>
Laying	<p>Post-mortem examinations of layers showed no signs of respiratory tract problems or internal/external parasites. The majority of mortality cases were related to prolapse, egg peritonitis and trauma.</p>
September 2013	
Rearing	<p>Pullets in Grower 2 were at 52 days of age. Mortality had increased from about 2% to 4% during the seventh week. The bulk of these mortalities were from Infectious Bursal Disease (also known as Gumboro), with the balance being runts and head trauma lesions.</p> <p>Examined birds showed Gumboro and other lesions typical of virulent IBD. Thus, in the face of virulent challenge as a result, about 2% mortality from IBD. It is suspected that this issue was due to "missed birds" (i.e. birds which did not receive vaccine at all at day-old age or were only partially vaccinated chicks). Whatever the system of vaccine application (via injection or via water) there is always the potential for some birds to not receive vaccine.</p> <p>Management has drawn up a contingency plan to add a live IBD vaccine via water at about 21 to 23 days of age.</p> <p>Plumex, the day-old chick supplier, has been informed of the IBD problem. This has resulted</p>

	in a 2% loss of chicks.
Laying	Post-mortem examinations of layers showed no signs of respiratory tract problems or internal/external parasites. Most cases were related to prolapse, egg peritonitis and head/neck or electric shock trauma.

6. Biosecurity

Rearing shed

Forest Farm is a well-security-fenced separated area with a single entrance about one kilometre from the existing original farm (main site). Natural vegetation provides a buffer zone within this fenced area, which surrounds the independently fenced rearing house with associated shower-in facility and second separate entry point. This allows the production of healthy pullets as long as biosecurity principles are strictly carried out at all times. The single entry point to the site has an improved vehicular spray disinfection (entire wheel perimeter) that provides sufficient spray for the undercarriage of any vehicle entering onto the premises. Goldenlay staffs visiting this site do not do so within 24 hours of contact with other parts of the production units, Facco or old houses or Grower 1.

Laying houses

Facco houses are cleaned regularly and remain neat and tidy with good internal environmental conditions. Energy-saving globes have been installed in all houses. Cages in houses have access to two (shared) drinker nipples for 18 birds per cage.

The construction of the controlled entry point and shower block for entry to the Facco production site is part of the overall improvement plan. This, together with colour coding site staff clothing, contributes to an improved biosecurity protocol for the section. Entry control and mandatory showering prior to entry applies not only to daily staff but all persons including maintenance/construction personnel and visitors.

7. Manure management

Goldenlay produces 15,600 tonnes of chicken manure annually from their Facco houses. Goldenlay's management has incorporated manure disposal into their crop farm fertiliser programmes. All manure produced from the chicken houses is transported to the nearby farms to be used as organic fertiliser. The laying houses are equipped with plastic conveyor belts, which collect the manure below the cages of the birds. The conveyor belt is operated every second day and moves the manure to the back of the house where it is dumped onto a concrete slab. Every second day, the manure is elevated onto a truck by a moveable conveyor belt, and transported to one of two crop farms.

During the rainy season and when manure application is not required the manure is stored under tarpaulins at the end of the crop fields. Formal storage areas need to be constructed to ensure that there is no spread of contamination from dissolving manure.

8. Legal framework

The Environmental Management Act (EMA) No.12 of 2011

The Act is the cornerstone of environmental management in Zambia. The purpose of this Act is to continue the existence of the Environmental Council and re-name it the Zambia Environmental Management Agency (ZEMA); provide for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources; provide for the preparation of the state of the environment report, environmental strategies and other plans for environmental management and sustainable development; provide for the prevention and control of pollution and environmental degradation. Having replaced the EPPCA of 1990, the EMA of 2011 is a principal law on all matters relating to environmental protection and pollution control in the

country.

The Zambia Environmental Management Agency was established under this Act to enforce the provisions of the Act and the subsidiary Statutory Instruments (SI) so as to provide for the health and welfare of persons, animals, plants and the environment in general. As provided for under the Act, specific regulations, standards and guidelines are also formulated as SI and enforced by ZEMA. The sections of the EMA below are relevant to this report:

Statutory Instrument No 141 of 1996 – Air Pollution Control (Licensing and Emission Standards)

The regulations provide for licensing of gaseous waste to the environment and also provides for statutory discharge limits for respective parameters.

The regulations are relevant to Goldenlay in that the dust emissions (respirable dust) from the identified potential areas of concern (PACs) are a high risk and have potential to contribute to the ambient air pollution of the surrounding areas. These include:

- the feed mill;
- the hover area;
- hammer mill working area; and
- the loading bay.

The Environmental Management Act (EMA 2011), Cap 204, on Noise Abatement

The Regulation prohibits unauthorised generation of noise pollution into the environment.

The Regulations are relevant to Goldenlay in that noise generation from the hover area, hammer mill area, loading bay, lime flour storage room and the incinerator at the site poses a high risk and as such has potential to pollute the environment.

The Water Act, Cap 198 of the Laws of Zambia

The Act regulates the management of water resources in the country. It also establishes the pollution of public water as an offence.

Goldenlay utilises fresh water resources and generates effluent with potential to pollute ground and surface water resources.

The Water Pollution Control (Effluent and Waste Water) Regulations, 1993

The Regulations prohibit unauthorised discharge of pollutants into the aquatic environment.

Relevance: Goldenlay discharges effluent from the main site. The discharge from any company must meet the Public Sewer Standards. In this regard, these regulations are still relevant to the operations at Goldenlay, concerning effluent discharge.

9. Air emissions

Incinerator

Goldenlay has an onsite incinerator manufactured by Volkan in the UK. The incinerator is a top-loading, single chamber incinerator with a total load capacity of 150kg. The incinerator is fuelled by diesel and a 230volt electricity supply. The incinerator is fitted with a 10 x 0.79 meter stack.

Due to the nature of emissions produced by incinerators, an external consultant is required to measure the stack emissions. The sampling is conducted semi-annually by inserting a gas analyser through

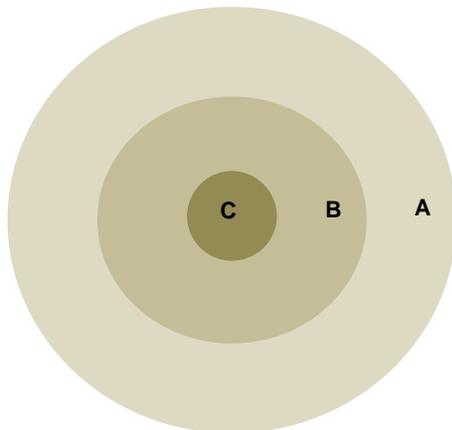
the port of the incinerator stack while the incinerator is functional and fully fired. The gas emissions from the incinerator are sampled in order to ascertain the concentrations of:

- CO (Carbon Monoxide);
- SO₂ (Sulphur Dioxide);
- NO_x (Nitrous Oxide);
- CO₂ (Carbon Dioxide);
- Pb (Lead); and
- Volumetric dust flow.



^ Illustrating the process conducted by the external consultant, Hilma Consultants.

The gas analyser probe is first inserted fully into the stack to collect samples around the middle of the stack. After 30 minutes, the results are taken and recorded. Samples are then taken at the periphery of the stack, halfway into the centre and at the centre of the stack duct.



The sampling probe is inserted at points A, B and C and the gas emissions recorded in ppm. The results are superimposed on the respective sampling points and the flow rate is consequently calculated and translated into daily, monthly, and finally, annual discharge.

Area of A = 0.18m²
Area of B = 0.20m²

At the time of sampling the incinerator was functional. The following table shows the results of the sampling for the incinerator when the probe was fully and half inserted at each sampling. Results of gases emitted from the incinerator stack when probed.

Parameter	Full insertion	Half insertion	Average	Flow rate	ZEMA*	Remark
CO	1,520ppm	331ppm	925.5ppm	1.35ppm/m ² /sec	100ppm	Above limit
CO ²	7.2%	5.3%	6.25%	0.009% ppm/m ² /sec	0.75%	Above limit
SO ²	79ppm	69ppm	74ppm	0.11 ppm/m ² /sec	20ppm	Above limit
NOx	57ppm	123ppm	90ppm	0.13 ppm/m ² /sec	10ppm	Above limit
Pb	Nil	Nil	Nil	Nil	0.017µg/m ³	Acceptable
Nett	560.30 °C	510.70 °C	535.50 °C			
Flue	600.20 °C	557.50 °C	578.90 °C			
Ambient Temperature	39.90 °C	46.80 °C	43.40 °C			Key ppm – part per million ppm/m ² /sec – part per million per square meter per second µg/m ³ – micro per cubic meter
Incinerator efficiency	55.7%	57.1%	56.4%			

Source of data: Data collected at Goldenlay

Results of volumetric dust particulate emissions from the incinerator work area while the incinerator was running are displayed below.

Parameter	Results	Flow rate	ZEMA	Remark
Dust particulate emissions	115.7µg/m ³ /hr.	0.06 µg/m ³ /hr.	150 µg/m ³ /hr.	Acceptable
Net temperature	535.50°C	-	N/A	Acceptable
Flue temperature	578.90°C	-	N/A	Acceptable
Ambient temperature	43.40°C	-	N/A	Acceptable

10. Dust

Due to the nature of Goldenlay's operations and the company's intention to be as self sufficient as possible, Goldenlay has built and operates mills to process soya and grain for their chickens. The equipment used for milling produces dust and has an impact on the surrounding area and staff within the mill. As part of an ongoing monitoring programme, Hilma conducted an audit on the dust concentrations within the mill.



^ The area sampler placed at the mixer/packaging area and loading area.

Measurements were made using a personal area sampler, which was placed at a height of 1.2 metres above ground at different locations within the feed mill. The filter was weighed to take the initial weight, after which the filter was placed on the cyclone filter assembly, connected to a pump and was operated at a calibrated constant rate. 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 in the filter is then extrapolated to 24 hours in order to make comparisons with the national standards.

Results of respirable dust collected at various locations:

Potential area of concern	Duration of sampling (minutes)	Difference in weight of filters (µg)
Mixer/packaging area	75	4.94
Hammer mill working area	60	2.81
Loading area	95	3.56

Respirable dust concentration:

Potential area of concern	Respirable dust total concentration (µg/m ³ /day)	Maximum Acceptable Concentration (MAC) (µg/m ³ /day)	Reference time (hours)	Remark
Mixer/packaging area	94.8	70	24	Above limit
Hammer mill working area	67.4	70	24	Acceptable
Loading area	53.96	70	24	Acceptable

Sampling time for the three areas of concern are recorded below:

Sampling area	Starting time (hours)	Finishing time (hours)	Total sampling time (minutes)
Mixer/packaging area	11:30	12:45	75
Hammer mill working area	12:50	13:50	60
Loading area	14:00	15:35	95

11. Noise

The mills and the incinerator generate noise during their operations. As a result, external consultants audited the level of noise to ascertain a baseline. The process for auditing the level of noise is described below, with the consultants' findings.

A sound-level meter was placed at a sampling position of 1.5 metres from the ground. Five sampling points were strategically selected for the exercise. Sampling was conducted in the following areas:

- hover;
- hammer mill;
- loading bay;
- lime flour storage room; and
- incinerator area.



^ Taking noise sampling around the hammer mill area as well as in the incinerator.

The noise levels produced at the incinerator were within the required noise limit guidelines of the IFC/World Bank, which falls under industrial/commercial area limit of 70dB(A). Noise level results obtained from five different sites are shown below:

Potential area of concern	Duration of sampling (minutes)	Maximum noise levels in decibels dB(A)	Minimum noise levels in decibels dB(A)	IFC/World Bank (Industrial/Commercial) Acceptable noise levels dB(A)	Remark
Hover area	10	80.8	80.2	70	Above limit
Hammer mill area	10	90.2	89.4	70	Above limit
Loading bay	10	78.1	77.3	70	Above Limit
Lime flour storage room	10	73.5	72.3	70	Above Limit
Incinerator	10	66.6	62.3	70	Acceptable

Noise levels measured at the hover area, hammer mill area, loading area and lime flour storage area were above the noise limit guidelines of the IFC/World Bank which falls under industrial/commercial area limit of 70dB(A). According to the noise guidelines limit of the IFC/World Bank, Goldenlay falls within the industrial category, which shows the maximum allowable leq (hourly) dBA is 70dB(A). The table below shows the limit guideline.

Category	Maximum allowable (hourly) in dBA	Maximum allowable (hourly) in dBA
	Day time(07:00hrs – 22:00hrs)	Night time (22:00hrs – 07:00hrs)
Residential: institutional and educational	55	45
Noise level at staff housing compound	49	43

12. Mill

Goldenlay has built two mills and accompanying storage areas. The grain and soya mills are both eight tonnes/hour mills with a capacity of 70 tonnes processed each day. Goldenlay receives the raw material from their crop farms as well as external suppliers in bulk. The feed is delivered to the main site and stored in either one of several grain dams or into the mill pit. Grain is conveyed into the grain mill from the pit where it is milled and bagged into 50kg bags and stored. Raw soya is delivered in bulk and placed in 50kg bags where it is stored before processing. After processing it is rebagged and stored. Goldenlay has the ability to mix feed in accordance to the needs of the flocks. Milling quality is checked during every milling session to ensure the fat content is correct; soya is rich in Omega-6, which is required for good quality eggs.

The current mills on the site have reached capacity in size and scale and are forming a bottleneck within the processing chain. Further to this the mill poses a material risk to the biosecurity of the flocks, raising the possibility of diseases being carried onto the farm and infecting the flocks. Management has evaluated possible expansion plans and solutions to this problem. Management has concluded that the best solution would be to remove the mills and storage facilities from the current site and relocate them to one of the crop farms, in particular Kafubu farm has been identified as the best location. Located 11km away from the current site, the cost of transporting feed to the main site is minimal, however, far enough away to ensure that no biosecurity risk is present.

13. Water resources

Water supply

The region that Goldenlay is located in is a water abundant area. The main site lies in the Kafubu river catchment area that extends into the DRC, measuring 539km². The average rainfall in the region is approximately 45,815ML/yr. The Kafubu dam located 10.5km away from the site is a major source of

water for the city of Ndola. However, due to the lack of infrastructure, Goldenlay obtains its water from the underground aquifer. The ground water is extracted out of a secondary feature such as a weathered zone, joints, fractures, fault or solution feature within consolidated hard rock. Weathered zones usually form shallow aquifers, which are less than 30 meters below the surface. The aquifers located in the Copperbelt region are generally divided into two main categories:

- *Highly productive aquifers:* the upper Ruan dolomite and Kundelungu limestone are included into this category. These are very productive and well distributed throughout the Copperbelt region.
- *Locally productive aquifers:* Lower Roan Quartzite, Muva sediments, granites and undifferentiated Kungelungu formations are included in this category. Located locally between larger aquifers.

It is understood that a large transverse fissure system with limestone is present according to drilling reports about the aquifer in the area. The recharge rate of the aquifer is strong and regulated by both direct infiltration from barerock and shallow soils, and by horizontal recharge where the land is covered by dense vegetation. Due to the reasonably uniform rainfall over long periods of time, the aquifer has sufficient recharge throughout the year. Variations in the water table are slight and are caused by the spatial variability in rainfall. However, these variations are not considered material.

Goldenlay requires water for various operational activities throughout the site. Due to the rural location of the facility, water is provided through a series of boreholes and tanks located at different points on the main site. Water from the site boreholes supplies the compound with water for both human and chicken consumption. Water is extracted from the underground aquifer and tested. The quality of water is tested in order to ensure that it is safe for the birds and staff members to consume. As part of Goldenlay's environmental monitoring programme, the water is tested twice a year by external consultants in addition to internal monitoring.

The external consultant extracts samples from four different points on the site:

- well 2;
- a borehole close to the egg room;
- a water storage tank; and
- a borehole located close to Facco 7.

ZEMA has adopted the World Health Organisation's (WHO) standards for potable water, which are also endorsed by the IFC. Wastewater from the Facco houses is measured against the IFC sector supplement guidelines as well as Zambian public sewage. The most recent laboratory results from the external consultants audit are shown below;



Red tank water testing



Egg room borehole water testing



Well 2 water supply point

Analytical results for the various water testing points on the farm site:

Parameter	Well 2	Egg room (borehole)	Red tank (sample)	Facco 7 (borehole)	ZEMA Guidelines (maximum permissible value for drinking water)
pH	6.68	7.0	6.99	6.91	6.5 – 8.5
Turbidity (NTU)	1.43	1.57	5.50	4.30	5.0
TSS (mg/l)	<1.0	<1.0	1.8	1.1	100
Conductivity (mMhos/cm)	362	246	145	150	1500
Settleable matter (mg/l)	<1.0	<1.0	<1.0	<1.0	-
Colour (hazen)	8.8	9.4	9.8	8.6	15
Hydrocarbons (mg/l)	<0.005	<0.005	<0.005	<0.005	500
Iron (mg/l)	0.12	<0.01	0.03	1.42	0.30
Total coliforms (#/100ml)	0	0	0	0	0

The quality of the water extracted from the underground aquifer is good enough to drink. The results from the water storage tank (Red Tank) sample show that Turbidity was above the ZEMA standards by 0.50 this is possibly due to sediment collection from the water settling in the tank.

Facco 7 borehole sample showed that the iron measurement was above the required ZEMA standard. The other parameters were within the required standards.

Wastewater

Goldenlay generates wastewater from three main sources; the washing of chicken houses, rain water run-off and human sewage. The wastewater generated by the Facco houses requires monitoring in order to ascertain if Goldenlay is compliant with ZEMA and WHO regulations. Effluent from the Facco houses may contain high levels of ammonia, biological oxygen-demanding enzymes as well as high chemical oxygen-demanding elements that would pollute the surrounding area. Wastewater from cleaning the chicken house is collected in storm water drains that surround the houses and is channelled into a French drain and settlement tanks. The sediment that collects in the drains is removed monthly, or more frequently if the level of activity and wastewater warrants this. Goldenlay carries out the sediment removal internally as the sediment is added to the chicken manure that is transported to the crop fields for fertiliser. The wastewater treatment tanks have five separate containment areas, which induce aeration and settlement. Once the water has passed through the final tank the water is allowed to seep into the ground.

All toilets on the site as well as the biosecurity showers are connected to a septic tank that treats the human sewage and wastewater prior to being discharged into the ground. The rain run-off is diverted by raised mounds and concrete channels landscaped into the site’s grounds. The rain run-off is dispersed through several different channels before leaving the property and draining into the nearby stream, approximately 750 meters from the boundary fence.

During water and effluent testing, samples collected from the various points on the farm site are placed into UN certified sample bottles and immediately packed into a cooler box between ice packs to maintain ‘freshness’ during transportation to the laboratory for analysis. All samples are analysed within four days of obtaining the samples.

Effluent samples collected at the effluent treatment tanks show that the total dissolved substances (TDS), conductivity and total coliforms parameters were above the ZEMA standards and public sewer standards. COD and BOD parameters did not meet the ZEMA standards for drinking water, however, the effluent water is mainly compliant with the Zambian public sewage standard. The effluent water is sufficiently sealed off to prevent the public from accessing the water. Goldenlay treats the discharged water as sewage and is discharged into the ground.

Effluent Analytical Results for sample collected at effluent treatment tanks

Parameters	Units	Results	ZEMA guidelines (maximum permissible value for drinking)	Public sewer standard
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		water)		
Nitrates	Nmg/1	2.94	50	–
pH		7.43	6 – 9	6 – 10
TSS	mg/l	392	100	1,200
TBS	mg/l	3890	3,000	3,000
COD	mgO ₂ /l	280	90	1,800
BOD	mgO ₂ /l	122	50	1,200
Conductivity	µS/cm	7750	4,300	6,000
Chlorides	mg/l	136	800	1,000
Total coliforms	#/100ml	17700	0	-

14. Human resources

Goldenlay has 288 employees that work on all three sites with 216 employees working on the main site. Employees are from the local area and speak a variety of languages. New employees are briefed on the disciplinary code and the expected performance indicators of their job. The new Human Resources officer, Ms Caroline Tembo, took up her position in January 2014. Caroline has signed a four-year contract and will continue to address all HR issues on all of Goldenlay's operations.

The SHE (Safety, Health and Environmental) Manager, Richard Sikezwe, is charged with implementing the Environmental Management Plan (EMP), departmental inspections and environmental compliance. Richard started at Goldenlay in August 2013, after the previous manager, Chikumbi Kasando, accepted a job at an environmental consultancy. Goldenlay has implemented changes to the occupational health and safety practices including:

- occupational exposure monitoring is performed on behalf of the company by external consultants, Hilma;
- monitoring for dust and noise levels, ventilation, heat stress, illumination, ergonomics, etc. The new monitoring regime has provided management with a greater understanding of potentially high risk factors located around the main site;
- medical test on employees have commenced including blood pressure, lung function, hearing, blood glucose, among others;
- tests for malaria are not considered relevant for local staff members;
- tuberculosis and HIV testing is conducted as part of awareness drive; and
- a first aid box is on site for minor medical emergencies i.e. cuts, bruises, etc.. For other medical emergencies, the patient is taken to Luanshya Clinic.

HIV

Goldenlay has developed an HIV policy for the company. A KAP (Knowledge, Attitude and Practices) survey was conducted by Afya Mzuri, an NGO operating in HIV-related services in April 2011 and aimed to acquire baseline data in the community as well as Goldenlay staff. The sample size of people interviewed was greater than 10% of the reported total population of 3,000. 318 interviews were successfully conducted, and a total of 131 blood samples were taken from Goldenlay employees. A peer educator system has also been designed and implemented. That staffs requiring ARVs are directed to Roan Hospital and Luanshya District, as are those requiring treatment for TB.

The results indicate that out of a total of 131 samples collected during the exercise, 24 samples showed a positive or reactive result, and 107 samples showed a negative or non-reactive result. This represents 18.3% HIV prevalence in relation to the total workforce that participated in the exercise.

Variables	Totals
Number of Goldenlay employees as at 30 September 2010	140 (100%)
Numbers of Goldenlay employees that attended prevalence sensitisation	119 (85%)
Number of samples collected during the exercise	131 (93%)
Number of non-reactive samples	107 (81.7%)
Number of reactive samples	24 (18.3%)

Voluntary counselling and testing (VCT):

VCT was provided in collaboration with the Society for Family Health (SFH) New Start and made available to employees, contractors and spouses interested in knowing their HIV status. Results from the New Start programme showed that of the 88 people tested: 15 tested positive (two women) and 73 negative. These results are separate from the Goldenlay prevalence survey and have no bearing on Goldenlay's total prevalence. This is because the VCT service was free and accessible to all (employees, contractors, spouses and customers, etc.), unlike the workplace prevalence survey that was exclusively for Goldenlay employees.

Survey results

The results of the survey indicate that Goldenlay has an HIV prevalence rate of 18.3%, which is higher than the provincial prevalence (17%), and much higher than the national prevalence (14.3%). These results underscore the urgency for the company, through its management, to put in place an effective HIV prevention programme, which also supports employees and their families to manage the effects of HIV. There is a need to design programmes that address behavioural change to prevent further spread of infection and to ensure that employees remain productive.

15. Occupational health and safety

Due to the nature of Goldenlay's operations an occupational health and safety (OHS) policy statement was created. Within this policy statement the following aspects are covered:

- the health and safety risks arising from work activities;
- to consult with their employees on matters affecting their health and safety;
- to provide and maintain safe plant and equipment;
- to ensure safe handling and use of substances;
- to provide information, instruction and supervision for employees;
- to ensure all employees are competent to do their tasks, and to give them adequate training;
- to prevent accidents and cases of work-related injuries;
- to maintain safe and healthy working conditions; and
- to review and revise this policy as necessary at regular intervals.

Responsibilities

The overall responsibility of OHS implementation is described below:

- Overall and final responsibility for health and safety is that of the Environmental, Social and Governance Officer (ESG)
- Day-to-day responsibility for ensuring this policy is put into practice is delegated to ESG, General Manager Operations (GMO), General Manager Production (GMP) and Operations Manager (OP)

To ensure health and safety standards are maintained, the following schedule of delegated authority is outlined below:

Name	Tasks
ESG	Risk assessments
GMO, GMP, PM and OP	Maintaining equipment
ESG, Heads of Department	Information, instruction and supervision
GMO, GMP	Training
ESG and Stores Manager	Accidents, first aid and work-related injuries
ESG	Monitoring, accident and ill health investigation
ESG, Head of Department	Emergency response procedures, fire evacuation protocols

All employees

The policy also states the employees' responsibilities:

- co-operate with supervisors and managers on health and safety matters;
- to not interfere with anything provided to safeguard their health and safety;
- take reasonable care of their own health and safety; and
- report all health and safety concerns to an appropriate person (as detailed in this policy statement). Since the employee on the job is frequently more aware of unsafe conditions than anyone else, employees are encouraged to make recommendations, suggestions, and criticisms of unsafe conditions to their immediate supervisor so that they may be corrected.

All supervisors:

- are responsible for the working conditions within their department and the plant generally;
- should remain alert at all times to dangerous and unsafe conditions, so that he/she may recommend corrective action, discipline employees who habitually create or enact unsafe practices, assess new or changed situations for inherent dangers, and follow up on employee suggestions for corrective action so that unsafe conditions are not instituted or permitted to exist.

Health and safety risks arising from work activities:

- Risk assessments will be undertaken by ESG.
- The findings of the risk assessments will be reported to the GMO, GMP, PM and OP.
- Action required to remove/control risks will be approved by the Managing Director and Operations Director. They will also be responsible for ensuring the action required is implemented.
- The ESG will check that the implemented actions have removed/reduced the risks.
- Assessments will be reviewed every 12 months or when the work activity changes, whichever is soonest.

Consultation with employees:

- employee representatives;
- respective supervisors; and
- consultation with employees is provided by all Heads of Department (HoDs).

Safe plant and equipment

- GMO, GMP, PM and OP will be responsible for identifying all equipment/plant needing maintenance.
- GMO, GMP, PM and OP will be responsible for ensuring effective maintenance procedures are drawn up.
- Any problems found with plant/equipment should be reported to OP and ESG.
- GMO, GMP, PM and OP will check that new plant and equipment meets health and safety standards before it is purchase.
- Health and safety advice is available from respective HoDs, ESG.
- Supervision of workers/trainees will be arranged/undertaken/monitored by ESG.
- ESG is responsible for ensuring that all employees working at locations under the control of other employers are given relevant health and safety information.
- Respective HODs and ESG manager will provide induction training for all employees.
- Respective HoDs will provide Job specific training.
- Training records are kept at/by ESG.
- Training will be identified, arranged and monitored by ESG.

Accidents, first aid and work-related ill health

- Health surveillance is required for employees doing the following jobs:
 - food handlers
 - egg room attendants
 - other employees
- Health surveillance will be arranged by ESG.
- Health surveillance records will be kept by/at ESG's office.
- The first aid box(es) is/are kept at general stores.
- All accidents and cases of work-related ill health are to be recorded in the accident book. The book is kept by/at ESG's office.
- All employees are responsible for reporting accidents, diseases and dangerous occurrences to the ESG or GMO, GMP, PM and OP.

Monitoring

- ESG with respective HoD and supervisor will be responsible for investigating accidents.
- ESG is responsible for investigating work-related causes of sickness absences.
- ESG is responsible for acting on investigation findings to prevent a recurrence.

Emergency procedures – fire and evacuation

- OP is responsible for ensuring the fire risk assessment is undertaken and implemented.
- OP checks escape routes every week.
- Fire extinguishers are maintained and checked by:
 - OP every month; and
 - Amerex every six months.
- Emergency evacuation will be tested every year.

16. Worker housing

Goldenlay provides some of its workers with staff accommodation. The accommodation is located approximately 250m outside the security fence, with a personnel gate granting workers access. The staff housing comprises two clusters of houses.

The 'old houses': these stand-alone houses were built under the previous management and consist of three general/non-specific purpose rooms and an outdoor pit latrine (in some cases more than one house will have access to the same toilet). An outdoor tap provides access to running water. Electrification has only recently been introduced under the current management. Current management has committed to ensuring that the houses are maintained in their current state. The houses are not fenced but are clustered together and are under supervision by Goldenlay's security guards. Currently 38 households a total of 137 people live in these old houses.

Currently, management is building 'new houses'; these houses are built in a semi-detached manner with three houses in a block and consist of a dedicated kitchen, living room and two bedrooms with one family bathroom. Water and sanitation is built into the houses with the toilets being connected to a septic tank. The housing blocks are fenced and are connected to an electricity supply. Currently 10 households a total of 38 people live in these old houses.

The current plan is to build one to two housing blocks each year. Management has recognised that no formal budgeting has taken place and no set timeline is agreed.

For the purpose of this baseline audit the European Bank for Reconstruction and Development Worker's Accommodation standards have been applied, as this forms a measurable, understandable and comparable international standard to audit the staff accommodation against. During this assessment an aggregate of the old houses and the new houses were considered.

General regulatory framework		
Have the international/national/local regulatory frameworks been reviewed?	No	Not critical Not prioritised
Are mandatory provisions on workers' accommodation identified?	No	Not critical Not prioritised
Assessing the need for workers' accommodation		
Availability of the workforce		
Has there been an assessment of workers' availability in the neighbouring communities?	Informal review has taken place. Locally based workers have communicated what type of accommodation is available in the surrounding areas.	Not critical Not prioritised
Has there been an assessment of the skills and competencies of the local workforce and how do those skills and competencies fit the project's need?	No. This is not required due to the nature of employment being based in basic manual labour. New employees undertake an induction process in the particular skill they are required to fulfil. Vacancies requiring skilled workers are advertised in appropriate mediums to obtain a diverse sample of possible recruits.	N/A
Has there been an assessment of the possibility of training a local workforce in order to fulfil the project's needs?	No assessment is required.	N/A
Availability of housing		
Has there been a comprehensive assessment of the different types of housing available in the surrounding communities prior to building any workers' accommodation?	No formal assessment was carried out. Local market houses are known by the business and local employees.	Not critical Not prioritised
For a larger project: is that assessment included in the Environmental and Social Impact Assessment?	N/A	N/A
Has there been an assessment of the impact on the communities of using existing housing opportunities?	N/A	N/A
Have measures to mitigate adverse impacts on the local housing market been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan?	N/A	N/A
Assessing impacts of workers' accommodation on communities		
Has a community impact assessment been carried out as part of the Environmental and Social Assessment of the overall project with a view to mitigate the negative impacts of the workers' accommodation on the surrounding communities and to enhance the positive ones?	No ESIA was carried out as this was not required by Phatisa standards for the nature and scale of this business. It is also not required by government regulations to conduct an ESIA on the company.	N/A
Have the potential health and safety impacts and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers' accommodation been included in the assessment?	N/A, no land is being acquired for the main site. Construction is limited to the main site only.	N/A
Have the impacts of workers' accommodation on community infrastructures, services and facilities been included in the assessment?	N/A, workers accommodation services the needs of the company and the number of houses built by Goldenlay would have no material effect on the community.	N/A
Have the impacts on local community's businesses and local employment been included in the assessment?	N/A, no assessment has been carried out.	N/A
Have general impacts of workers' accommodation on communities' health, (notably the increased risk of road accidents and of communicable diseases), and community social cohesion been included in the assessment?	N/A, no assessment has been carried out.	N/A
Does the assessment include appropriate mitigation measures to address any adverse impacts identified?	N/A, no assessment has been carried out.	N/A
Types of workers' accommodation		
Has consideration been given to provision of family accommodation?	Yes, workers who reside in the houses are entitled to bring immediate family to reside.	Compliant
Do individual accommodations comprise bedrooms, sanitary and cooking facilities provided as part of the family accommodation?	Houses built by the previous management have three rooms: Bedroom, kitchen and sitting room. With outside latrines.	Compliant

	Houses built and proposed to be built under the current management have one/two bedrooms, kitchen, sitting room and bathroom.	
Are adequate nursery/school facilities provided?	Schooling is provided for by the Zambian government, three schools are located in the area	N/A
Is special attention paid to providing adequate safety for children?	No, N/A	N/A
Standards for workers' accommodation		
National/local standards		
Have the relevant national/local regulations been identified and implemented?	Yes	Compliant
General living facilities		
Is the location of the facilities designed to avoid flooding or other natural hazards? Are the living facilities located within a reasonable distance from the work site?	The houses are located 250 meters from a small stream (a feeder stream). The land is secured and adjacent to the work site.	Compliant
Is transport provided to worksite safe and free?	NA, housing is adjacent to the work site.	N/A
Are the living facilities built using adequate materials, kept in good repair and kept clean and free from rubbish and other refuse?	Yes, the materials used are standard concrete blocks and cement. Roofing is corrugated iron sheets. Windows are standard aluminium frames and glass.	Compliant
Drainage		
Is the site adequately drained?	The natural slope of the land provides natural drainage.	Compliant
Heating, air conditioning, ventilation and light		
Depending on climate, are living facilities provided with adequate heating, ventilation, air conditioning and light systems including emergency lighting?	Houses built by the previous management have minimal windows. Current management has electrified the houses and provide greater access to water. New houses built by current management are well ventilated, have running water, electricity and sewage.	Priority Partial compliance
Water		
Do workers have easy access to a supply of clean/potable water in adequate quantities?	Yes.	Compliant
Does the quality of the water comply with national/local requirements or WHO standards?	Yes, the water is connected company water supply, which is borehole water. The Goldenlay monitoring system evaluates the quality of water on semi-annual basis.	Compliant
Are tanks used for the storage of drinking water constructed and covered to prevent water stored therein from becoming polluted or contaminated?	Yes	Compliant
Is the quality of the drinking water regularly monitored?	Yes. Every six months.	Compliant
Wastewater and solid waste		
Are wastewater, sewage, food and any other waste materials adequately discharged in compliance with local or World Bank standards and without causing any significant impacts on camp residents, the environment or surrounding communities?	Houses built by the previous management have pit latrines adjacent to the houses. Houses built by current management are connected to septic tanks.	Priority Partial compliance
Are specific containers for rubbish collection provided and emptied on a regular basis?	No	Priority Not compliant
Are pest extermination, vector control and disinfection undertaken throughout the living facilities?	Yes, pest control practices are implemented by ESG manager on site, rodent traps are placed around the compound.	Compliant
Rooms/dormitories facilities		
Are the rooms/dormitories kept in good condition?	Yes, the buildings are maintained by Goldenlay management.	Compliant
Are the rooms/dormitories aired and cleaned at regular intervals?	Yes, each room in the houses have either working windows or doors.	Compliant
Are the rooms/dormitories built with easily cleanable flooring material?	Yes, the buildings are made from concrete and structure. The walls are plastered and are easily cleanable.	Compliant
Are the rooms/dormitories and sanitary facilities located in the same buildings?	Yes/No. The sanitary facilities are located within the buildings of the 'new houses'.	Compliant

	However, pit latrines are located outside of the houses in the 'old houses'	
Are residents provided with enough space?	Yes, each room is 7x4 m.	Compliant
Is the ceiling height high enough?	Yes, the ceiling is above 2.5m.	Compliant
Is the number of workers sharing the same room/dormitory minimised?	Yes, only members of the employee's immediate family are allowed to stay in the house. The definition applied in this case, is spouse and children.	Compliant
Are the doors and windows lockable and provided with mosquito screens when necessary?	Yes, the doors are lockable. However, no mosquito nets are provided.	Compliant
Are mobile partitions or curtains provided?	No. Inhabitants are entitled to use their own.	Compliant
Is suitable furniture such as table, chair, mirror, bedside light provided for every worker?	No. Inhabitants are entitled to use their own.	Compliant
Are separate sleeping areas provided for men and women?	N/A	N/A
Bed arrangements and storage facilities		
Is there a separate bed provided for every worker?	N/A	N/A
Is the practice of "hot-bedding" prohibited?	N/A	N/A
Is there a minimum space of one metre between beds?	N/A	N/A
Is the use of double deck bunks minimised?	N/A	N/A
When double deck bunks are in use, is there enough clear space between the lower and upper bunk of the bed?	N/A	N/A
Are triple deck bunks prohibited?	N/A	N/A
Are workers provided with comfortable mattresses, pillows and clean bed linens?	Inhabitants are responsible for their own mattresses.	Compliant
Are the bed linens washed frequently and applied with adequate repellents and disinfectants (where conditions warrant)?	Inhabitants are responsible for their own linen. Washing facilities are located close to the old house. New house have running water.	Compliant
Are adequate facilities for the storage of personal belongings provided?	Yes, personal belongings are stored in personal items of	Compliant
Are there separate storages for work clothes and PPE and depending on condition, drying/airing areas?	PPE is kept on site and washed by staff.	Compliant
Sanitary and toilet facilities		
Are sanitary and toilet facilities constructed from materials that are easily cleanable? Are sanitary and toilet facilities cleaned frequently and kept in working condition?	Yes,	N/A
Are toilets, showers/bathrooms and other sanitary facilities designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors?	N/A	N/A
Are separate sanitary and toilet facilities provided for men and women?	No.	Compliant
Toilet facilities		
Are there an adequate number of toilets and urinals?	N/A	Compliant
Are toilet facilities conveniently located and easily accessible?	Yes.	Compliant
Showers/bathrooms and other sanitary facilities		
Is the shower flooring made of anti-slip hard washable materials?	N/A	N/A
Are there an adequate number of hand washbasins and showers/bathrooms facilities provided?	N/A	N/A
Are the sanitary facilities conveniently located?	N/A	N/A
Are shower facilities provided with an adequate supply of cold and hot running water?	N/A	N/A
Canteen, cooking and laundry facilities		
Are canteen, cooking and laundry facilities built with adequate and easy to clean materials?	Yes, the facilities are built mainly from concrete and thrown concrete surfaces.	Compliant
Are the canteen, cooking and laundry facilities kept in clean and sanitary condition?	The canteen is cleaned regularly by cooking staff.	Compliant
If workers cook their own meals, is kitchen space provided separately from the sleeping areas?	Yes	Compliant
Laundry facilities		
Are adequate facilities for washing and drying clothes provided?	N/A	N/A

Canteen and cooking facilities		
Are workers provided with enough space in the canteen?	Yes	Compliant
Are canteens adequately furnished?	Yes	Compliant
Are kitchens provided with the facilities to maintain adequate personal hygiene?	Yes, the facilities have sinks for cooking staff to wash their hands. The main site also has showers for workers as part of the biosecurity protocols.	Compliant
Are places for food preparation adequately ventilated and equipped?	Yes. The facilities are partially open aired.	Compliant
Are kitchen floor, ceiling and wall surfaces adjacent to or above food preparation and cooking areas built in non-absorbent, durable, non-toxic, easily cleanable materials?	Yes.	Compliant
Are wall surfaces adjacent to cooking areas made of fire-resistant materials and food preparation tables equipped with a smooth, durable, non-corrosive, non-toxic, washable surface?	Yes.	Compliant
Are adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment provided?	Yes.	Compliant
Are there adequate sealable containers to deposit food waste and other refuse? Is refuse frequently removed from the kitchen to avoid accumulation?	Yes.	Compliant
Standards for nutrition and food safety		
Is there a special sanitary process such as the WHO "5 keys to safer food" implemented in relation to food safety?	Not audited	N/A
Does the food provided contain appropriate nutritional value?	Not audited	N/A
Does the food provided take into account workers' religious/cultural backgrounds?	Not audited	N/A
Medical facilities		
Are first-aid kits provided in adequate numbers?	The main site has first-aid kits located in different areas.	Compliant
Are first-aid kits adequately stocked?	Yes, first-aid kits are checked regularly.	Compliant
Is there an adequate number of staff/workers trained to provide first aid?	Yes.	Compliant
Are there any other medical facilities/services provided on site? If not, why?	The nature of the facility does not warrant a dedicated medical area. The nearest hospital is located <10km away.	Compliant
Leisure, social and telecommunications facilities		
Are basic social collective spaces and adequate recreational areas provided to workers?	N/A. The facility is located <3km from the nearest town.	N/A
Are workers provided with dedicated places for religious observance? Can workers access a telephone at an affordable/public price?	N/A, local churches are nearby.	N/A
Are workers provided with access to internet facilities?	No.	N/A
Managing workers' accommodation		
Management and staff		
Are there carefully designed worker camp management plans and policies especially in the field of health and safety (including emergency responses), security, workers' rights and relationships with the communities?		Not critical Partial compliance
Where contractors are used, have they clear contractual management responsibilities and duty to report?	N/A	N/A
Does the person appointed to manage the accommodation have the required background, competency and experience to conduct his mission and is he/ she provided with the adequate responsibility and authority to do so?	The person was selected to manage the staff accommodation was elected by the staff and has a good relationship with management. The manager has no formal training in estate management, however it is not deemed necessary.	Compliant
Is there enough staff to ensure the adequate implementation of housing standards (cleaning, cooking and security in particular)?	N/A	N/A

Are staff members recruited from surrounding communities? Have the staffs received basic health and safety training?	Staff members are recruited from nearby towns of Ndola, Baluba and Luanshya.	Compliant
Are the persons in charge of the kitchen particularly trained in nutrition and food handling and adequately supervised?	No, the kitchen staff prepares meals that are traditional and widely accepted to the workers. Nutrition should be addressed.	Not critical Not prioritised
Charging fees for accommodation and services		
Are the renting arrangements fair and transparent?	Yes, they are part of the employees' remuneration package.	N/A
Are workers provided with adequate information about payment made?	Yes, the US\$ value equivalent is stated in the employment contract.	Compliant
Where appropriate, are renting arrangements and regulations clearly included in workers' employment contracts?	Yes	Compliant
Are food and other services provided for free or reasonably priced, that is, not above the local market price?	Yes.	Compliant
Is the payment in kind for accommodation and services prohibited?	Yes	Compliant
Health and safety on site		
Have health and safety management plans including electrical, mechanical, structural and food safety been designed and implemented?	Yes, the houses fall under the management of the employees and health & safety protocols are employed from the general operations manuals.	Compliant
Has the accommodation manager a duty to report to the health authority specific diseases, food poisoning or casualties?	Not audited.	N/A
Is there an adequate number of staff/workers trained in providing first aid?	No	Not critical Not prioritised
Has a specific and adequate fire safety management plan been designed and implemented?	Not for the houses	Priority Not compliant
Is guidance on alcohol, drug and HIV/AIDS and other health risk-related activities provided to workers?	Yes, as part of the company policy.	Compliant
Are contraception measures (condoms in particular) and mosquito nets (where relevant) provided to workers?	No	Not critical Not prioritised
Do workers have an easy access to medical facilities and medical staff, including female doctors/nurses where appropriate?	Yes, the local clinic is <10km away	Compliant
Have emergency plans on health and fire safety been prepared?	For the company main site which can be expanded to the houses but has not to date	Not critical Partial compliance
Depending on circumstances, have specific emergency plans (earthquakes, floods, tornadoes) been prepared?	N/A	N/A
Security on workers' accommodation		
Has a security plan including clear measures to protect workers against theft and attack been designed and implemented?	No	Not critical Not prioritised
Has a security plan including clear provisions on the use of force been designed and implemented?	No	Not critical Not prioritised
Have the backgrounds of security staff been checked for previous crimes or abuses? Has the recruitment of security staff from both genders been considered?	Yes, as part of the company practice	Compliant
Have security staff received clear instruction about their duty and responsibility?	Yes	Compliant
Have security staff been adequately trained in dealing with domestic violence and the use of force?	No, this is considered either a police matter or traditional matter. Country laws and customs are adhered too.	Compliant
Are body searches only performed in exceptional circumstances by specifically trained security staff of both genders?	Not Audited.	N/A
Do security staff have a good understanding about the importance of respecting workers' rights and the rights	Yes, as some of the security personnel live within the staff housing and are a part of the community.	Compliant

of the surrounding communities and adopt appropriate conduct?		
Do workers and communities have specific means to raise concerns about security arrangements and staff?	Yes, with the staff housing manager or general management.	Compliant
Workers' rights, rules and regulations on workers' accommodation		
Are limitations on workers' freedom of movement limited and justified?	Yes, for security and biosecurity reasons the access gate between the houses and site is locked during the night. This is does not limit the worker's free access "off-site"	Compliant
Is an adequate transport system to the surrounding communities provided? Is the practice of withholding workers' ID papers prohibited?	N/A	N/A
Is freedom of association expressly respected?	Yes	Compliant
Are workers' religious, cultural and social backgrounds respected?	Yes, this will be governed by human resources department.	Compliant
Are workers made aware of their rights and obligations and provided with a copy of the accommodations' internal rules, procedures and sanction mechanisms in a language or through a media they understand?	No	Priority not compliant
Are house regulations non discriminatory, fair and reasonable?	Yes.	Compliant
Are regulations on alcohol, tobacco and third parties' access to the camp clear and communicated to workers?	N/A	N/A
Is a fair and non-discriminatory procedure to implement disciplinary procedures, including the right for workers to defend themselves, set up?	No.	Priority Not compliant
Consultation and grievance mechanisms		
Have mechanisms for workers' consultation been designed and implemented?	Yes	Compliant
Are workers provided with processes and mechanisms to articulate their grievances in accordance with PS2/PR2?	Yes they are outlined within the Human Resources Manual and the Grievance Policy.	Compliant
Have workers subjected to disciplinary proceedings arising from conduct in the accommodation had access to a fair and transparent hearing with the possibility to appeal the decision?	No, examples have been of disciplinary actions have been documented.	N/A
Are there fair conflict resolution mechanisms in place?	In accordance with the HR manual and grievance policy	Compliant
In cases where serious offences occur, are there mechanisms to ensure full cooperation with police authorities?	Yes.	Compliant
Management of community relations		
Have community relation management plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion been designed and implemented?	Yes, the community relationship programme was designed by the ESIA consultant for the expansion farms. No new system has been drawn up for the main site.	Compliant
Do community relation management plans include the setting up of liaison mechanisms to allow a constant exchange of information and consultation of the surrounding communities?	Yes, Goldenlay has appointed an ESG manager to manage the relationship with the communities around all Goldenlay sites.	Compliant
Is there a senior manager in charge of implementing the community relation management plan?	Yes the ESG manager.	Compliant
Is there a senior manager in charge of liaising with the surrounding communities?	Yes the ESG manager.	Compliant
Are the impacts generated by workers' accommodation periodically reviewed, mitigated or enhanced?	Not audited	N/A
Are community representatives provided with easy means to voice their opinions and lodge complaints?	Yes, the community representatives can either discuss these issues with the ESG manager or with the local councillor who will take up their issues with either the company or the local authority.	Compliant
Is there a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10?	Yes, the ESG manager has an active role in community relationships and any grievances are discussed openly.	Compliant

17. Social and Environmental Management System/EMP

Phatisa evaluates all social and environmental risks during the due diligence process. The due diligence is carried out by an approved external consultant. In accordance with the IFC risk categorisation profiling Goldenlay's main site is considered a risk category B. According to Phatisa's SEMS, category B investments do not require an Environmental Social Impact Assessment; rather a comprehensive set of recommendations made by the consultant can be incorporated into the investment's EMP. The table below is a summary of all recommendations made by the external consultant during the due diligence of the main site with the risk categorisation and status as at the end of the fourth quarter 2014.

No	Item	Performance standard infringement	Time to completion	Budget	Risk priority	Status
1.	Implement a comprehensive SEMS, including specifically best practice Health and Safety and Labour Practices of the ILO, OHSAS 18001, ISO14001, IFC Performance Standards, legal and permit requirements, such as appointments, registers, risk assessments, procedures, legal compliance assessments, incident records emergency response plans, scheduled inspections, etc. Regular internal and external audits should be communicated to management.	PS 1	Q1 2014	US\$ 45,000	High	Completed
2.	Ensure adequate capacity is allocated to fulfil a Human Resources function, whose roles shall specifically include the development and adherence to all the respective labour practices in accordance with ILO, AfDB and IFC standards.	PS 2	Immediate	Subject to market-related salaries and candidates		Completed
3.	Compliance monitoring against EMP on six-monthly basis, until all findings cleared, and then annually.	PS 1 & 3	Q4 2013	US\$ 6,000		Commenced
4.	Water monitoring of river and ground water every six months (before and after rainy season).	PS 1 & 3	Q3 2013	US\$ 6,400 p/a		Completed, Ongoing
5.	Monitoring of incinerator emissions.	PS 1 & 3	Q3 2013	As per quote		Completed, Ongoing
6.	Monitor manure composition and impacts of manure disposal on soil, surface and groundwater at points of disposal.	PS 1 & 3	Q3 2013	US\$ 3,000		Completed, awaiting results
7.	Grievance and disciplinary procedure should be implemented and communicated to current and prospective employees and adhered to by management.	PS 2	Q1 2013	N/A		Completed

No	Item	Performance standard infringement	Time to completion	Budget	Risk priority	Status
8	Commence with the following environmental monitoring programme: compliance monitoring against EMP on six-monthly basis, water monitoring of river and groundwater, water consumption, incinerator emissions, manure composition and impacts of manure disposal on soil, surface and groundwater, emissions from the production houses.	PS 1 & 3	Q3 2013	US\$ 40,000 - US\$ 50,000		Completed
9.	Develop suitable alternative to staff housing if an air emissions survey shows elevated levels of pollutants of concern (ensuring that housing allowances are adjusted accordingly).	PS 2 & 3	Q1 2013	TBD	Medium	Not applicable, pollution is within acceptable limits at the housing. Monitoring will continue
10.	The soya and grain mills to be subject to health and safety risk assessment by an independent expert and upgraded accordingly.	PS 2	Q3 2012	US\$ 2,000		Internal audit completed. Future plans to move the mills to Kafubu. The new mill will be constructed to present best practice standards.
11.	Install water meters and monitor water consumption.	PS 1	Q4 2013	US\$ 9,000		Monitoring currently takes place in the poultry houses. Expanded monitoring will be considered.
12.	Remove storage shed/work shop and replace with suitable facility. Build proper grain storage buildings.	PS 2	Q4 2014	TBD		Grain storage Completed. Workshop will be moved to Kafubu.
13.	Determine flood lines of the Baluba stream (1:50 and 1:100 year).	PS 7	N/A	US\$ 8,000		Change order
14.	Develop emissions inventory, basic dispersion model (or monitoring of emissions in ambient concentrations) and community health risk assessment (depending on results of the previous studies) to determine any health affects from the production houses in the compound.	PS 3	Q2 2014	US\$ 18,000		Completed
15.	Plan the need for pesticides and evaluate their effectiveness, as well as potential environmental impacts, to ensure that the pesticide with the least adverse impact is selected.	PS 3	Q1 2013	TBD		Completed for main site. Review expected for expansion sites.
16.	A detailed independent audit of the use of pesticides on site, including the disposal of containers and washing of containers, should be undertaken on a regular basis.		Q4 2013	US\$ 2,500		Completed

No	Item	Performance standard infringement	Time to completion	Budget	Risk priority	Status
17.	Develop a community Liaison Policy or PR Policy (guiding relations with civil society stakeholders), and appoint a suitable competent or qualified staff member to enact such.	PS 1	Ongoing	To be performed by SHEQ Manager		Completed
18.	Occupational exposure monitoring and medical examinations should be implemented immediately.	PS 2	Q3 2012	US\$ 5,000		Commenced
19.	Noise emission from the company's operations needs to evaluate within the community, the nearest sensitive area to the company's operations.	PS 3	Q3 2014	Management time		Completed
20.	An independent investigation in to the risks to community health and safety from possible ingestion of hazardous substances in Goldenlay's products.	PS 2	Q1 2013	US\$ 2,500	Low	Internal audit completed. No antibiotics used, no heavy metals in feed.
21.	Cement bases for the transformers should be constructed, and the transformer oil analysed for PCBs.	PS 3	Q2 2014	US\$ 3,500		Completed, on going monitoring
22.	Management must commit to allocating an annual budget and building plan for the construction of workers housing.	PS 2 & 4	Q4 2016	TBD		Additional item Ongoing

Change order

Management has considered the recommendation to determine the 50-year and 100-year flood line. Goldenlay management does not consider the possibility of flooding to be a material risk due to the elevation of the main site.

Goldenlay has completed all outstanding recommendations from the original social environmental due diligence relating to the main site, except for the removal of the storage shed and the above change order. Goldenlay management has prepared a design for a new permanent storage facility to be built on the Kafubu farm. Phatisa supports this action, as it will result in a reduction of personnel movement on the site, reducing the risk of exposing the flock to pathogens. Construction of new the facility on the Kafubu farm will be included in the 2015 budget. Goldenlay will also be relocating the milling complex to the Kafubu site during 2015. The budget has been approved and the designs are being finalised.

In regard to the construction of new houses for Goldenlay employees, management annually budgets to construct four three detached housing blocks per annum. Phatisa supports this measured approach to improving the lives of the company's staff. Construction is managed by Goldenlay management and quality assurance is carried out by the on site quality assurance managers, who oversee other projects in the area.

Goldenlay Social Environmental Management System (SEMS)

In accordance with IFC performance standard 1, a social and environmental management system was drafted to detail all environmental and social action to be carried out on the main site. Below is an extract from the SEMS document which Goldenlay implements.

SEMS no.	Key performance criteria	Key performance indicator	Responsibility	Status as at 2014
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1	Risk assessment methods to support effective environmental planning and management, including emergency preparedness and response planning (GLL1)	Conduct Facility hazards/risks/accidents/incidents identification and significance assessment. Develop Emergency Preparedness and Response Plan.	ESG	Complete
		Identify areas/aspects for assessment. Review until significant risks are incorporated in emergency preparedness and response plan.	ESG	Ongoing
2	Develop and implement procedures for monitoring, measuring and reporting environmental indicators and for taking corrective actions as necessary (some areas require procedures for corrective action) (GLL1)	Identify/determine environmental aspects that need to be monitored.	ESG/GM	Ongoing
		Develop continual monitoring and reporting forms with timeline guided by license returns submission.	ESG	Ongoing
		Develop standard procedures for response (taking corrective action) to abnormal levels of environmental indicator values (Ref: license conditions, SOPs).	ESG	Completed
3	Develop and implement an environmental training, awareness and competence programme (completed for workshop staff, but mini-workshop required for sections personnel too) (GLL1)	Identify training needs for different departments/sections. Relate to significant environmental aspects and operations giving rise to impacts from each area in the company	ESG	Completed
		Develop simple environmental training, awareness and competence programmes suited for each group of personnel and operations carried out.	ESG	Ongoing
		Develop competence programmes in line with training programmes developed above .	ESG	Completed
4	Develop and implement an emergency preparedness and response plan (need for an assessment and hazard identification exercise (GLL1)	In accordance with EMP, implement after developing emergency preparedness and response plan as indicated above.	ESG	Completed
5	Run-off from the growers house will be channelled to an impoundment area (GLL12)	Construct drainage from Faccos leading to soak away/septic tanks.	OP/ESG/ Maintenance	(Ongoing) as 14/4/2012
6	A containment pond to act as a buffer zone to the Baluba stream will be constructed and runoff from the poultry housing will be channelled there (GLL20, GLL31, GLL43)	Construct sizeable septic tank and soak away/French drain to act as a buffer zone to Baluba stream.	OP/ESG/ Maintenance	Ongoing with 5.
7	Surface water drains will be constructed to divert and direct clean runoff from the building away from areas containing waste (only partially completed) (GLL21, GLL32, GLL44)	Construct/re-dig drainage furrows behind soya plant running behind canteen leading to septic tank and soak away. Divert canteen wash water into septic tank.	OP/ESG/ Maintenance	Completed
8	Surface water drains will be cleaned on and regular and maintenance carried out to remove silt and debris. Silt traps will be installed where necessary (GLL23)	In line with construction of furrows as mentioned above, install overflow or meander obstacles within the furrow to slow flow and trap dirt/silt. Provision to clean furrows also.	OP/ESG/ Maintenance	Ongoing
9	Dust collection units in feed grinding operations will be installed (GLL50)	Plug all leaks in dust-carrying ducts; particular points include pipe exits from mixers into auger. Consider covering with easily removable flexible material when transferring feed from mixer to auger. In soya plant, construct dust duct from cleaner cyclone leading up out through the roof. Paint roof with light/silver/white colour for temperature cooling in the soya plant.	OP	Complete

10	The oil trap will be serviced on a regular basis. Oil residue will be collected and placed in a drum to be recycled as waste oil. Sludge accumulated in the oil trap will also be removed on a regular basis and stockpiled on site until a contractor to treat it will be sourced (GLL61)	In line with construction of oil trap/interceptor and cleaning programme.	ESG	Ongoing
11	Oil traps will be provided in order to capture and recover all oily residues present in site drainage. This will prevent carryover of oil with storm water runoff (GLL70, GLL72)	Oil trap needed only at effluent point sources e.g. filling station, engine wash bay...where detergent is not used (in line with proposed vehicle wash bay).	OP/ESG/Maintenance	Complete
12	Drainage from the filling station will be directed to a collection sump equipped with an oil trap as to provide treatment of site discharges prior to release into the site drainage system (GLL75)	Construct collection sump with no outlet. Collected spill to be scooped out manually.	ESG/OP/Maintenance	Ongoing
		Block breather pipe. Scoop overflow manually from access pit and add to use oil drums.	OP	Pending
13	Any spillages or accidental releases should be dealt with in accordance with the spill response plan (closed drainage/trap still required) (GLL77)	Develop spills response plan. (Ref: PC/GLL ADMIN/DESKTOP/ENVIRONMENTAL/SPILL RESPONSE. [Incorporate into emergency response plan])	ESG	Drafting
14	Hazardous materials handling procedures to ensure compliance with regulatory requirements will be developed and implemented (GLL82)	Compile MSDS (material safety data ESG, etc.) and develop handling procedure based on chemicals stored on site as well as hazardous waste (used oil, fluorescent tubes. PPE required).	ESG	Completed
15	A spill response plan, which incorporates appropriate response actions for each of the hazardous materials identified during the development of the inventory, will be developed (GLL83)	Develop spills response plan. (Ref: PC/GLL ADMIN/DESKTOP/ENVIRONMENTAL/SPILL RESPONSE. [Incorporate into emergency response plan])	ESG	Drafting
16	The warehouse floor will be provided with bunding for containment. The drainage from the warehouse will be linked to an evaporation tank that will be emptied regularly. The tank will be covered during the rainy season (GLL87)	Chemical storage room to have drainage in case of major spill. Similar to collection sump from silver tank at filling station. The drainage should lead to a sump outside the store building.	OP/ESG/Maintenance	Pending
17	The warehouse building will be provided with two emergency exits to facilitate escape in case of emergency. The emergency exits will be clearly labelled (GLL88)	For consideration by management. Fire escape option.	OP	Under consideration
18	Develop an OHS (Occupational Health and Safety) policy to ensure that it supports compliance with Zambian OHS requirements and continuous improvements (GLL97)	To prepare OHS draft policy.	MGT/ESG	Pending
19	Develop and implement risk assessment methods to support effective OHS planning and management (GLL98)	Develop and implement risk assessment procedure and generic form. Implement control measure to minimise identified risks.	ESG/Supervisors	Pending
20	Develop and implement a procedure for reviewing OHS legislation and integrating regulatory requirements into	To follow after development, authorisation and implementation of company draft copy by senior management.	ESG/MGT	Pending

	OHS procedures (GLL99)			
21	Develop and implement procedures for monitoring, measuring and reporting OHS indicators (GLL101)	To follow after risk assessment and control measure are implemented in the workplace.	ESG	Pending
22	Review OHS capacity developments and training needs at all levels of organisation (GLL102)	Identify OHS training needs for key personnel. E.g. supervisors, mechanics and Facco crews.	ESG	Reviewing Q4 2014
23	A fire hydrant, buckets of sand will be available on site. Adequate signage – no smoking (still require a fire hydrant at egg room extension. More signage also needed) (GLL139)	Generate signage for risk-prone areas around the farm.	ESG/MGT	Pending
24	Compile information relating to public health factors that could be impacted by GLL's operations (GLL146)	Relate to EMP aspects and impacts assessment list. Compile and document specific list and information. e.g. delivery of manure. Potential pollution of water bodies, odour emanating from delivering of manure.	ESG	Pending
25	Risk assessment reports will be produced for appropriate action to be taken (GLL159)	To document all subsequent risk assessments that will be generated and all appropriate actions recommended.	ESG	Pending
26	A health and safety audit will be undertaken in order to assess the effectiveness of the health and safety policy and emergency response plan, and also to enable continual improvement in the management of health and safety at GLL (GLL160)	To be conducted after all OHS requirements stated above are in place.	ESG	Pending

18. IFC EHS poultry production guidelines

As a result of Phatisa's investment into Goldenlay, the company is legally bound to become IFC-compliant over the duration of the investment. During the external due diligence conducted by EBS Consultants Goldenlay was audited against the IFC Environmental, Health and Safety (EHS) Guidelines for Poultry Production (2007). During routine monitoring audits conducted by Phatisa's SEMS manager the company is again audited against these standards to ensure progress is made towards compliance. The following section provides a summary of EHS issues associated with poultry production, which occur during the operational phase, along with recommendations for their management and the results from the external due diligence as well as the latest Phatisa audit.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
General safety measures		
Prevention of falls into openings for water supply systems, underground manure storage tanks, and other confined spaces through installation of covers, fences, and other fall prevention methods.	Our site inspection showed no evidence of such risks.	Our site inspection showed no evidence of such risks.
Training on correct bird handling techniques and provision of appropriate personal protective equipment (PPE), such as gloves and aprons, to prevent scratches.	This is performed in-house.	This is performed in-house.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Occupational health and safety hazards associated with confined spaces on farms (e.g. manure pits, silos, grain bins, water tanks, or inadequately ventilated buildings) include the risk of asphyxiation, primarily due to the accumulation of methane. Entry to all confined spaces should be restricted and should be subject to permitted supervision by properly trained persons.	The opportunities for these types of risks are few as far as tanks and pits are concerned. No procedures exist for operating in confined spaces though and should be developed as part of a comprehensive H&S management system.	The opportunities for these types of risks are low. Procedures have been drawn up and notices posted for operating in confined spaces though and awareness has formed part of a comprehensive H&S management system.
Air quality		
Use local air extraction devices at dust generating equipment, such as silos and grinders.	Only one fan is present in the soya and grain plants respectively, and from our initial assessment, these are incorrectly sized and/or positioned to reduce dust levels.	New fans have been installed in the soya and grain mills. If the dust levels are still too high during the external audits, management has committed to installing more vents within the mill.
Ensure that workers potentially exposed to dust and bio-aerosols, such as catching gangs, are provided with adequate respiratory protection including properly fitted masks equipped with filters especially designed to capture dust and micro-organisms; and	Workers are issued with dust masks for the above-mentioned areas, but the enforcement of such appears to be weak and was confirmed by management as being the case. We observed several workers performing maintenance on the equipment without dust masks.	Workers are issued with dust masks and other PPE, employees are now responsible for collecting and returning their PPE back to the mill managers. Mill management has introduced a new system for enforcing appropriate PPE is worn at all times within the mill. All subsequent inspections have shown appropriate PPE is worn at all times.
Store only dry feed and grain to minimise microorganism growth.	This is the case at Goldenlay.	Compliant
Exposure to biological agents		
Inform workers of potential risks of exposure to biological agents and provide training in recognising and mitigating those risks;	No such training is provided.	Training is now carried out by the ESG and mill officers at the beginning of the shift. New formalised record sheets will be introduced from Q1 2014.
Provide personal protective equipment to minimise all forms of exposure to materials potentially containing pathogens; and	Staff operating in and around the production houses did so without any PPE such as dust masks. According to documentation, PPE has been issued to the staff to this effect.	New PPE has been issued to employees. The PPE has been issued in different colours to allow for easy identification to distinguish those personnel who have and those who do not have authorisation to enter the biologically sensitive areas.
Ensure that those that have developed allergic reactions to biological agents are not working with these substances.	According to management, no such cases have occurred.	No cases reported.
Gender issues		
Consider women's economic empowerment as key to sustainable development.	According to management, the staff was all male at acquisition in 2005. Now, 15% of workers are women, although, as far as we can determine, these are all at worker level. No policies or plans exist for the specific economic development of women, and as such, we would consider that Goldenlay do not consider such as "key" to sustainable development.	Women are considered for employment at all levels. Human Resources is managed by a woman, and two female tractor drivers are employed. Goldenlay has introduced a non-discrimination policy to their employment manual.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Not consider women to be a homogeneous group. This would entail that women, to the extent possible, are given the same opportunities as their male counterparts at all levels or activities of portfolio companies.	As far as we experienced, the management at Goldenlay is all male.	During 2013 a woman managed the ESG department and a woman currently manages the Human Resources department.
Pay attention to the co-operative relations between women and men.	No evidence in support of this requirement was available from Goldenlay.	Compliant.
Find out if potential investees' largest shareholders have stated gender policies and practices.	We were not able to determine such for shareholders of Goldenlay.	Phatisa has an equal opportunity policy.
Pollution prevention and abatement		
Animal waste		
Match feed content to the specific nutritional requirements of the birds in their different production/ growth stages.	Not audited	Compliant
Use low-protein diets, supplemented with amino acids.	Not audited	Compliant
Use low-phosphorus diets with highly digestible inorganic phosphates (e.g. for poultry, a total phosphorus reduction of 0.05% to 0.1% [0.5 to 1g/kg of feed] can be achieved).	Not audited	Compliant
Use quality, uncontaminated feed materials (e.g. where concentrations of pesticides and dioxins are known and do not exceed acceptable levels) that contain no more copper, zinc, and other additives than is necessary for animal health.	Quality assurance on feed was not audited.	Compliant
Ensure production and manure storage facilities are constructed to prevent manure contamination of surface water and ground water (e.g. use of concrete floors, use of roof gutters on buildings to collect and divert clean storm water, and covering manure storage areas with a fixed roof or plastic sheeting).	The new production houses are excellent in this respect and are constructed specifically to remove manure efficiently, directly into trucks over a concrete floor, which is cleaned daily.	Compliant
	For the older production houses, the waste is scraped up manually and stored under cover until delivery is ready.	Compliant
Keep waste as dry as possible by scraping wastes instead of or in addition to flushing with water to remove waste, minimise amount of water used during cleaning (for example, by using high-pressure, low-flow nozzles).	The waste is scraped or removed by conveyor belt, thereby resulting in minimal surface water run-off, which is collected in underground (and sealed) pits.	Compliant
Use hot water or steam in cleaning activities instead of cold water, as this can reduce the amount of water used by 50%.	Not audited	Partially compliant, most houses have hot water access and use this.
Further reduce the moisture content of dry poultry excreta (e.g. by blowing dry air over it or by conveying ventilation air through the manure pits).	This is not the case at Goldenlay.	Not practiced

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Minimise the surface area of manure in storage.	Not audited. Manure is removed every second day for the new houses, and twice a week for grower houses. Our site visit indicated acceptable levels for odour and flies for occupational exposure.	The manure is removed every second day from the new houses, and twice a week for grower houses. There is an acceptable level of odour and flies for occupational exposure.
Locate manure piles away from water bodies, floodplains, wellheads or other sensitive habitats.	Manure stockpiles are located away from water bodies and off-site for biosecurity reasons.	Manure stockpiles are located away from water bodies and off-site for biosecurity reasons.
Check for leakage regularly (e.g. inspect tanks for corrosion of seams, especially those near ground level, and empty tanks at least annually or as necessary).	Borehole monitoring indicated elevated levels of phosphates, the source of which should be confirmed.	Please consult the latest external consultant test results.
Use double valves on outlets from liquid tanks to minimise the risk of unintentional release.	Liquid tanks are underground cement pits.	Liquid tanks are underground cement pits.
Place dry manure or litter in a covered or roofed area.	Compliant	Compliant
Conduct manure spread only as part of a comprehensive nutrient and waste management plan that takes into account the potentially harmful constituents of this waste including potential phyto-toxicity levels, potential concentration of hazardous substances in soils and vegetation, as well as nutrient limits and groundwater pollutant limits. If possible, land spread manure directly after batch cleaning (most ammonia is emitted during the manure's first month of storage) and only during periods that are appropriate for its use as plant nutrient (generally just before start of the growing season).	As far as we are aware, this is not the case at Goldenlay, although the manure disposal activities and site were not inspected.	Compliant: All manure is removed to Goldenlay's crop farm sites and spread there as part of the crops lands fertiliser. During the months were fertiliser is not applied the manure is stored under plastic sheets on the farmland and protected from the rain.
Manure storage facilities should have sufficient capacity for nine to 12 months of manure production so that manure can be applied to agricultural land at appropriate times.	Non-compliance. Disposal takes place daily or weekly from site and no intermediate storage capacity is available.	Compliant: Disposal takes place daily or weekly from site and storage capacity is available on the crop farms.
Design, construct, operate, and maintain waste management and storage facilities to contain all manure, litter, and process wastewater including runoff and direct precipitation (designed for 100-year flood event).	Non-compliance. Underground pits are not protected from storm water ingress and were full at the time of inspection. Process wash water was being discharged from site. No diversion of clean storm water occurs from the production areas.	Compliant: storm water and wastewater from the houses collects into the French drains.
Remove liquids and sludge from lagoons as necessary to prevent overtopping.	Not applicable: the site operates no lagoons.	Not applicable: the site operates no lagoons.
Build a reserve slurry storage lagoon.	Not applicable.	N/A
Transport liquid effluent in sealed tankers.	Not audited – the liquid slurry is sucked out of the pits by Nkana Water and Sewage.	The liquid slurry is sucked out of the pits by Nkana Water and Sewage and transported in a sealed tanker.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Manage sludge and sediments from wastewater treatment systems as part of the solid waste stream and according to the principles applied to manure and other solid wastes with special consideration of potentially harmful constituents.	Nkana Water and Sewage perform wastewater treatment. Goldenlay prescribes no conditions on the use of the solid fractions from such.	Nkana Water and Sewage perform wastewater treatment.
Poultry carcasses		
Use reliable commercially available options approved by local authorities that dispose of carcasses by rendering or incineration, depending on the cause of fatality. Incineration should only be conducted in permitted facilities operating under international recognised standards for pollution prevention and control.	Incineration was only permitted on the site as of 1 Jan 2011.	Permits are current.
	Goldenlay is non-compliant in terms of adhering to the conditions of this permit for the following: absence of any quarterly or six-monthly monitoring.	Compliant: semi-annual monitoring is conducted by Hilma Consultants.
Industrial process wastewater		
Reduce water use and spills from animal watering by preventing overflow of watering devices and using calibrated, well-maintained self-watering devices.	Water management appeared to be neat and well contained on the site.	Water usage is managed as part of an ongoing monitoring programme.
Install vegetative filters to trap sediment.	Not audited.	Sand filters used as part of French drain.
Install surface water diversions to direct clean runoff around areas containing waste.	Non-compliance. No diversion of clean storm water occurs from the production areas.	Non-compliance. No diversion of clean storm water occurs from the production areas.
Implement buffer zones to surface water bodies, as appropriate to local conditions and requirements.	A ~ 50m – 75m buffer zone occurs from the stream and the compound/site boundary. As the old poultry houses are situated immediately on the northeast boundary of the site, they are closest to the stream, as are several compound houses. We would therefore recommend that the 1:50 and 1:100 year flood lines for the stream are determined.	Compliant: Management has considered the possibility of a 1:50 and 1:100 flood studies and does not consider the risk of flooding to be negligible.
Avoiding land spreading of manure within these areas.	Not audited.	N/A
Air emissions		
Consider the situation of new facilities taking into account distances to neighbours and the propagation of odours.	Non-compliant. This was not considered in the EPB for the new facility, nor was any emissions inventory or dispersion model developed for the old farm on the compound. The compound is 100m away from the closest production house and blows directly towards the compound.	The stack to the incinerator has been raised in order to increase dispersion. A new workers compound is also being built which is further away from the incinerator and not in the prevailing wind direction. Incinerator emissions are monitored semi-annually, and any deviations from the accepted value will be addressed.
Control the temperature, humidity, and other environmental factors of manure storage to reduce emissions.	These factors are controlled for the benefits of the laying hens, not for ammonia reduction.	Compliant
Consider composting of manure to reduce odour emissions.	Not considered.	N/A

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Reduce emissions and odours during land application activities by applying a few centimetres below the soil surface and by selecting favourable weather conditions (e.g. wind blowing away from inhabited areas).	Not audited.	Not audited, manure is removed from the site and not applied to land on the main site.
If necessary, apply chemicals (e.g. urinase inhibitors) weekly to reduce conversion of nitrogen to ammonia.	Not performed	N/A
Dust		
Install dust collection systems (including use of misters) in areas with dusty operations (e.g. feed grinding).	Not performed	Not performed
Implement fugitive dust-control measures (e.g. wetting vehicle parking lots and frequently travelled dirt roads, as necessary).	Not performed	Not performed
Use of pesticides – integrated pest management		
Maintain structures to keep out pests (e.g. plug holes, seal gaps around doors and windows).	Pest access to grain is poorly controlled on site. Access to the new birdhouses is well controlled, but the old houses are far more accessible as they are only protected by mesh wire.	Pest access to grain is poorly controlled on site. Access to the new birdhouses is well controlled, but the old houses are far more accessible as they are only protected by mesh wire.
Use mechanical controls (e.g. traps, barriers, light, and sound) to kill, relocate, or repel pests.	Not implemented by Goldenlay. Housekeeping around the mills is average, and surface water standing adjacent to the production houses.	Compliant. Traps are located around the mills and Facco houses.
Use predators to control pests. Protect natural enemies of pests by providing a favourable habitat (e.g. bushes for nesting sites and other indigenous vegetation) that can house pest predators.	N/A	N/A
Use good housekeeping practices in barns and other facilities to limit food sources and habitat for pests.	Not audited	Housekeeping practices have improved, with regular cleaning taking place.
Improve drainage and reduce standing water to control mosquito populations.	Not audited	The site is on a slope and does not pose a risk for standing water to collect.
Consider covering manure piles with geotextiles (which allow water to enter the pile and maintain composting activity) to reduce fly populations.	Not applicable as manure is removed daily.	Not applicable as manure is removed daily.
If pesticides are used, identify in the IPM plan the need for the pesticide and evaluate their effectiveness, as well as potential environmental impacts, to ensure that the pesticide with the least adverse impact is selected (e.g. non-leachable pesticides).	As far as we are aware, no evaluation of the impacts and effectiveness of various pesticides have been performed.	Internal audit has been conducted and no issues have been reported.
Train personnel to apply pesticides according to planned procedures, while using the necessary protective clothing.	Not audited	Partial compliance: on-site training is conducted before the employee starts working with the chemicals.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Where feasible or required, pesticide application personnel should be certified for this purpose.	Not audited	Not audited
Review the manufacturer's instructions on the maximum recommended dosage and treatment, as well as published experiences on the reduced rate of pesticide applications without loss of effect, and apply the minimum effective dose.	Not audited	Not audited
Avoid the use of pesticides that fall under the World Health Organisation Recommended Classification of Pesticides by Hazard Classes 1a and 1b.	<p>According to management, the following pesticides are in use on site:</p> <ul style="list-style-type: none"> ▪ Organophosphate pesticides, rat poison, and disinfectants (active ingredients: Potassium Peroxomonosulphate 50% m/m) ▪ ATS Tellic 500EC: active ingredient is pirimiphos-methyl (organophosphate). ▪ Quickphos is used for the fumigation of a wide range of raw and processed commodities, including grain. 	No change
Avoid the use of pesticides that fall under the World Health Organisation Recommended Classification of Pesticides by Hazard Class II if the project host country lacks restrictions on distribution and use of these chemicals, or if they are likely to be accessible to personnel without proper training, equipment, and facilities to handle, store, apply, and dispose of these products properly.	A detailed assessment of these pesticides against these requirements has not been performed.	Not performed
Avoid the use of pesticides listed in annexes A and B of the Stockholm Convention (Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, and Toxaphene), except under the conditions noted in the convention.	A detailed assessment of these pesticides against these requirements has not been performed.	Not performed
Use only pesticides that are manufactured under license and registered and approved by the appropriate authority and in accordance with Food and Agriculture Organisation's (FAO) International Code of Conduct on the Distribution and Use of Pesticides.	No programme for disposal of pesticide containers has been provided.	No programme for disposal of pesticide containers has been provided.
Use only pesticides that are labelled in accordance with international standards and norms, such as the FAO's Revised Guidelines for Good Labelling Practice for Pesticides.	Not audited. The need to construct a compliant chemical store (construction of vent in the chemical stores room to vent out fumes and for aeration) was identified in February 2011.	The storeroom is built next to the offices and is vented. Access to the pesticides is controlled; only department heads are allowed to remove pesticides.
Select application technologies and practices designed to reduce unintentional drift or runoff, only as indicated in an IPM programme, and under controlled conditions.		
Maintain and calibrate pesticide application equipment in accordance with the manufacturer's		Not audited.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
recommendations.		
Store pesticides in their original packaging, and in a dedicated location that can be locked and properly identified with signs, with access limited to authorized persons. No human or animal food should be stored in this location.	Not audited. The need to construct a compliant chemical store (construction of vent in the chemical stores room to vent out fumes and for aeration) was identified in February 2011.	The storeroom is built next to the offices and is vented. Access to the pesticides is controlled; only department heads are allowed to remove pesticides.
Trained personnel in ventilated and well-lit areas should undertake mixing and transfer of pesticides, using containers designed and dedicated for this purpose.		
Used pesticide containers should not be used for any other purpose (e.g. drinking water) and should be managed as a hazardous waste as described in the General EHS Guidelines. Disposal of containers contaminated with pesticides also should be done in a manner consistent with FAO guidelines and with manufacturer's directions.		
Purchase and store no more pesticide than needed and rotate stock using a "first-in, first-out" principle so that pesticides do not become obsolete. Additionally, the use of obsolete pesticides should be avoided under all circumstances.	Not audited.	Compliant
A management plan that includes measures for the containment, storage and ultimate impacts on all obsolete stocks should be prepared in accordance to guidelines by FAO and consistent with country commitments under the Stockholm, Rotterdam and Basel Conventions.	Not audited.	Not audited
Implement groundwater supply wellhead setbacks for pesticide application and storage.	Not audited.	Not applicable
Maintain records of pesticide use and effectiveness.	Not audited.	To be started as part of EMP Q1 2014
Animal diseases		
Establish sound biosecurity protocols for the entire poultry operation that control animals, feed, equipment, and personnel, entering the facility (for example, quarantine periods for new animals, washing and disinfecting equipment, showering and protective clothing and footwear for personnel, and keeping out stray animals, rodents and birds).	Compliant. The entire site is controlled through a strict biosecurity programme, including spraying of vehicles, foot washings, no raising of poultry by staff, etc.	Compliant. The entire site is controlled through a strict biosecurity programme, including spraying of vehicles, foot washings, no raising of poultry by staff, etc.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Control farm animals, equipment, personnel, and wild or domestic animals entering the facility (e.g. quarantine periods for new animals, washing and disinfecting crates, disinfection and coverage of shoes before entry into bird housing zones, providing protective clothing to personnel, and closing holes in buildings to keep out wild animals).	Compliant	Compliant
Prevent the interaction of wild birds with feed, as this interaction could be a factor in the spread of avian influenza from sparrows, crows, etc.	Compliant. All feed is contained in production areas.	Compliant. All feed is contained in production areas.
Vehicles that go from farm to farm (e.g. transport of veterinarians, farm suppliers, buyers, etc.) should be subject to special precautions such as limiting their operation to special areas with biosecurity measures, spraying of tires and treating parking areas with disinfectants.	Compliant	Compliant
Sanitise bird-housing areas.	Compliant – the growing houses are subject to double protection measures: a quarantine facility for grower house personnel, showers upon entrance, sterilised canned foods, vehicle spray booth, etc.	Compliant – the growing houses are subject to double protection measures: a quarantine facility for grower house personnel, showers upon entrance, sterilised canned foods, vehicle spray booth, etc.
Establish a detailed animal health programme supported by the necessary veterinary and laboratory capability. Identify and segregate sick birds and develop management procedures for adequate removal and disposal of dead birds.	Compliant – this is being performed by the company. Two attendants per production house are in constant attendance to the birds.	Compliant – this is being performed by the company. Two attendants per production house are in constant attendance to the birds.
Where possible establish all in all out systems with only one age group per farm.	Compliant – this is the case: each production house houses only birds of the same batch.	Compliant – this is the case: each production house houses only birds of the same batch.
Workers on multiple age bird farms should always work with the youngest birds first before moving on to the older birds.	Not applicable	N/A
Train workers in the application of animal health products.	Not audited.	On-the-job training is conducted before a task is commenced.
Community health, safety and security Food safety impacts and management		
Facilities involved in livestock production should use a veterinary service on an annual or more frequent basis to review and assess the health of the stock and employees' competence and training. With the assistance of the veterinary service, facilities should develop a veterinary health plan to include the following aspects.	A veterinary service is utilised by the company, the capabilities and independence of which was not assessed during the course of this SEDD.	Compliant: Dr Roger Horner is the specialist vet who conducts semi-annual audits of the flocks.

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Summary of major diseases present and potentially present.	E.Coli was reported as being the only disease within the flock. It occurs worldwide in all species and all ages of poultry and is caused by a gram-negative bacterium Escherichia Coli. It is the most common bacterial pathogen of poultry, and the second most common of all poultry pathogens. It results in low performance in older birds or high mortality in younger birds, high embryonic mortality, respiratory distress and enteritis (diarrhoea).	As above in veterinary section
Disease prevention strategies.	<p>Antibiotics are used on the chickens when required. The following are also utilised to control diseases within the farm:</p> <ul style="list-style-type: none"> ▪ medication (vaccinations); ▪ drugs added to feed for disease prevention; ▪ serological testing; ▪ drinking water chlorination; ▪ strict entry at the main gate to facility, including spraying of vehicles; ▪ personnel walk through treated water bath and use of PPE; ▪ no poultry from outside is allowed into the farm; ▪ personnel living on-site are not allowed to rear chickens; ▪ quarantine facility for grower houses personnel with showers, sterilised canned foods and vehicle spray booth; ▪ regular flushing of drinking lines, and ▪ manure is disposed of at destinations at least 1.5 km from the farm site. 	Compliant: Veterinary reports
Treatments to be administered for regularly encountered conditions.	Antibiotics against E.Coli	Compliant: Veterinary reports
Recommended vaccination protocols.	Not audited.	Compliant: Veterinary reports
Recommended parasite controls.	Not audited.	Compliant: Veterinary reports
Medication recommendations for feed or water.	Not audited.	Compliant: Veterinary reports
<p>Apply only approved antibiotics in strict accordance with the manufacturer's instructions to ensure responsible and correct use.</p> <p>Apply approved antibiotics that are purchased and utilised on prescription and under the guidance of a qualified professional even where no prescription is required.</p> <p>Prepare a contingency plan that specifies how antibiotics should be applied following the identification of disease outbreaks. Can be locked and is properly identified with signs, with access limited to authorised persons</p>	We would recommend that a separate audit against these requirements be performed by an independent veterinarian. As far as we are aware, no such study has been undertaken by Goldenlay.	Compliant: Veterinary reports

LABOUR AND WORKING CONDITIONS	STATUS AT DUE DILIGENCE	STATUS AS OF Q4 2013 (PHATISA)
Store antibiotics in their original packaging, in a dedicated location that: can contain spills and avoid uncontrolled release of antibiotics into the surrounding environment; provides for storage of containers on pallets or other platforms to facilitate the visual detection of leaks.		
Avoid stockpiles of waste antibiotics by adopting a "first-in, first-out" principle so that they do not exceed their expiration date. Any expired antibiotics should be disposed of in compliance with national regulations		

19. Recommendations

Water and effluent waste water

Due to Goldenlay’s extraction of underground water from the aquifer as well as Goldenlay’s generation of effluent, which contains high levels of BOD and COD, management has been advised to implement the following recommendations by Hilma;

- regular monitoring of water quality at all its water sources within the farm until all the parameters meet the ZEMA guidelines for drinking water;
- management at the farm should monitor the effluent treatment facility to ensure that the effluent accumulated within the farm before discharging into the environment is within acceptable levels before been introduced into the environment; and
- management should ensure that water samples are audited every month in order to establish an average result over a six-month period.

Respirable dust

Respirable dust emitted from the hover area within the feed mill and hammer mill working areas were above the required standard. Respirable dust emitted at the lime flour loading bay were acceptable and within the required standards. These levels are acceptable and there is no need for any mitigation measures to be carried out. Management should continue improving the dust levels emitted within the feed mill by:

- introducing a machinery maintenance programme that should improve the operating efficiency of the mill.

Respirable dust emissions from the mixer/packaging area were above the required standards. As a result management should consider:

- viable areas for increased ventilation ducts in strategic areas to increase airflow into and out of the mixer/packaging area.

Noise levels

The noise levels produced at the incinerator were within the required standards. Noise levels measured at the hover area, hammer mill area, loading areas as well as the lime flour storage area were above the required standards. As a result workers in these areas are required to wear earplugs or ear muffs. Goldenlay’s management evaluates the feasibility of the following recommendations into their monitoring programme:

- management should ensure that the workers around the hammer mill and hover areas always wear respirators and earplugs/ear muffs;
- regular medical check-ups for workers in the feed mill should be done;
- reduce the duration of exposure to noise and dust by rotating shifts; and
- workers in the feed mill must have ear muffs/ear plugs at all times.

Incinerator

Lead (Pb) gas was not emitted from the incinerator stack. As a result the levels are acceptable and there is no need for any mitigation measures to be carried out at present. However, the incinerator has elevated levels of CO, CO₂, NO_x and SO₂. In order for management to address these issues the following recommendations have been proposed:

- management should ensure that monitoring of the levels of CO, CO₂, NO_x and SO₂ is sustained in order to ascertain if there is an increase in emission levels;
- increase aeration into the incinerator to ensure complete combustion takes place;
- regular servicing of the incinerator should be carried out;
- an advanced incinerator with a boiler and bag house should be acquired; and
- proper PPE should be worn at all times for workers in the Incinerator area.

Environmental Management Plan (EMP)

Goldenlay's management has committed to drafting and implementing an Environmental Management Plan (EMP). Goldenlay has completed drafting the EMP as well as the Social and Environmental Management System (SEMS) document. Both the EMP and SEMS documents incorporate the recommendations made by the permit conditions, local law, SEDD recommendations ISO 14000 and the IFC EHS sector supplement guidelines. Management has commenced obtaining baseline data for emissions and effluent generated from its operations, which will provide a suitable base comparison for future testing. It is recommended that Goldenlay continue to implement these policies and conduct annual reviews of the company's performance.

Annexure A : Census

Occupancy list 18/11/2013

House No	Full name	Position/occupation
Old houses		
1	Mohammed Bushary	Managing Director
2	Fletcher Broad	Operations Director
3	Joseph Nonde	Production Manager
4	Helgardt Van Rooyen	General Manager Ops
5	Shadreck Mwenda	Electrician
6	Kelvin Chinamachibi	Security Guard
7	Woollet Sambaombe	Maintenance
8	Samuel Sianemba	Guard
9	Abel Tembo	Driver
10	Fatima Teteka	House Servant
11	Kapenda Chipulu	Security Guard
12	Mr Simwanza	Contractor
13	Samuel Mfula	Security Guard
14	Terence Chose	House Servant
15	Doreen Siwo	Sales
16	Lyson Lungu	Security Guard
17	Deborah Chisenga	Egg Room
18	Caroline Musenge	Sales
19	Samson Mazimba	Security Guard
20	Edward Mwansa	Security Guard
21	Nickson Mwanza	Soya Plant
22	Mary Kasaba Musunga	Cook
23	Francis Mwewa	Driver
24	James Kasoka	Security Guard
25	Ronald Mwansa	Feedmill
26	Mulenga Kafula	Security Guard
27	Chanda Fulaule	Guard
28	Vestone Mashabe	Millsman
29	Chikungulu Mwansa	Security
30	Rodwell Sichembe	House Servant
31	Alfred Munthali	Security Guard
32	Simon Chimpishanya	Egg Room
33	Friday Nkandu	Mechanic
34	Faith Sakala	Domestic Worker
35	Mattias Mwanza	Security Guard
36	John Chileshe	Welder's Assistant
37	Michael M Lungu	House Servant D2
38	Christian Mukolwe	Security Guard
New houses		
39	Michael Lungu	House Servant D1
40	Davis Chamalanda	Tractor Driver
41	Brian Lungu	Guard
42	Charles Shinaka	Plumber
43	Leonard Chama	Stores
44	Evans Chipili	Electrician
45	Shilton Mfula	Mechanic
46	Shadreck Mwape	Supervisor
47	Japhet Malupande	Plumber
48	Vacant	
Forest Farm		
1.	Lazarous Nyirenda	Workshop
2.	Andrew Mulenga	Welder