

# TERRA Industrial Farming Complex Environmental and Social Impact Assessment

Report Prepared for

**TERRA S.P.R.L**



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Report Prepared by



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# **TERRA Industrial Farming Complex Environmental and Social Impact Assessment**

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## Disclaimer

The opinions expressed in this report have been based on the baseline information collected by SRK Consulting (Democratic Republic of Congo) Pty Ltd through social, stakeholder engagement and water resources site visits and interviews with key informants in the area. Additionally other primary and secondary information was supplied to SRK by TERRA SPRL. The opinions in this report are provided in response to a specific request from TERRA. SRK has exercised all due care in reviewing the supplied information and data from TERRA. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

## Executive Summary

SRK Consulting (Democratic Republic of Congo) Pty Ltd (SRK) has been requested by TERRA SPRL (TERRA) to prepare an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Programme (ESMP) for the development of a rain-fed maize farming project in Lumumbashi, Democratic Republic of Congo (DRC). The proposed TERRA project plans to establish a maize plantation of 10,000 hectares (ha) on two sites, Lubanda (5,000 ha) and Katofio (5,000 ha). Approximately 1,500 ha is currently being cultivated at the Lubanda site.

A local consultant (GAC) has previously conducted an ESIA for the TERRA project in April 2010. This ESIA and ESMP are required for lender funding purposes (International Finance Corporation (IFC)) and therefore needs to comply with international standards. The ESIA and ESMP intends on filling the gaps in the GAC report and is compiled in accordance with good international industry practice (GIIP) based on the Equator Principles (EP) and IFC's Performance Standards (IFC, PS) on environmental and social sustainability, as well as aligns with TERRA's corporate policies.

SRK prepared this ESIA and ESMP following the collection of additional baseline information and stakeholder engagement with informants in the project area. The ESIA includes a detailed impact assessment and management plan.

### Project location

The TERRA project is located approximately 90 km east of Lubumbashi and 80 km south of Kundelungu National Park, DRC. The project site is situated within the vicinity of the N5 road (Route Kasenga) to the south in the surrounding area of the Lubanda Village, Kasenga territory, Haut-Katanga District in Katanga Province.

### Project description

As mentioned above, TERRA is currently cultivating maize rain-fed project in a 1 500 ha area located around the Lubanda site. In the year 2011-2012 TERRA produced approximately eight thousand tons of Grade A white maize. TERRA plans to increase their production by clearing an additional 8 500 ha of land for maize plantation. The maize will be grown on a total of approximately 9 500 ha after allowances are made for access roads and related infrastructure, and will significantly increase the Katanga Province's maize production. TERRA's production will, reach approximately 80 thousand tons a year, which is equivalent to 8% of the current national maize deficit in Katanga. With the production of that magnitude, the TERRA agricultural project is expected to become the largest maize farm in the DRC.

In addition to the excess demand that already exists, TERRA is expected to benefit from the opportunity created by a new legislation in Katanga that requires all mining companies in the province to supply 25kg per month of maize meal to all of their employees.

Maize is a tropical grass that is well adapted to many climates and hence has wide-ranging maturities from 70 days to 210 days. Maize plants are erect and may grow as tall as 3m, with little tillering capacity. White maize is the type of maize grown by TERRA. The seed of a maize plant is called the kernel and consists of three major parts: the fruit wall, endosperm and embryo. The kernel is made up of approximately 10% protein, 70% carbohydrate, 2.3% crude fibre and 1.4% ash. It is also a source of Vitamins A and E, riboflavin and nicotinic acid.

- Maize is the main dry land crop planned on the two farms and will be planted in October to November and harvested between May and August of the following year. Summary of the cultivation process. The maize cultivation process and associated calendar for different stages are illustrated in the table below.

**Table 1: Maize cultivation process and associated calendar**

Crops type	Characteristic	Comments
Land Clearing	Dozing, levelling, etc.	From May to October
Crop processing	Ploughing	From August to November
	Seedling	
Crop husbandry	Crop establishment	From November to Earlier December
	Fertiliser for sowing	
	Maintenance at crop establishment (weeding)	
Crop handling	Harvesting	From May to September

The maize crop is the rainy crop; the rainfall is sufficient in this region and provides necessary water. No irrigation is necessary for the TERRA project. Maize goes through various growth stages such as: flowering, cob and kernel development, maturity and harvesting. When the husk covers the cobs, they dry out and turn brown and the grain hardens, this is when the crop should be harvested. Harvesting is done with a machine called combined harvester. The seedlings are maintained by application of different fertilizers and agrochemicals including:

- Herbicides
- Nematicides and insecticides
- Fertilizers

The total range of pesticides fertilizers to be used includes nitrogenous and phosphates. Harvesting of maize is done mechanically. Harvesting machines with in-field tractor-trailer combination (7 tonne capacity trailers) delivers maize to 15 tonne trailers on the side of the fields (loading zones). Two or three of these 16 tonne capacity trailers is then hauled by one tractor to the storage facility. Mechanical harvesting of the maize will leave leaves and tops in the fields that will be burnt to avoid the growth of weeds.

Currently maize is packaged in 50kg bags stored in a warehouse. Thereafter the bags are transported by trucks over a distance of about 90kms to Lubumbashi where it is sold. Currently the works carried out on the TERRA site during the different phases have required certain facilities and infrastructures. With the development of the project, other facilities and infrastructures are planned for farming operations such as:

- Mechanical Workshop;
- Storage facilities for crops;
- Storage facilities for pesticide, fertiliser, insecticides and other chemical used for farming;
- Fuel storage and distribution facilities;
- Garages;
- Various access and on site roads;
- Domestic waste storage facility;
- Domestic and potable water reticulations ;
- The electric power supply facilities with the solar panels; and
- Accommodations facilities for the working force.
- Block drainage system.

For the TERRA project power is supplied by three generators and solar panels. The type of wastes generated by the TERRA project includes:

- Organic waste: maize crops remained after harvesting, trees
- Waste water: pack house, spray and fertigation stations
- Iron/metal (nails, welding rods etc.) used oil filters, parts that are replaced from machineries/generators
- Office paper, packing boxes: from office work
- Agrochemical containers from agrochemical usage
- Used engine oil and used lubricants from farm machinery maintenance.

Wastes will be disposed of in accordance with DRC and lender requirements including the IFC EHS Guidelines. A waste management facility (WMF) is on the site including hazardous waste from the project. Co-processing (incineration) or project-generated and local waste will require feasibility assessment as the size of the farming operation increases. Package sewage treatment plants have been chosen over septic tank based on the improved treatment of sewage and larger numbers of employees which the system can deal with.

TERRA provides accommodation facilities for its employees. The accommodation capacity currently is as follows:

- 10 expats
- 5 for seniors Congolese
- 30 for general workers and
- Housing for 200 labours and 40 regular staff also provided.

TERRA plays an integral role in developing communities in close proximity to its farming activities, which in turn has a positive and multiplier effect on the economy in the region. TERRA has worked with the Local Government in identifying the needs of the local community and has already donated the following:

- Two boreholes in the Lubanda villages
- Regular donation of medicines to local clinics as a contribution to health and family welfare of the surrounding villages
- Installation of 10, 50 watt solar street lights at strategic points.

The following are earmarked projects over the next five years, where TERRA will continue to work with relevant authorities to identify priorities:

- Revamp schools and provide educational material
- Create training program for small groups farmers
- Continue solar lighting solutions for surrounding villages
- Continue water solutions.



## **ESIA and ESMP approach**

The ESIA and ESMP is being undertaken to ensure that the environmental and social impacts of the project are fully understood and adequately managed. The ESIA also provide valuable input into project planning decisions. For this project, the process involved the development of an ESIA to meet international legislative requirements. SRK has undertaken an ESIA (this report) which will be submitted to the IFC for disclosure (60 days). Thereafter the report will be updated based on feedback from the IFC, TERRA and its agents. TERRA is recommended to compile a comprehensive ESIA which complies with GIIP, including with the IFCPS and World Bank EHS standards.

## **Stakeholder engagement**

SRK undertook focus group and key informant meetings between December 2013- March 2014 for the ESIA, during which stakeholders were informed about progress with the project and were invited to comment. Information sharing and planning meetings were also held with traditional and administrative authorities representing local. Stakeholder comments reflected a positive perception about the project, with perceived benefits including provision of job and business development opportunities, poverty reduction, and promotion of education, improvement to infrastructure (notably roads and electricity) and health facilities, as well as increased social mobility being major themes. Government officials responded favourably in terms of expectations of macroeconomic benefits and improved availability, as well as pricing of maize in DRC.

Comments, issues and overall perceptions expressed by stakeholders consulted during the focus group meetings and key informant interviews undertaken by SRK in February 2014 for the ESIA mirrored those of the ESIA conducted in 2010 by GAC. Items noted included a request for support for local farmers, improved road access, improved lives for the youth, reduced reliance on charcoal-making which impacts on the environment, and alcoholism linked to unemployment. Opportunities for collaboration by TERRA with local non-governmental and government (including police) structures were noted. Concerns raised included perceived low salaries, limited availability of potable water for both communities, loss of agricultural land from the project footprint, as well as air pollution and dust impacts from the project. Since the GAC ESIA in 2010, TERRA have addressed some of these issues by complying with the DRC Labour Code with regards to salaries and has installed two boreholes in the surrounding villages as part of TERRAs corporate social responsibility.

Public disclosure of the ESIA was undertaken through the distribution of a Background Information Document (BID) in French. The BID describes the project and provides a summary of the key findings and recommendations of the specialist studies. Stakeholders were been notified by letter in French and Swahili. The BID indicates where to find the reports and how to comment. Stakeholders had the opportunity to comment either by completing the comment form available with the BID or writing a letter or sending an email by 20 March 2014 to the contact details provided.

Copies of the BID together with the notification letter and comment form were delivered to the relevant authorities in Lubumbashi, the Territory Office in Kasenga and Kipushi, as well as to traditional authorities and community leaders in the project area, for distribution to community members.

A total of approximately 100 comments sheets in French were distributed to stakeholders during scoping phase of the ESIA update. To date, the key comments received from stakeholders on the ESIA update, focus mainly on the following:

- Employment opportunities for local communities
- Concern about potential impacts of project related activities on water resources in the area.

- Hope that TERRA will continue to adhere to high standards and provide fair treatment and good salaries to employees.

For a detailed description of the key issues raised during stakeholder engagement, refer to Appendix B of this report. An additional round of stakeholder engagement is proposed for the comprehensive ESIA and ESMP phase.

## Baseline environment

Table 1 below summarises the biophysical and socio-economic trends in the TERRA project area.

Aspect	Description
Geology	The project is located within the Central African Copper belt and the stratigraphy of the area is divided into a younger Kundelungu Supergroup underlain by an older Roan Supergroup. The project area is entirely underlain by the Kundelungu Group, formerly called the Upper Kundelungu, of the Katangan Series. The Kundelungu is 300 m thick, comprises mainly argillaceous to sandy clastic rocks and is underlain by the ' <i>Petit Conglomerat</i> ' a <i>diamictite</i> .
Topography	The project area is characterised by a flat area with gently undulating topography at the North limit of the concession. The TERRA farms are situated in the "Highlands" The area's elevation is roughly 1,200m above sea level.
Soils	<p>The soils in the Lubanda area can be grouped with the soils north and east of the Lubanda Lake, and extended to the south of the lake towards Minga. Upper layers with humus are visible in the total area and are the result of bush fire and the thickness increases from the savannah to the light forest areas.</p> <p>In general these soils are sandy soil, rich in clay and belong to the zonal soils of type A-2, yellowish red and well drained.</p> <p>The soils in the concession area of Lubanda are characterized by three groups of soil:</p> <ul style="list-style-type: none"> <li>• The ferrisols or ferrasols;</li> <li>• The sandy formations of pilocene; and</li> <li>• Alluvium moderns, hydromorphic.</li> </ul> <p>• Due to low (nearly no) human activity in the area, the soil is expected to be clean. Soils are not prone to erosion in the TERRA concession.</p>
Land use	<p>The site is located within an area characterised by livestock farming and rural settlements. Shifting cultivation forms the basis of the farming system in the Lubanda and Katofio area. Food crops (cassava, plantains, bananas, maize, soya beans, beans and sweet potatoes) are produced. Typically, an average household may own 5-10 ha of land but usually only 1ha or less under cultivation.</p> <p>Natural resources used regularly by local residents include wood, fish and wild animals, building materials, medicinal plants, and potable water.</p>
Biodiversity	<p>The DRC is considered to be the most biologically diverse country in Africa, with at least 11000 plant species having been recorded, of which 29% are found only in the DRC. The study area is dominated by miombo woodland, followed by scrub, cultivation, and wetland habitat. No species of conservation importance (i.e. Red Data and DRC legislation) were observed. Alien invasive and weedy plant species occur throughout the TERRA concession, but are primarily associated with disturbed/transformed areas such as along roads and around fields and villages.</p> <p>Faunal diversity in the TERRA farming area is represented by mammals, rodents, fish, birds, molluscs and invertebrates. The general degraded character of natural habitats in the concession areas has resulted in a deteriorated faunal diversity.</p> <p>No Red Data mammals were recorded within the TERRA concession during the faunal surveys. Occurrence of these mammals is limited by continued habitat disturbance and loss regionally.</p> <p>The TERRA concessions area is located 80km from the Kundelungu National Park, which is a sensitive area. The hydrological system of the concession is dominated by the presence of Lubanda Lake, which according to DRC regulations, are also sensitive ecosystems.</p>
Water resources	There are no restrictions on the use of irrigation water on either of the farms but irrigation is at present only done on the Lubanda farm. The project area is characterised by a flat area with gently undulating topography. The hydrology system of

	<p>the concession area is predominantly characterized by the Lubanda lac and wetland area.</p> <p>Three main rivers cross through the project area and all the rivers converged at the Lubanda Lake: the Kafira River, flowing in a northerly direction, the Kabemba in the East and the Kalemba River, which originates from the West cross the Lubanda village and flows eastwards to connect onto the Lubanda Lake. These rivers, as well as the wetlands including the Lubanda Lake, are used as a source of potable water to the surrounding villages.</p> <p>While the proposed site preparation and facility for farming activities for the project are not anticipated to cause any short-term or long-term groundwater impacts, GIIP will need to be employed during the farming operation to ensure impacts (if any) are minimal and are properly mitigated.</p> <p>The water is of good quality with levels within the guideline limits with the exception of iron (with concentration ranging between 1.4 and 2 mg/l) which is above the stipulated concentration limit for drinking water of 0.3 mg/l.</p> <p>There are two boreholes in the project area that are used for domestic purposes.</p>
Climate	<p>The TERRA project is located south of the equator within a tropical wet and dry climatic zone, with a five-month dry season (May to September) and a seven-month rainy season (October to April). Average rainfall is 1000 mm per annum. Temperatures vary between 1 degree Celsius and 37 degrees Celsius but average temperatures are between 6 degrees Celsius in June and 33 degrees Celsius November.</p> <p>South-easterly winds prevail during the dry season while north westerly winds are prevalent during the wet season. Wind speeds are generally low, less than 5 or 10 km/h.</p>
Air quality	<p>Due to the current lack of industrial development, air pollution levels in the area are low. Key emissions are airborne dust from vehicles on the nearby road; smoke from burning of agriculture residues and bushes; and coal and dust from household fires. Transportation through this area is very limited coupled with the presence of a few income generating activities, the air quality is expected to be good. There is no information on the effects of climate change on the rivers in the area and potential floods. The DRC is deemed to be a sink for carbon.</p>
Noise	<p>The TERRA project will generate no significant noise levels during its farming operations. The principal noise emission source is tractors, vehicles and generators. DRC Regulation<sup>2</sup> allows ambient noise level during the day (07:00 to 19:00) of 45 dBA and during the night (19:00 to 07:00), 40 dBA.</p>
Visual character	<p>Visual intrusion and loss of a “sense of place” may occur directly as a result of installation of project infrastructure and changes to the landscape (due primarily to vegetation clearing and construction of associated infrastructures). Indirect impacts may also result from dust blown from exposed surfaces and farming operations such as tillage, ploughing , as well as lighting of site infrastructure in an otherwise relatively unlit environment, both of which could be visible from a considerable distance. Non waste such as building rubble and domestic waste, both directly and indirectly (due to increased population and development in the area) related to the Terra Project, is another aspect that could result in a negative change in visual character of the area.</p>
Traffic and transportation	<p>Traffic volumes in the study area are low, with only 3289 vehicles observed over a period of 24 hours on the N5 highway. A large portion of this traffic is attributed to light vehicles, followed by light trucks and light cars. Very few heavy trucks utilise this route. The main highway in Lubumbashi is the N5.</p>
Socio-economic	<p>There are over 250 ethnic groups in the DRC, the biggest of which include the Lubas, the Kongos, the Mongos and the Mangbetu-Azande. The Bembas are by far the most dominant ethnic group in the area.</p> <p>A household survey was conducted within the project area. 91.3% of males constitute household heads, leaving a small percentage of women-headed homes. There are less males aged 0-45 than females in the project area.</p> <p>French is the official language and the mode of instruction at schools in the DRC. Lingala is mostly spoken in and around Kinshasa (the capital), in the west of the country. However, most people in the project area stated that Kibemba was their first language (73%).</p> <p>Land in the project area is easily accessible to households, where people are allowed to use the land free of charge provided that prior consent is given by the traditional authority – usually by the village chief.</p> <p>Literacy rates in the project area are low. The results of the household survey show that</p>

	<p>29.5% of the people aged 6 and older are not and have not attended school, that 21.4% of the people aged 18 and above have a secondary education or more and that 2% of the population in the area has some form of tertiary education.</p> <p>People living in the project area sought their basic medical advice from a number of clinics, health posts, dispensaries and pharmacies. However, medical facilities are not adequate in terms of quality and quantity and that patients travel to Lubumbashi to treat more severe cases.</p> <p>Households typically comprise one structure with two to three rooms including bedrooms and living room, forming a compound. People cook and shower outside. People in the project area get their water from two main sources, namely hand dug wells and streams/rivers.</p> <p>Employment opportunities in the area are scarce. Most people therefore rely on the informal sector or on subsistence farming and animal husbandry to meet their basic needs.</p> <p>Farming is the main activity in the area, followed by sand exploitation, fishing and hunting.</p>
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### Impacts identified during the ESIA

A standardised impact assessment methodology was used to identify and rate the significance of potential environmental and social impacts arising from the proposed project. It should be noted that a precautionary approach was applied in assessing impacts given that certain baseline investigations are still underway. Hence the significance of impacts may change in the Comprehensive ESIA. The negative environmental and social impacts can be mitigated by identified management measures and the significance of the majority of potential impacts can be reduced to low negative post-mitigation.

### Environmental and Social Management Plan

The ESMP presents the management/mitigation measures of the identified potential impacts associated with the project, including air quality, water resources, biodiversity, noise, traffic, economic development and social. It also sets out the organisational structure, roles and responsibilities of staff and the requirements for monitoring, review and reporting.

### Plans developed and pending

Key plans containing specific management and mitigation measures provided by specialists and the SRK project team are included in the main body of the ESMP. The Stakeholder Engagement Plan (SEP), incorporating the stakeholder grievance mechanism is the only 'stand-alone' plan. The list of plans to date is as follows:

- Environmental Awareness Plan;
- Construction and Land Clearing Control Plan;
- Community Health and Safety Plan (CHSP);
- Emergency Preparedness and Response Plan (EPRP);
- Cultural Heritage Management Plan and Chance Find Procedure;
- Influx Management Plan;
- Contractor Management Plan;
- Employment and Capacity Plan;
- Water Management Programme.

### Stand-alone plans that have been developed include the following:

- SEP, incorporating the stakeholder grievance mechanism.

**Additional plans that should be included in the comprehensive ESIA and ESMP include:**

- Water quality and quantity
- Air quality management plan
- Biodiversity management plan
- Waste management plan
- Occupational health and safety plan (OHSP)

**Conclusion**

SRK has undertaken the ESIA (this report) which will be submitted to the IFC for disclosure (60 days). Thereafter the report will be updated based on feedback from the IFC, TERRA and its agents. TERRA is recommended to compile a comprehensive ESIA which complies with GIIP, including with the IFCPS and World Bank EHS standards.

This ESIA and ESMP is the first and only of SRK's key deliverables towards the development of a Comprehensive ESIA and ESMP during 2014. It should be noted that owing to the limited baseline information and data available at this stage, the impact assessment has taken the precautionary approach with negative impacts potentially rated higher than they might. The ESIA incorporates the following components:

- An outline of the baseline environment and description of the proposed activity;
- A description of the ESIA and ESMP process, as well as stakeholder documentation including the key issues and concerns raised by stakeholders during the project process to date;
- Overview of findings of the specialist studies undertaken to date; and
- Environmental and social impact assessment and management measures for the construction and operational phases.

The project site is located approximately 90 km east of Lubumbashi and 80 km south of Kundelungu National Park in the vicinity of the N5 road (Route Kasenga) to the south in the surrounding area of the Lubanda Village, Kasenga territory, Haut-Katanga District in Katanga Province of DRC. The vegetation dominating the immediate vicinity of the TERRA farms is savannah with grasses such as *Hyperhenia*, *Panicum* and *Imperata* species. The forest trees in the area are of the Zambezi type (*Miombo*), *Brachystegia* and *Pterocarpus* species. The diversity of mammals in the project area is low and that of bird's moderate, while insects showed higher diversity. A number of Red List species occur in the area, most of them being specific to forest habitat. Local communities are reliant on subsistence agriculture to meet their basic livelihood needs. Potable water for domestic and animal consumption is mainly sourced from boreholes in the villages highlighting the importance of groundwater resources.

The ESIA has involved one round of stakeholder engagement with government, community and non-governmental role players, with more engagement proposed to follow in the process of developing the final ESIA and ESMP. Stakeholder documentation has included a BID for the ESIA and ESMP. The report proposes measures in the Stakeholder Engagement Plan (SEP) (including grievance mechanism process) to address stakeholder issues during all project phases. Concerns about the project are explained the Issues and Responses Report (IRR) (Appendix B of the main report). The project is widely welcomed by stakeholders, with development expectations including employment and services.

As part of the ESIA by GAC, a site survey for baseline data collection, and environmental monitoring for data collection was carried out by the experts of GAC in 2010. The subsequent ESIA by SRK

included an additional site survey undertaken from December 2013 to March 2014 by key specialists from SRK's project team to fill critical gaps and update the baseline information where possible. The four month project timeframe did not however allow for detailed primary data collection and analysis, and where relevant, limitations in this regard are noted. The following specialist studies were undertaken by SRK: surface and groundwater; socioeconomic; and biodiversity, and updated the baseline information presented in the 2010 ESIA. The project is anticipated to bring regional and local economic benefit including through job creation. Key potential negative impacts requiring careful management during construction include impacts from construction activities (e.g. loss of flora and biodiversity, noise and dust), social disruption from influx of workers, traffic and road safety, as well as soil erosion. During operation, key potential negative impacts could include groundwater drawdown leading to lowering of the water table, which in turn could impact communities' water availability. Air pollution from dust of construction and tractors and ongoing social disruption from traffic and risk of disease are potential impacts for communities in the immediate vicinity of the development.

Findings from specialist input to the ESIA include the need for review of community development issues which should proceed as a priority during the Comprehensive ESIA and ESMP phase. These issues will form the focus of in-depth social baseline investigations, analysis and recommendations.

The Comprehensive ESIA and ESMP should contain detailed recommendations and plans for management, monitoring, audit and review for the lifetime of the project, covering aspects including social impacts, air pollution, water quality and quantity, cultural heritage as well as biodiversity.

It is anticipated that it will be possible to successfully mitigate impacts associated with the development, with no fatal flaws having been identified to date. The ESMP should be integrated into TERRA's ESMS which should be aligned with the requirement for certification.

# 1 Introduction

## 1.1 Background to project

SRK Consulting (Democratic Republic of Congo) Pty Ltd (SRK) has been requested by TERRA SPRL (TERRA) to prepare an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Programme (ESMP) according to International Finance Corporation (IFC) standards to develop a rain-fed maize farming project which is located 90 km east of Lumumbashi town. The proposed project plans to establish a maize plantation of 10,000 hectares (ha) on two sites, Lubanda (5,000 ha) and Katofio (5,000 ha). Approximately 1,500 ha is being cultivated at the Lubanda site.

An ESIA for the TERRA project was conducted by a local consultant (GAC) in April 2010. This ESIA and ESMP needs to comply with good international industry practice (GIIP) based on the Equator Principles (EP) and IFC's Performance Standards (IFC, PS) on environmental and social sustainability, as well as align with TERRA's corporate policies.

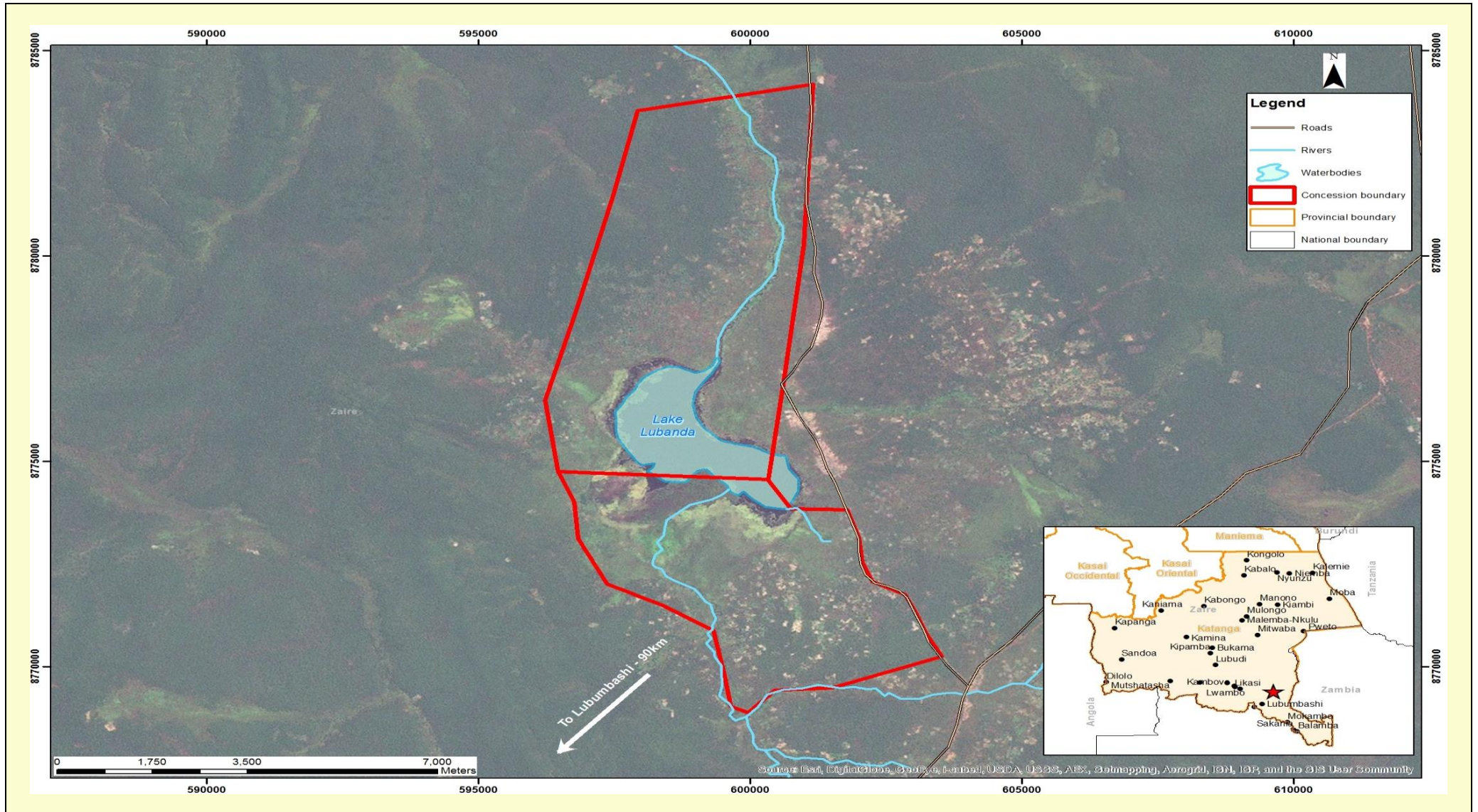
This report is commissioned mainly for the purpose of IFC funding and not for submission to the DRC government. This ESIA and ESMP are intended to fill in the gaps in the GAC report and prepare an ESIA and ESMP that meets EP and IFC PS standards. Where appropriate, information has been extracted from the ESIA report (prepared by GAC). In addition to reviewing the GAC report, SRK undertook the following:

- Site visits by the water and social team to collect additional baseline data and fill in the gaps identified in the GAC report. This included the water team taking water samples and testing of water quality from handdug wells and boreholes.
- Meetings with key informants in the project area;
- Household survey with community members in the project area;
- Collection of baseline information pertaining to traffic and biodiversity;
- Reviewed existing and available information and data; and
- Undertook stakeholder engagement with key informants and community members in the surrounding area (The stakeholder engagement process is further explained in Section 3 of this report).

Based on SRK's reviews, specialist information, data collection and opinions, an ESIA and ESMP were prepared. This ESIA includes a detailed impact assessment and management plan.

## 1.2 Geographical setting

The project site is located approximately 90 km east of Lubumbashi and 90 km south of Kundelungu National Park in the vicinity of the N5 road (Route Kasenga) to the south in the surrounding area of the Lubanda Village, Kasenga territory, Haut-Katanga District in Katanga Province of DRC. The figure below illustrates the regional locality of the TERRA project.



**Figure 1-1: Regional Locality Map of the TERRA project area**



### 1.3 Project team

The SRK team is largely made up of staff from SRK's DRC and South African offices, as well as specialist sub-consultants. The core team members and their roles are outlined in Table 1-1. SRK is the overall project manager for the ESIA process and has provided reporting expertise; given insight on interpretation of the relevant guidelines and standards; and co-ordinated liaison with the client team. Where possible, in-country expertise (both from SRK's DRC office and local sub-contractors) has provided logistical support, undertaken a heritage assessment, assist with species identification for ecological studies, interview communities during the socio-economic surveys, and conducted stakeholder consultations.

**Table 1-1: SRK ESIA team members**

Company	Name	Role in ESIA Process	Qualifications/Experience
SRK Project management team	Darryll Killian	Project reviewer	Partner; Principal Environmental Scientist MSc (Environmental)
	Susa Maleba	Project co-ordinator	DRC Country Manager; Mining Consultant BSc (Hons) (Mines environmental Control)
	Natasha Anamuthoo	Reporting	Environmental Scientist B Soc Sc Geogrphy and Environmnetal Management, CEAPSA
SRK SA specialist team	Azwindini Mukheli	Water resources study update	MESc, Earth Science, University of Venda, in progress BSc (Hons), Geohydrology, UFS, 2011 B.ESc (Hons), Earth Sciences, Univen, 2003
	Vuyo Matshikiza	Socio-economic study co-ordinator	BCom (Hons) Economics; Socio-economist
	Vis Reddy	Air quality study update (desktop)	Partner, Principal Consultant MSc (Environmental Geochemistry), Pr.Sci.Nat.
	Dhiren Naidoo	Air quality specialist input and impact rating	Principal Climate Change Consultant; MPhil (Env Science)
SRK DRC	Huguette Besa Nyemba	Stakeholder engagement / social baseline field study. Logistical support	Undergraduate: Sciences and Technics of development
	Patrick Mboma	Stakeholder engagement / social baseline field study	BSc, Geography; Environmental Scientist
	Philippe Katuta	Stakeholder engagement / social baseline field study	BSc, Chemistry; Environmental Scientist

## 1.4 Project's sponsor

TERRA SPRL is a leading agribusiness company, headquartered in Lubumbashi, with a vision to become a Pan-African agricultural company with a diverse portfolio of farming activities. Its current primary focus is growing white maize, the main staple food within the province of Katanga, as part of an import replacement strategy for the region.

The TERRA management has extensive experience in international project development, particularly in Sub-Saharan Africa. The company aims to implement a quality maize production in the Katanga province and expects to become the largest maize farm in the DRC by 2016.

Company	TERRA SARL
Address	African Milling Company Congo S.P.R.L. 5457 Route Kinsevere, Lubumbashi, Katanga Province, Democratic Republic of Congo
	TERRA Farm, Route Kundelungu, Haut Katanga District, Katanga Province.
Registration Number in the New Trade Register	10066
National Identification Number	6-0-N46901N
Company Status	Limited (SPRL)

## 1.5 Potential project lender organisations

- IFC and
- World Bank

## 1.6 Purpose of the report

The ESIA report is submitted to the lenders for review and consideration for funding purpose. This report will also be made available for public review and disclosure. The purpose of this report is to:

- Present the project;
- Provide an overview of the environmental and social systems affected by the project;
- Assess the impacts of the project's operations on the physical, biological and social environment;
- Program sensitization and information and keep minutes of meetings held with project affected parties and stakeholders concerned by or interested in the project;
- Design an environmental and social management plan comprising project and environmental monitoring mechanisms and the compensation plan, where necessary.
- Present an Environmental and Social Action Plan (ESAP) for ongoing and/or future management and monitoring related to the project;
- This report was prepared by SRK on the basis of:
  - A review of available documents reports and data regarding the proposed project;
  - Analysis of relevant studies and reports on maize production as relates to the proposed project supplied by TERRA and its agents;
  - Personal communications with TERRA management and their agents;
  - Engagement of key stakeholders through formal and informal village meetings;

- Household surveys conducted by SRK;
- Various field visits for baseline data collection;
- One on one interviews with individuals and groups; and
- SRK's specialist experience.

The ESIA and ESMP is undertaken to ensure that the environmental and social consequences of the project are understood and impacts are adequately managed. The ESIA and ESMP will also provide valuable input into project planning decisions.

## 2 Governance Framework

### 2.1 Introduction

This section provides an overview of the governance framework (relevant policies, directives and guidelines) applicable to the (ESIA) and (ESMP). The structure and content of the ESIA and ESMP is guided by legal requirements and guidelines including:

- The laws and regulations of the DRC including international treaties and agreements;
- TERRA's policies and standards;
- The EPs, IFC, PS;
- The World Bank (WB) Environment, Health and Safety (EHS) Guidelines;
- The legislation and regulations of the DRC, including international treaties and agreements that the DRC is signatory to (such as treaties that protect biodiversity, endangered species, various ecosystems and monitoring of greenhouse gas emissions);
- Good International Industry Practice (GIIP), and
- Any other benchmarks, guidelines and reference materials.

The scope of the ESIA and ESMP outlined in this report was developed in accordance with the abovementioned requirements and each one is described in further detail below.

### 2.2 DRC regulatory framework

#### 2.2.1 Constitution

The Constitution, also known as the Constitution of the Third Republic, was adopted by the Government on 18 February 2006. The preamble of the Constitution reaffirms Congo's adherence to human rights and the equal representation of men and women in state institutions. It further reaffirms adherence to the Universal Declaration of Human Rights, the African Charter on Human and Peoples' Rights (African Charter), and the UN conventions on the rights of children and women. The DRC has sanctioned all the main international human rights and humanitarian legal requirements, including the UN Convention on Civil and Political Rights and the UN Convention on Social, Economic and Cultural Rights. The Constitution also protects fundamental freedoms, including:

- Opinion, conscience and religion (Article 22);
- Expression (Article 23);
- Information, press and communication (Article 24);
- Privacy (Articles 29 and 31);
- Movement (Article 30);
- Assembly, demonstration and petition (Articles 25, 26 and 27, respectively);
- Asylum (Article 33) and;
- Protection of foreign nationals and their property (Article 32).

The Constitution fundamentally applies the right of cultural association and protection of its citizens' thereto in Article 45, implying the right to practice cultural beliefs and customs during cultural ceremonies and events, including funerals and the protection of cultural objects.

Article 53 of the DRC Constitution states that:

- Every person has a right to a healthy environment and which is favourable to his/her full development.
- The environment must be protected.
- The State must look after the protection of the environment and the health of the people.

Article 123 of the DRC Constitution makes provision for laws to be made concerning, inter alia, “the protection of the environment and tourism”.

Article 203 allows for co-operative governance by central government and the Provincial administrations “to protect the environment, natural sites and landscapes, and the conservation of such sites”. The Constitution of the Democratic Republic of the Congo of 18 February 2006 makes the following provisions:

- All Congolese are equal before the law and have the right to equal protection by the law (article 12);
- In education, access to public services or any other area, no Congolese shall be subject to discrimination, whether on the basis of law or executive action, on the grounds of religion, family origin, social status, residence, political opinions or convictions or of belonging to a race, ethnic group, tribe or cultural or linguistic minority (article 13);
- The State has the duty to ensure and promote the peaceful and harmonious coexistence of all of the country’s ethnic groups.
- It also ensures the protection and promotion of vulnerable groups and of all minorities. It ensures their development (Article 51).

## 2.2.2 DRC Agricultural Law, LOI N° 11/022 of 24 December 2011

**Title 2, Chapter 3: Institutional framework: Article 6:** Government defines and implements national agricultural policies, which provinces must to consider when formulating their by-laws. These national policies encompass the following: exploitation, research, production, finance and commercialization of agricultural inputs.

**Article 7:** Provincial government is responsible for formulating policies which have a bearing on the following:

- Description of available farming resources;
- Requirements relating to type and quantity of farming products; and
- Environmental protection;

**Article 8:** government is required to establish a consultative committee comprising public and private stakeholders and members of the community. A similar consultative community must be established at provincial level. This is the responsibility of provincial government.

**Title 3, Chapter: Farming: Article 10:** Land distribution is the responsibility of national, provincial and local government.

**Article 17:** the agricultural contract establishes the type of produce and the minimum quantity the project proponent must produce.

**Article 18:** the law recognizes that local communities have customary land rights

**Article 19:** official certificates are not allotted when customary land is given to individuals of collectives for farming.

**Article 24:** land owners are permitted to sublet their land to a third party for the purpose of farming. It is the owner's responsibility to comply with his obligations vis-à-vis government

**Article 32:** the owner of the concession has the following rights:

**Inside the concession –**

- use water and forest resources for farming provided that the recommendation of the ESIA and EMPP are adhered to;
- dig irrigation systems; and
- Inside the concession – build haul roads

**Article 33:** the roads built by the project proponent can be used by neighbouring roads users provided that they don't impede on the functioning to the enterprise.

**Chapter 6, Aspects relating to health and safety: Article 47:** national and provincial government is responsible for formulating policies relating to the following:

- prevention and fight against harmful organisms, including those in quarantine;
- the use of production harmful to the environment and to community health;
- import and export of inputs and outputs.

**Title 4: Environmental Protection: Article 66:** the project proponent must conduct an ESIA prior the commencement of the operation

**Article 67:** the ESIA must be conducted according to the legislation on environmental protection

**Article 68:** the Minister of the Environment should conduct an audit for sites susceptible to environmental damage

**Article 69:** all agricultural activities in or close to protected areas are forbidden

**Article 70:** National, provincial and local governments are responsible for identifying measures aimed at protecting the environment and people's health.

### 2.2.3 National Environmental Action Plan

The DRC formulated its National Environmental Action Plan (NEAP) in 1997, in response to Agenda 21 of the United Nations Conference on the Environment and Development held in Rio de Janeiro in 1992. The main finding was that the system of management of the country's natural resources was deficient and that a legal framework was urgently required.

The major issues identified in the NEAP were:

- Daily destruction of the environment as a result of extreme poverty, population growth and general ignorance about environmental matters;
- Water pollution, together with the absence of national water quality standards;
- Soil degradation in areas with high population densities;
- Air pollution resulting from the agricultural, industrial and energy industries; and
- Urban degradation and unhealthy conditions resulting from a combination of poor planning, the inability of municipal authorities to control the influx of migration to the cities, as well as population growth.

## 2.2.4 Framework Law on the Environment

The Framework Law on the environment lays down the general principles which serve as a basis for the specific laws for governing the different sectors of the environment. The Act specifies the requirement for an ESIA, an environmental audit, an environmental assessment of policies, plans and programs, the creation of an institutional framework, an Intervention Fund for the Environment, as well as the strengthening of penal provisions. In recognition of Article 123 (point 15) of the Constitution, the DRC government has promulgated the Framework Law on the Environment (Act No.11/009 of 9 July 2011). The Act aims to:

- Define the broad guidelines in terms of the protection of the environment;
- Direct the management of the immense potential held by the Republic in the form of natural resources, with a view to SD benefitting people;
- Reduce risks and combat all forms of pollution and nuisances; and
- Serve as a basis for specific legislation governing the conduct of sectors which, while distinct from the environment, have an undeniable direct or indirect impact.

The Framework Law on the Environment comprises the following nine chapters:

Chapter 1: General provisions;

Chapter 2: Institutional framework;

Chapter 3: Procedural mechanisms;

Chapter 4: Funding mechanisms;

Chapter 5: Management and Conservation of natural resources;

Chapter 6: Reducing risk and combating pollution and nuisances;

Chapter 7: Civil liability;

Chapter 8: Offences and penalties; and

Chapter 9: Temporary, final and repealing provisions.

Chapter 3 (Section 2) of the Framework Law on the Environment deals with Environmental and Social Impact Assessments (ESIAs). It requires in section 21 that projects which may have an impact on the environment including industrial, commercial, agricultural, forestry developments should submit an Environmental Impact Statement (EIS), accompanied by an Environmental Management Plan for the project (EMPP). It is intended that those activities requiring an environmental impact study will be listed in a Decree, which will also stipulate the required contents of the environmental impact assessment report, the terms of its approval and the public consultation procedure.

Article 23 requires audits to be carried out on any project or activity presenting a potential risk to the environment and communities, while Article 24 states the need for public involvement. Moreover, Chapter 5 (Articles 28 to 35) stipulates the conservation and sustainable management of ecosystems, natural resources and sites and monuments located on national territory as well as the need to develop and implement the sustainable management plans, programs and measures.

## 2.2.5 Agricultural project and land rights

The Land Affairs Department in Kipushi stated that there are no land title holders within the TERRA concessions (GAC EIA, 2010). This was further confirmed by the IFC in 2014.

## 2.2.6 The Environmental Protection Act (2012)

The DRC has specific legislation pertaining to the protection of cultural resources as specified in the newly legislated Environmental Protection Act. This act specifies general principles which serve as a basis for specific laws for governing the different sectors of the environment. Act No. 11/009 of 09 July 2011 Regarding Fundamental Principles Relating to the Protection of the Environment, Chapter 5: Management and Conservation of Natural Resources, Article 35 specifies that the State, the provinces and the decentralized territorial entity, within their respective jurisdictions, shall identify and ensure the protection, conservation and development of cultural and natural heritage. The DRC Environmental Protection Act came into effect in 2012. Article 203 of this act allows for cooperative governance by central government and the provincial administrations: *“to protect the environment, natural sites and landscapes, and the conservation of such sites.”*

## 2.2.7 Environmental legislation

In addition to the above legislation, there are numerous laws relating to environmental management in the DRC as listed in Table 2-1, but not limited thereto.

**Table 2-1: Key DRC environmental legislation**

Aspect	Agreement/convention
General environment	<ul style="list-style-type: none"> <li>National Environmental Action Plan (NEAP), 1997.</li> <li>Arrêté Ministériel No 043 of 8 December 2006 and No 8 of 3 April 2007.</li> <li>Framework Law on the Environment (Act No. 11/009 of the 9 July 2011).</li> <li>Ordinance No 07/018 of 16 May 2007.</li> <li>Code Foncier (1973, amended in 1980).</li> </ul>
Soils and land use	<ul style="list-style-type: none"> <li>Article 28 (Topography, Geology and Land Use) from Chapter II of Schedule IX, Decree no. 038/2003 of 26 March 2003.</li> <li>Article 75 (Dead Ground Management) of Chapter V of Schedule IX, Decree no. 038/2003 of 26 March 2003.</li> <li>Framework Law on the Environment (Act No. 11/009 of the 9 July 2011).</li> <li>Code Foncier (1973, amended in 1980).</li> </ul>
Water	<ul style="list-style-type: none"> <li>Decree of May 6, 1952 on water.</li> <li>Ordinance 52-443 of 21 December 1952.</li> <li>Regulation on lake and Watercourse contamination and pollution of 1 July, 1914.</li> <li>Article 30 to 33 from Chapter II of Schedule IX, Decree no. 038/2003 of 26 March 2003.</li> <li>Articles 53 to 74 of Schedule IX of the Decree no. 038/ 003 of 26 March 2003.</li> <li>Code Foncier (1973, amended in 1980).</li> </ul>
Climate and air quality	<ul style="list-style-type: none"> <li>Article 29 (Climate and Air Quality) of schedule IX of the Mining Regulations, Decree no. 038/2003 of 26 March 2003.</li> <li>Articles 49 to 52 of Schedule IX of the Decree no. 038/2003 of 26 March 2003.</li> </ul>
Biodiversity and protected areas	<ul style="list-style-type: none"> <li>Forest Code (Law 011 2002 of 28 May 2002).</li> <li>Nature Conservation Law (Regulation no 69-041) of 22 August 1969.</li> <li>Regulation 79-244 of 16 October 1997 Amended 1995 and 1996).</li> <li>Law no 75-023 of 22 July 1975 and Regulation no 78-190 of 5 May 1978.</li> <li>Ministerial decree no 55 of 7 December 2006.</li> <li>Articles 34 to 37 (Biological Environment) of Schedule IX of the Decree no. 038/2003 of 26 March 2003.</li> </ul>



Aspect	Agreement/convention
	<ul style="list-style-type: none"> <li>Schedule XII of the Decree no. 038/2003 of 26 March 2003.</li> <li>Code Foncier (1973, amended in 1980).</li> </ul>
Noise and vibrations	<ul style="list-style-type: none"> <li>Articles 46 to 48 from Chapter II of Schedule IX, Decree no. 038/2003 of 26 March 2003.</li> </ul>
Cultural heritage	<ul style="list-style-type: none"> <li>Ordinance 70-089 of 11 March 1970.</li> <li>Ordinance 71-016 of 15 March 1971.</li> <li>Article 46 of the Constitution of the DRC of 18 February 2006.</li> <li>Articles 205 and 206.</li> </ul>
Resettlement	<ul style="list-style-type: none"> <li>Code Foncier Immobilier et Regime Des Suretés, 5 April 2006.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>Framework Law on the Environment (Act No. 11/009 of the 9 July 2011).</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>Hunting law (Act No 82/002 of the 1 June 1982)</li> </ul>

## 2.2.8 Land Tenure System

In the past the project area belonged to the community Bemba. After the independence in 1960, the new state became the sole custodian of the land including forests and mineral resources. This law was reinforced by the ratification of the "Loi Foncier" or Law of the Land 1973.

Today, the DRC government has sovereignty over the land and is the proprietor of the land. The Constitution recognises private ownership of the land and its resources, obtainable through Common or Customary Law.

TERRA initiated in 2006, the Land Acquisition process for the Lubanda concession and in 2008 for the Katofio concession.

The current chief of the groupement operated since 2008 succeeding the previous leader of grouping who died in early 2006. The leader of the grouping in the interim, Mr Modest Mofia had received the delegates of TERRA in 2006 at the time of the request of land. The current leader confirmed that the procedure as required by custom, had been respected. He also gave his full support to TERRA and confirmed that he has followed progress of the project through the different steps of development, including obtaining the legal documents of its concession in accordance with land law.

## 2.2.9 Legal land right

The legal framework allowing the implantation of the TERRA project is Act No. 75-021 dated of July 20, 1973 related to the general regime of property, real estate regime and regime of safety, as amended and supplemented by Law No. 008 of the July 18, 1980 (land law). The concession area allocated to the project is 10,000 hectares, with 5 000 ha to Lubanda and 5000 ha to Katofio. According to the rights obtained by the company, TERRA can:

- Occupy;
- Clear;
- Develop; and
- Use a total of 10,000 ha.

Initially, the concession was obtained for a five-year period, however after demonstrating progress with regards to land development, the concessions were granted for a 25-year period. As part of the process of attaining these rights, TERRA consulted and sought permission with various stakeholders, including the local chief, local administrators, as well as the ministry of agriculture and environmental affairs. The concession contracts have been conferred for adjacent 1,000ha blocks.

The farming land rights for both Lubanda and katofio concession areas includes following titles respectively.

**Table 2-2: Terra project land right**

<b>Lubanda Concession (5000 ha)</b>
<ul style="list-style-type: none"> <li>• Request for land of the TERRA Sprl No.30/09/2006 ;</li> <li>• Decree No. 550/33/BUR-CSD-KAT/2006 dated 3/10/2006 from the District Commissioner of the Haut Katanga on opening investigation, prior to the concession of rural land;</li> <li>• Authorisation of customary occupation of land for agro-pastoral use No. 552/001/BUR.COST/GPT/KAT/006 from the Chief of the Groupement Katete dated 4/10/2006 ;</li> <li>• Authorization of occupation of land for agricultural use and the rearing of small and large livestock d ated 6/10/2006 from the Head of Sector of Kafira ;</li> <li>• Convention of occupation of land for agricultural use and the rearing of small and large livestock between the Sector of Kafira and the Company TERRA dated 6/10/2010 ;</li> <li>• Mission Order no. 10,161 / 105/HT-KAT/2006 of the Service of the Public Service of the District of Katanga 12/10/2006 laying Delimitation Agricultural Concession to Lubanda, grouping Katete, Territory of Kasenga in the account of TERRA Sprl</li> <li>• Road Map No. 10,161 /BUR-DIST/FPA/ 104/HT-KAT/2006 10/18/2006 ;</li> <li>• Minutes of investigation, prior to the granting of a land of 5000 hectares located in the locality of Sifa Lubanda Sector/chiefdom of Kafira requested by the Company TERRA Sprl 10/18/2006</li> <li>• Opinion and consideration of Mr. l'Inspector of l 'Agriculture, Fishing and Livestock of the Territory of Kasenga about the need to grant a land to agricultural use of 5000 hectares to the Company TERRA Sprl the 20/10/2006</li> <li>• Opinion and consideration of the Administrator of the Kasenga Territory dated to 11/26/2006</li> <li>• administrative record of 22/12/2006 of l 'Inspector of Territory of l 'Agriculture, Fisheries and Animal Husbandry with the Company TERRA SPRL;</li> <li>• Request opinions and considerations No. 2481/003/2006 of the Conservative Real Estate Securities h Mr. Attorney of the Republic near the Tribunal de Grande Instance of the Haut Katanga to Kipushi, Folder TERRA SPRL, RAG: 780 of 8/01/2007;</li> <li>• Minutes of observation of development No. 22375,22376 , 22381 to 383 of the riding land of the Haut Katanga - Division of the Cadastre of the 10/06/2008;</li> <li>• Contracts of lease no. 0245 h 0249 of term of 25 years from the riding land of the Haut Katanga - Division of Real Estate Securities dated 27/06/ 2009;</li> <li>• Ministerial Decrees No. 48/CAB/MIN/AFF.FUNC/2009 to 50/CAB/MIN/AFF.FUNC/2009 dated 27/06/2009 laying each creation of a parcel of land of 1000 ha to use agro-pastoral of the Cadastral Plan of the Territory of Kasenga District of Haut Katanga , Katanga Province.</li> </ul>
<b>Katofio (5000 ha)</b>
<ul style="list-style-type: none"> <li>• Approval by the public prosecutor No.012/022/PR.086/07.</li> <li>• Convention for land farming and stock farming of small and cattle.</li> <li>• Letter and consideration issued by the Admnistrator of Kasenga Territory (dated to 26/12/2006.</li> <li>• Authorization of farming and stock farming issued by the chiek of Kafira sector and dated to 6/12/2006</li> <li>• Customary Autorization of land farming and stocj farming No. 552/001/BUR. COUT/GPT/KAT/006, issued by the chief of groupment and dated 4/12/2006.</li> <li>• Land demand dated 20/09/2006.</li> </ul>

The concession coordinates are shown in the table below.

**Table 2-3: Cordinates of the concession area**

<b>Concession</b>	<b>Cordinates</b>	
Lubanda Land		
Lubanda 1	S11 08 684 E 027 55 806	
	S 11 06 881 E 021 54 607	
	S 11 06 295 E 027 56 099	
	S 11 07,348 E 027 56,839	
Lubanda 2	S 11 03 444 E 027 53 711	
	S 11 01 492 E 027 54 840	
	S 11 01480 E 027 96 492	
	S 11 03 794 E027 55.243	
Katofio land		
Katofio land 1	S11 04 57 E 028 01 46,3	062443 8774700
	S11 04 04.9 E028 01 07,6	0611273 8776310
	S11 06 19,5 E027 58 45,1	0606938 8772188
	S11 09 20,1 E028 03 55,2	0613835 8766860
	S11 05 52.0 E028 04 31,1	0617438 8772998
	S11 05 24.7 S028 01 29,3	0611926 8773856
Katofio land2		

### **Restriction zone and Ground landlord**

TERRA SPRL, holds the legal right for farming 10,000 ha of land. TERRA has followed the appropriate legal process according to DRC legislation with regards to compensation. The list of individuals who were compensated was established by the 'Inspection of I 'Agriculture, Fisheries and Livestock and has been signed by the beneficiaries (see Appendix A).TERRA gave these individuals two years to relocate as opposed to the six months required notification time. This highlights TERRA's concern and commitment to the affected communities as well as following GIIP practice.

There is no area which can be considered as zone of restriction or public interest in the TERRA concession. Restriction zones include cemeteries, archaeological remains or national monuments, dams (the Lubanda lake is excluded from the current TERRA concession and access to the lake has

been preserved for the community members.) or public buildings representing a national heritage, airports footprints or a national park.

## 2.2.10 International agreements and conventions

The DRC is signatory to a number of international agreements and conventions relating to environmental management. They set the context within which the DRC regulatory regime operates, and may therefore indirectly affect the proposed project. The key agreements are summarized in Table 2-4 below.

**Table 2-4: Key international agreements**

Aspect	Agreement/convention
Climate change/air quality	<ul style="list-style-type: none"> <li>• United Nations Framework Convention on Climate Change (UNFCCC), 1994.</li> <li>• Kyoto Protocol, 1997.</li> <li>• Vienna Convention for the Protection of the Ozone Layer, 1985.</li> <li>• Montreal Protocol on Substances that Deplete the Ozone Layer, 1989.</li> </ul>
Biodiversity and protected areas	<ul style="list-style-type: none"> <li>• Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar/Wetlands Convention), 1971.</li> <li>• Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), 1973.</li> <li>• United Nations Convention on Biological Diversity, 1992 (UNCBD).</li> <li>• Cartagena Protocol on Biosafety (CPB).</li> <li>• United Nations Convention to Combat Desertification, 1994 (UNCCD).</li> <li>• Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.</li> <li>• Rotterdam Convention on the Prior Informed Consent Procedure on Certain Hazardous Chemicals and Pesticides in International Trade (1998).</li> <li>• Stockholm Convention on Persistent Organic Pollutants.</li> <li>• United Nation's Forum on Forests (UNFF).</li> <li>• Treaty on Central African Forests Commission, 2004.</li> <li>• Algiers Convention.</li> <li>• Bonn Convention on Migratory Species.</li> </ul>
Cultural heritage	<ul style="list-style-type: none"> <li>• United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, 1970.</li> <li>• UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention).</li> </ul>
Human rights	<ul style="list-style-type: none"> <li>• International Convention on the Prevention and Punishment of the Crime of Genocide.</li> <li>• International Convention on the Elimination of All Forms of Racial Discrimination (ICERD).</li> <li>• International Covenant on Civil and Political Rights.</li> <li>• International Covenant on Economic, Social and Cultural Rights.</li> <li>• International Convention on the Elimination of All Forms of Discrimination Against Women.</li> <li>• Convention on the Rights of the Child.</li> </ul>
Labor health and safety	<ul style="list-style-type: none"> <li>• Elimination of all forms of forced and compulsory labor – Convention 29 and 105.</li> <li>• Elimination of discrimination in respect of employment and occupation – Convention 100 and 111.</li> <li>• Effective Abolition of Child Labor – Convention 138 and 182.</li> </ul>

## **2.3 TERRA's Policy**

### **2.3.1 Environmental Policy**

TERRA aims to ensure that the environment in which it operates remains ecologically sound and sustainable. It also aims to provide a safe working environment and be a positive contributor to the local socio-economic environment.

This policy outlines TERRA's duty to minimize and mitigate environmental impacts, to protect and enhance the quality of the environment, to comply with all applicable environmental statutes and regulations and to seek continuous improvement in environmental performance.

The policies are regularly reviewed and strengthened; Furthermore, TERRA is committed to providing a safe working environment for all employees and contractors as well as being a positive contributor to a healthy social/ economic environment for the local people in areas where the company operates.

### **2.3.2 Community Policy**

TERRA conducts activities in a manner that promotes positive and open relationships with communities, government and other stakeholders to support sustainable benefits for local communities in areas where the company operates, throughout the life cycle of a project. TERRA recognizes the vital role that stakeholder engagement plays and through active engagement with stakeholders, strives to maximize the positive impacts of its activities as well as assist communities to ensure their self-sufficiency beyond the company's activities. TERRA is also committed to public reporting of their performance and stakeholder engagement.

Through the continual improvement of social assessments, community partnerships and local development assistance programs, TERRA aims to prevent, mitigate and ameliorate the environmental and social impacts of its operations. TERRA accommodates the different cultures and heritage of the communities in which the company operates and also supports community-based projects and small business opportunities. Furthermore, TERRA promotes hiring, education and training of employees from the local communities.

## **2.4 International Standards and Guidelines**

### **2.4.1 Equator principles**

The Equator Principles Financial Institutions (EPFIs) have adopted a set of guidelines, known as the Equator Principles, published in 2003 and revised in 2006 and update in 2012. EPIII was adopted in 2012.

The principles provide a framework for an accepted international approach to the management of social and environmental issues. They were developed by a number of leading financial institutions, including the IFC, to provide an approach to determine, assess and manage environmental and social risk in project financing. The intention is to ensure that projects are developed in a site specific manner that is socially responsible and reflects sound environmental management practices. The principles apply to all new projects seeking project finance from EPFIs with total project costs of US\$10 million or more. TERRA is requiring some funding from international lenders, that could be EPFI's; the ESIA and ESMP report with strictly comply with EP requirements. The principles, sentiments and approaches included in the EPs and IFC Performance Standards are applicable to the project and are therefore outlined in this section.

To provide guidance on how the broad-based EPs can be made specific to this project, reference is made to a number of WB guidelines and IFC policies, standards and guidelines, which are generally considered to represent good international practice (GIIP).

## 2.4.2 International Finance Corporation Performance Standards

In Non-Organization for Economic Co-operation and Development (OECD) countries (e.g. DRC), the applicable social and environmental standards are the IFC Policies and Performance Standards. A particular focus is placed on ensuring adequate public consultation and disclosure is carried out so that affected communities are fully informed about the project and their views and concerns are taken into account.

Previously the IFC Safeguard Policies (e.g. Operational Policy 4.01) were used as the main guidance documents (and were specifically referenced in the EPs), but in April 2006, the IFC published a new set of guidelines to update the policies, called the PS. These PS have since been updated in January 2012. Most of the PS are applicable to the proposed project and are listed below.

- PS1: Assessment and Management of Environmental and Social Risk Impacts;
- PS2: Labor and Working Conditions;
- PS3: Resource Efficiency and Pollution Prevention;
- PS4: Community Health, Safety and Security;
- PS5: Land Acquisition and Involuntary Resettlement;
- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PS7: Indigenous Peoples; and
- PS8: Cultural Heritage.

The Performance Standards are aimed at providing guidance on how to identify risks and impacts, and are designed to help to avoid, mitigate and manage risks and impacts as a way of doing business in a sustainable way.

The IFC has a suite of tools to assist with the application of the performance standards including guidance notes on each performance standard, general and sector specific Environment, Health and Safety (EHS) Guidelines and good practice manuals.

## 2.4.3 Good International Practice tools

The following are a suite of tools to assist with the application of the performance standards including guidance notes on each performance standard, general and sector specific Environment, Health and Safety (EHS) Guidelines and good practice manuals.

### General Environment, Health and Safety Guidelines

The Environmental, Health and Safety (EHS) Guidelines document is a reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The EHS Guidelines document outlines the performance measures that are generally considered to be achievable in the new facilities by existing technology at reasonable costs. The EHS document covers various environmental, social and health and safety components. One component that is of importance to this project for the Framework Report is the construction section, which is section 4 of this document. This section outlines the measures for specific guidance on prevention and control of community health, environment and safety impacts that may occur during new project developments (IFC, EHS Guidelines, 30 April 2007).

## **World Bank Environment, Health and Safety Guidelines**

The WB EHS Guidelines are technical reference documents with general and industry-specific examples of good international industry practice (GIIP), as defined in IFC's PS3 on Resource Efficiency and Pollution Prevention<sup>1</sup>. Reference to the EHS Guidelines is required under PS3. The IFC uses the EHS Guidelines as a technical source of information during project appraisal activities.

The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC and are generally considered to be achievable in new facilities at reasonable costs by existing technology. For IFC-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to IFC, become project- or site-specific requirements.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

New versions of the EHS Guidelines became effective from April 2007, and replaced those documents previously published in Part III of the Pollution Prevention and Abatement Handbook and on the IFC website. The General EHS Guidelines contain information on cross-cutting environmental; occupational health and safety; community health and safety; and construction and closure issues potentially applicable to all industry sectors. They should be used together with the relevant industry sector guidelines.

### **Environmental, Health, and Safety Guidelines for Food and Beverage Processing**

These guidelines cover the processing of meat, vegetable, and fruit raw materials into value-added food and beverage products for human consumption. Meat and poultry slaughtering and processing activities, from reception of the animals until the carcasses are ready for sale or further processing, are covered in the EHS Guidelines for Meat Processing and the EHS Guidelines for Poultry Processing.

#### **2.4.4 Environmental controls and applicable regulations/ guidelines**

The proposed project will operate under strict environmental controls to ensure that pollution/contamination is minimised. Implementation of the proposed ESMP will further minimise emissions and contamination resulting from the project as far as possible. All emissions and wastes generated by the Terra project will be managed in the line with the following national and international environmental best practice guidelines and regulations.

The "Pollution Prevention and Abatement Handbook" by the World Bank Group- effective July 1998;

- The "Pollution Prevention and Abatement Handbook" by the World Bank Group- effective July 1998;
- IFC Environmental, Health, and Safety Guidelines, General EHS Guidelines:
- IFC Environmental, Health and safety general guidelines (April 2007)
- IFC environmental, Health, and safety guidelines for plantation crop production (April 2007)

<sup>1</sup> The information in this section has been taken and modified from <http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines>.

## Air pollution controls

Air pollutants generated during the farming operation of the Project consist primarily of particulates from farming operations (clearing, ploughing, tilling, spraying, spreading and harvesting), as well as fuel combustion by machineries and generators.

### Dust

The World Bank/IFC guidelines and EU standards will be used for dust control. Dust control measures will be implemented within the perimeters of Terra farming, on access roads and at farm land. The water can be used for dust suppression on haul roads.

### Other emissions

Low NO<sub>x</sub>, SO<sub>x</sub> and CO<sub>x</sub> due to fuel combustion emanating from machines, vehicles and diesel generators.

## International Guidelines

**Table 2-5: Comparison of IFC/WB, HWO, EU and DRC Air Quality Standards and guidelines**

Parameter	IFC/WB <sup>(1)</sup>	WHO <sup>(2)</sup>	EU <sup>(3)</sup>	DRC <sup>(4)</sup>
Particulate Matter (PM <sub>10</sub> )	50 µg/Nm <sup>3</sup>	50 µg/ m <sup>3</sup> (5)	50 µg/ m <sup>3</sup> (8)	500 g/N m <sup>3</sup> (11)
Nitrogen Oxide (NO <sub>2</sub> )	200 µg/N m <sup>3</sup>	200 µg/ m <sup>3</sup> (6)	200 µg/ m <sup>3</sup> (9)	200 g/N m <sup>3</sup> (12)
Sulphur Dioxide (SO <sub>2</sub> )	20 µg/N m <sup>3</sup>	20 µg/ m <sup>3</sup> (7)	125 µg/ m <sup>3</sup> (10)	500g/N m <sup>3</sup> (13)

### Notes:

*IFC EHS Guidelines for Ambient Air Quality, (April 30, 2007)*

*World Health Organisation – Ambient Air Quality Guidelines Global Update 2005*

*EU Directive 2008/50/EC – ANNEX XI - Limit Values for Protection of Human Health (2008)*

*DRC - “OFFICIAL NEWSPAPER OF THE DEMOCRATIC REPUBLIC OF CONGO, Office of the president de la République, DECREE N°038 / 2003 OF CARRYING MARCH 26TH, 2003, MINING REGULATIONS”.*

*WHO Guideline – PM10, 24 hour average period*

*WHO Guideline – NO2, One hour average period*

*WHO Guideline – SO2, 24 hour average period*

*EU Limit Value - PM10, 24 hour average period*

*EU Limit Value - NO2, One hour average period*

*EU Limit Value - SO2, 24 hour average period*

*DRC – Maximal average 24 hours*

*DRC – Maximal average 24 hours*

*DRC – Maximal average 24 hours*

### Noise

The IFC “Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Environmental Noise Management (April 30, 2007)”, provides the following Noise Level Guidelines: “Noise impacts should not exceed the levels presented in Table 2-6, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.



**Table 2-6: IFC Noise level guidelines**

Receptor	One hour LAeq (dBA)	
	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

A comparison of IFC/WB, EU, WHO and DRC Guidelines/Standards for Noise in industrial / commercial areas is presented in Table 2-7.

**Table 2-7: Comparison of IFC/WB, EU and DRC noise Guidelines / Standards**

Parameter	IFC/WB (1)	EU (2)	DRC (3)
Daytime	70 dB(A) (4)	70 dB(A)	70 dB(A)
Nighttime	70 dB(A) (4)	70 dB(A)	70 dB(A)

**Notes:**

*IFC EHS Guidelines – General EHS Guidelines: Environmental – Noise Management*

*EU Directive 2003/10/EC*

*DRC - “OFFICIAL NEWSPAPER OF THE DEMOCRATIC REPUBLIC OF CONGO, Office of the president de la République, DECREE N°038 / 2003 OF CARRYING MARCH 26TH, 2003, MINING REGULATIONS”.*

*Guidelines values for noise levels measured outdoors. Source: Guidelines for Community Noise, WHO, 1999.*

## 2.4.5 IFC good practice note addressing grievances from project affected parties

Companies across the globe and through the various stages of project life cycle can benefit from understanding community concerns and complaints and addressing them. This Good Practice Note provides guidance on basic principles and process steps that organizations should take into account when creating and implementing grievance mechanisms. Together, these principles and steps constitute a baseline set of considerations and good strategies for designing and implementing procedures appropriate to the project scale and impact.

## 2.4.6 International treaties and agreements

The DRC has ratified all the main international human rights and humanitarian legal instruments, including the UN Convention on Civil and Political Rights and the UN Convention on Social, Economic and Cultural Rights. DRC Government has ratified three International Labour Organization (ILO) conventions: The Abolition of Forced Labour Convention, the Discrimination (Employment and Occupation) Convention, and the Minimum Age Convention. The Democratic Republic of Congo has ratified Convention No. 138, the Minimum Age Convention and Convention No. 182, the Worst Forms of Child Labour Convention, both in 2001. Child labour is regulated by the law under which children are not allowed to perform hazardous work. DRC has signed the “Convention on International Trade in Endangered Species of Wild Fauna and Flora.” DRC has signed international agreements on: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, and Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, and Wetlands. The DRC has approved the following international conventions and protocols pertaining to the environment and which are of relevance to the Proposed Project:

- United Nations Framework Convention on Climate Change, 1992;
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal adopted on 22 March 1989;

- Bamako Convention on the Ban of the Import into Africa and the Control of Trans-boundary Movement and Management of Hazardous Wastes within Africa, adopted 30 January 1991;
- Convention on Biological Diversity, 5 June 1992;
- United Nations Convention to Combat Desertification (UNCCD), adopted 1997;
- Convention on the Protection of World Cultural and Natural Heritage ratified 1975;
- Convention on the Means of Prohibiting and Preventing the Elicit, Import, Export and Transfer of Ownership of Cultural Property, ratified 2003;
- Montreal Protocol, 1985;
- Ramsar (wetlands) Convention; and
- The Kyoto Protocol.
- The ratified treaties become part of the national laws and their provisions prevail in case of contradictions with the provisions of the national laws.

#### **2.4.7 Other benchmarks, guidelines and reference materials: voluntary principles on security and human rights**

The Voluntary Principles on Security and Human Rights guides companies in maintaining the safety and security of their operations within a framework that ensures respect for human rights and fundamental freedoms. They have been adopted by responsible companies operating in former conflict zones, and in areas where security functions are both essential and sensitive. The DRC has been identified as a priority country for engagement of the Voluntary Principles.

##### **Extractive Industries Transparency Initiative**

The EITI is a coalition of governments, companies, civil society groups, investors and international organizations. The aim of this initiative is to strengthen governance by improving transparency and accountability in the extractive industries sector. The EITI promotes improved governance in resource-rich countries through the verification and full publication of company payments and government revenue. The DRC government voted to join EITI in November 2005. Despite difficulty in the beginning, EITI/DRC has so far published the reports of information relative to payments by extractive Enterprises to the Government and income collected by the Government from such enterprises for the years 2007, 2008, 2009 and 2010.

##### **Industry Sector Guidelines**

Industry sector guidelines provide details on the EHS issues and impacts associated with specific sectors, and propose management measures including indicators and monitoring requirements. The following industry sector guidelines may be applicable to the proposed project:

- Waste management facilities; and
- Water and sanitation.

##### **International Labour Organization (ILO) Guidelines on Occupational Safety and Health Management Systems**

In 2001, the ILO published ILO-OSH 2001, also titled "*Guidelines on Occupational Safety and Health Management Systems*" to assist organizations with introducing OSH management systems. These guidelines encourage continual improvement in employee health and safety, achieved via a constant process of policy, organization, planning and implementation, evaluation, and action for improvement, all supported by constant auditing to determine the success of OSH actions. The ILO

management system was created to assist employers to keep pace with rapidly shifting and competitive industrial environments. The ILO recognizes that national legislation is essential, but sometimes insufficient on its own to address the challenges faced by industry, and therefore elected to ensure free and open distribution of administrative tools in the form of occupational health and safety management system guidance for everyone. This open access forum is intended to provide the tools for industry to create safe and healthy working environments and foster positive safety cultures within the organizations.

### **Occupational Health SAS 18000**

OHSAS 18000 is an international occupational health and safety management system specification. OHSAS 18000 comprises two parts, OHSAS 18001 and 18002 and embraces a number of other publications. OHSAS 18000 is the internationally recognized assessment specification for occupational health and safety management systems. This internationally recognized specification for occupational health and safety management system operates on the basis of policy, planning, implementation and operation, checking and corrective action, management review, and continual improvement.

### **International Organisational for Standardization (ISO) 14001**

ISO 14001 sets out the criteria for an environmental management system. It does not state requirements for environmental performance, but maps out a framework that a company or organization can follow to set up an effective environmental management system. It can be used by any organization that wants to improve resource efficiency, reduce waste and impact down costs. Using ISO 14001 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved. ISO 14001 can also be integrated with other management functions and assists companies in meeting their environmental and economic goals. ISO 14001, as with other ISO 14000 standards, is voluntary, with its main aim to assist companies in continually improving their environmental performance, whilst complying with any applicable legislation. Organizations are responsible for setting their own targets and performance measures, with the standard serving to assist them in meeting objectives and goals and the subsequent monitoring and measurement of these. ISO 9001 Quality Management Systems and ISO 14001 Environmental Management System can work in tandem with OHSAS 18001/18002 to complement each other and form a better overall system. Each component of the system is specific, auditable, and accreditable by a third party after review.

### **International Organisational for Standardization (ISO) 26000**

In 2005, ISO launched the development of an International Standard providing guidelines for Social Responsibility. It was adopted in November 2010. ISO 26000 in contrast with most ISO standards does not aim at certification. The objective of ISO 26000 is to *“provide harmonized, globally relevant guidance based on international consensus among expert representatives of the main stakeholder groups and so encourage the implementation of social responsibility worldwide. The guidance in ISO 26000 draws on best practice developed by existing public and private sector initiatives and is intended to be useful to organizations large and small in both these sectors”* International Labour Organization (ILO) published ILO-OSH 2001.

ISO 26000 defines social responsibility as the *“responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behaviour that contributes to sustainable development, including health and the welfare of society; takes into account the expectations of stakeholders, is in compliance with applicable law and consistent with international norms of behaviour and is integrated throughout the organization and practised in its relationships”* International Labour Organization (ILO) published ILO-OSH 2001. ISO 26000 deals with a wide range of issues and has identified seven “core subjects”: organizational governance;

human rights; labour practices; the environment; fair operating practices; consumer issues; and community involvement and development. Although it is not meant to become a certification standard nor to be used as a standard-setting document, nothing in the text prevents countries from adopting national standards based on ISO 26000 that could become certifiable.

## **The UN Global Compact**

Officially launched on 6 July 2000 by the United Nations, the Global Compact (UNGC or GC) is a voluntary initiative which “seeks to align business operations and strategies everywhere with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption”. With over 6066 corporate participants and other stakeholders from over 132 countries, the UN Global Compact has become the largest corporate responsibility initiative.

The ten principles of the Global Compact are:

### **Human Rights**

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights.
- Principle 2: Make sure that they are not complicit in human rights abuses.

### **Labour Standards**

- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining.
- Principle 4: The elimination of all forms of forced and compulsory labour.
- Principle 5: The effective abolition of child labour.
- Principle 6: The elimination of discrimination with regard to employment and occupation.

### **Environment**

- Principle 7: Businesses should support a precautionary approach to environmental challenges.
- Principle 8: Undertake initiatives to promote greater environmental responsibility.
- Principle 9: Encourage the development and diffusion of environmentally friendly technologies.

### **Anti-Corruption**

- Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

The participants in the Global Compact can include the following:

Companies from any industry sector, except those companies involved in the manufacture, sale etc. of anti-personnel land mines or cluster bombs, companies that are the subject of a UN sanction or that have been blacklisted by UN Procurement for ethical reasons. Private military companies and tobacco companies, often excluded by other initiatives or ethical funds, are allowed to become participants. To participate, a company simply sends a letter signed by their CEO to the UN Secretary General in which it expresses its commitment to:

- The UN Global Compact and its ten principles;
- Engagement in partnerships to advance broad UN goals; and
- The annual submission of a Communication on Progress (COP).

Companies joining the United Nations Global Compact commit to implement the ten principles within their “sphere of influence”. They are expected to make continuous and comprehensive efforts to advance the principles wherever they operate, and integrate the principles into their business strategy, day-to-day operations and organizational culture.

Other stakeholders can also participate in the Global Compact, including civil society organizations, labour, etc.

## 3 ESIA and ESMP Approach

### 3.1 ESIA and ESMP Objectives

The ESIA and ESMP is being undertaken to ensure that the environmental and social impacts of the project are fully understood and adequately managed. The ESIA also provide valuable input into project planning decisions. For this project, the process involved the development of an ESIA to meet legislative requirements. As mentioned in Section 3, SRK has undertaken an ESIA (this report) which will be submitted to the IFC for disclosure (60 days). Thereafter the report will be updated based on feedback from the IFC, TERRA and its agents. TERRA is recommended to compile a comprehensive ESIA which complies with GIIP, including with the IFCPS and World Bank EHS standards.

The objectives for the ESIA are outlined below:

- Identify issues and concerns that need to be addressed regarding the proposed project;
- Identify national, international and corporate management requirements which the project must satisfy;
- Gather and evaluate baseline information to characterise the affected environment and communities;
- Undertake consultation with stakeholders and promote full disclosure of information and transparency with regards to the project;
- Identify, define and evaluate environmental and social impacts so that the potentially significant impacts can be adequately addressed during project design, as well as where necessary during construction, operation and rehabilitation/closure;
- Adapt and apply TERRA's environmental and social management systems approach to set out key management and monitoring objectives for the life cycle of the project which can be further developed and implemented by TERRA and any contractors involved;
- Assess and provide feedback on project alternatives; and
- Promote environmental and social sustainability.

This ESIA has been planned and undertaken with due consideration of the legal, regulatory and policy requirements outlined in legal framework above.

### 3.2 Overview of this study

This ESIA report has been compiled based on the GAC ESIA report, various SRK site visits stakeholder engagement, including one-on-one individual and group meetings, household surveys, socio-economic and biophysical baseline data collection and management meetings from December 2013 to March 2014, to identify the following environmental and social areas of concern:

- To achieve the desired environmental compliance standards under the IFC/World Bank Guidelines (discussed in detail in Section-2 of this ESIA Report) as applicable to the project.
- Plans and activities to remedy/mitigate any potential adverse impacts and the gaps.
- Any other points/steps to be taken which could be beneficial to mitigate environmental adverse impacts.

In addition to the evaluation and review of the available records, data and the facts for the project feasibility study, detailed discussions were held with the concerned members of the project management as well as other project stakeholders during visit to DRC and on the project site study.

Recommendations regarding measures to be taken to mitigate and compensate for any determined/detrimental environmental impacts are contained in the ESMP, including all parameters that need to be measured, and the frequency of monitoring actions.

A qualitative and semi-quantitative methodology was adopted to conduct this study inter-alia in due compliance with the ESIA requirements. The study included collection of both primary and secondary data regarding environmental status and other relevant factors.

### 3.3 Assessment process and methods

The first step in the ESIA and ESMP process was environmental and social screening of the project, following which it was categorised (in terms of the IFC / World Bank).

**Table 3-1: ESIA and ESMP schedule**

ACTIVITY	TARGET DATE/S	STATUS
<b>PROJECT INITIATION (December 2013)</b>		
Project initiation	Finalize approach, scope of work, contracts and scheduling Review of available data and applicability to Project Undertake gap analysis of available information Site visit	December 2013
<b>SCOPING (December 2013 – February June 2014)</b>		
Review existing information & gap analysis	Collect available information Prepare gap analysis Map and define zone of influence Compile information needs list on project description and available information	End January / early February
Layouts and project description	Submit needs list to TERRA Obtain project description and infrastructure layout	Early February
Stakeholder engagement	Prepare stakeholder engagement schedule & relevant materials	December 2013
	Commence stakeholder engagement	December/January
	Prepare Issues and Responses Report	7 March

<b>SPECIALIST STUDIES &amp; PROJECT DESCRIPTION (January 2014 – March 2014)</b>		
Specialist studies	Desktop biodiversity input	3 March
	Water – surface and groundwater	3 March
	Socioeconomic	14 March
Project description	Project description information	3 March
<b>IMPACT ASSESSMENT AND MANAGEMENT PLAN (January 2014 – August 2014)</b>		
Reporting	Prepare draft ESIA report	21 March
	Prepare non-technical summary	26 March
	Review of draft ESIA and non-technical summary	24 – 27 March
	Update and produce final draft ESIA and non-technical summary for public disclosure	28 – 31 March
	Translation of Non-Technical Summary for disclosure to stakeholders	28 – 31 March
	Print non-technical summary Distribute to stakeholders	1-4 April
	Provide comment period for stakeholders	7 April – 5 May
Reporting	Update draft ESIA report based on stakeholder comments & IFC feedback & any additional information	6 -12 May
	Submit ESIA to TERRA for review	12-16 May
	Finalise ESIA report	19-21 May

### 3.4 Categorization of the TERRA project

Categorization of the project is based on environmental and social screening criteria of the IFC/World Bank:

**Category A:** Projects with potential significant adverse social or environmental impacts those are diverse, irreversible, or unprecedented;

**Category B:** Projects with potential limited adverse social or environmental impacts that are few in number, generally site specific, largely reversible and readily addressed through mitigation measures, and;

**Category C:** Projects with minimal or no social or environmental impacts.

The Equator Principles defines Category A and B projects as follows:



The **Category A** principle classification criteria refer to significant adverse environmental impacts affecting sensitive sites, or diverse impacts, or they are unprecedented.

A **Category B** project is defined as those where the potential adverse environmental impacts on human populations, or environmentally important areas, are less adverse than those of Category A projects.

Other systems for project categorisation exist, but do not differ materially from the IFC / EP project categorisations. Based on the project screening and workshop of SRK specialists, the TERRA project is categorised as a Category A (IFC / EP) project in terms of the definitions above due to the number of potentially significant environmental and social impacts, some of which will not be reversible through mitigation.

SRK specialists listed the justification for their characterisation of the project as Category A in terms of the IFC guidelines as follows:

### **Inherent Risks and Sensitivity of Receiving Environment**

The local context of the TERRA project is understood to be sensitive. Site community relations representatives report that people living within the area of the TERRA concession and in the project area of influence are dependent on agriculture and water resources. Some sensitivities relating to biodiversity due to the presence of Miombo, wetlands and lakes were also observed in the Project area.

### **Diversity and Significance of Potential Impacts**

Potential impacts from the farming activities are considered to be significant due to the use of insecticides, pesticides, fertilisers. The key impacts and risks considered relevant to the project assessment include for example:

- Potential contamination of soil, groundwater and surface waters (and induced impacts on the biodiversity) from dust emissions, hazardous product storage tanks, improper disposal of waste and infiltration of contaminated water by chemicals ( fertilisers, pesticides and other);
- Traffic increase (transport on the site of required material, final product delivery) impacting the local population's health and safety at later stage;
- Large workers influx to the area and associated secondary impacts (including pressure on local social infrastructure and transmittable diseases); and
- Past and future economic and physical displacement to accommodate the footprint of the Project.

The ESIA has therefore been prepared to meet the IFC's assessment and reporting requirements of a Category A project.

In accordance with Category A requirements, there are recommendations, in the ESIA Report, to prevent, minimize, mitigate or compensate for adverse impacts identified. The following requirements will be incorporated within the ESIA process through the full assessment of potential impacts as follows:

- Identification of opportunities to improve environmental performance;
- Preparation of a full social and environmental assessment i.e. a full ESIA;
- Preparation of an Environmental Management Plan (ESMP);
- Provided an ESMP with mitigation, and monitoring; and
- Carried out consultations in a structured and culturally sensitive way.

### 3.5 Site surveys and specialist studies

As part of the ESIA by GAC, a site survey for baseline data collection and environmental monitoring for data collection was carried out in 2010. Results of the monitoring are reported in the relevant sections of this report.

The subsequent ESIA by SRK included additional site visits undertaken from December 2013 to March 2014 by key specialists from SRK's project team to fill critical gaps and update the baseline information where possible. As mentioned earlier in this report, SRK conducted various site visits, water sampling, social, traffic and biodiversity baseline data collection and undertook stakeholder engagements with key informants and community members in the project area. The following specialist studies were included in SRK's ESIA update:

- Air quality – desktop update of previous study by GAC;
- Noise – desktop study ;
- Water resources – site assessment and monitoring program for the current 1,500 ha and collection of selected samples;
- Ecology, ecosystem services and biodiversity (terrestrial and aquatic) –desktop study, field investigation and update of previous study by GAC;
- Economics – site assessment and update of GAC study;
- Soils and land capability – desktop study, information provided by TERRA SPRL and update of GAC study based on available information and experience;
- Traffic – traffic data collection from the DRC ministry;
- Social impact assessment – Meetings with Group Chief, meetings with local chief, as well as group meetings with community leaders, NGOs and household surveys by SRK team and update of previous study by GAC.

## 3.6 Review of project related documentation

For the purposes of this ESIA, SRK reviewed the project related documentation listed in Table 3-2 and where relevant incorporated extracts and findings of these into this ESIA report.

**Table 3-2: Documents reviewed by SRK**

Document	Author	Date of Publication
ESIA report and annexes	GAC	February 2010
Land compensation payment lists	Kasenga District (Inspectorate of Agriculture)	November 2006 – July 2009
Land concession information and permits	TERRA	-
Weather data	TERRA	February 2010 - October 2013
Surface water analysis report	TERRA	-
Soil Investigation	SGS-TERRA	Dec 2010
Routine Soil Analysis	MANEX	March 2010
Applicable regulation (Agriculture law, Environmental law, Land law and investment code)	DRC	-
Approval and Authorisation letters	Local, district, provincial, national and traditional authorities	2006 – 2014
Topographical map (1/100 000)	Land affairs (Haut Katanga district)	

## 3.7 Assumptions and Limitations

### 3.7.1 Assumptions

The following assumptions have been made by SRK in the preparation of this report:

- All the technical data and information provided by TERRA, including the previous ESIA's was accurate and up-to-date. It was assumed that all existing specialist reports would be made available to SRK for review and update.
- Baseline data has been collected by SRK and TERRA between December 2013 and March 2014. Where spatial, temporal and scope gaps are identified, it is assumed that TERRA will address these gaps as part of its management commitments and once addressed will be incorporated into an ESIA and ESMP and as part of the monitoring plans.
- SRK's point of departure for this ESIA was the lender terms of reference. In the course of the study period, SRK has identified further gaps in the GAC ESIA (2010) that have not been filled as part of this study. We have noted these as part of the environmental plan of action (ESAP) and we assume that these actions and our recommendations will be implemented.

- The ESMP is a dynamic document and should evolve as and when the project description is updated and finalised as well as over the lifetime of the project. The ESMP in this document is based on a developing project and we assume once the project has been finalised, and at later relevant points in the project, that updates will be made to the ESMP and other management plans.
- SRK has assisted TERRA in developing an environmental and social policy however it is assumed that TERRA will operationalise and take ownership of this environmental and social policy through the development of an environmental and social management system based on good international industry practice. Similarly it is assumed that TERRA will implement and engage with stakeholders on the basis of the stakeholder engagement plan and the associated grievance mechanism to be developed by SRK.
- It is assumed that TERRA accepts and will implement the management commitments contained in the ESIA and ESMP.
- A monitoring and evaluation system, including auditing, will be established to track the implementation of the ESMP to ensure that management measures are effective to avoid, minimize and mitigate impacts; and that corrective action is being undertaken to address shortcomings and/or non-performances.
- TERRA and its contractors/consultants will adopt a process of continual improvement when managing and/or mitigating negative environmental impacts arising from the project. The ESMP will be used as the basis of environmental management and will be improved and refined regularly.
- TERRA has already conducted a compensation programme for the entire 10,000ha area which was done with consultations of the relevant DRC authorities and traditional norms. Compensation paid for the 272 households therefore represents all the expected compensation. The LACPF will only be required to address the risk that illegal settlers encroach on the concession area and to restore livelihoods where these are impacted.

### 3.7.2 Specialists Assumptions

#### Soils, land capability and land use

- It is assumed that there are no unique soils present within the project area.
- It is assumed that in the majority of the area to be impacted, there is limited agricultural activity.
- It is assumed that there are areas adjacent the project area not directly impacted by TERRA farming activities with similar soil types and land capabilities that could be utilized for agricultural purposes.

#### Air Quality

- Based on the information supplied and SRK's experience and knowledge on similar operations, dust (TSP and PM<sub>10</sub> (i.e. particulates with an aerodynamic diameter of less than 10µm)) and gas (SO<sub>2</sub>, NO<sub>x</sub>, CO and VOC's) were identified as the main air quality pollutants of concern to be assessed in this study.

#### Water resources

- It is assumed the hydrogeological study would be undertaken and will include run-off estimations and baseline contributions (reduced run-off and baseflow contributions to these streams).

### 3.7.3 Limitations

- The ESIA and ESMP have been conducted between December 2013 and March 2014. As such the collection of comprehensive primary baseline data has been limited. Where further baseline monitoring is required, this is highlighted in the ESIA and ESMP as an action that must be pursued.
- Water quality sampling that has been undertaken by SRK has been limited to the rainy season (January 2014) and to one round of sampling. Previous data collected by GAC was also limited and does not contribute towards a useful dataset for analysis and prediction. Recommendations in this regard have been submitted as a scope of work for detailed water studies.
- Records of previous stakeholder engagement were not recorded and hence not available to SRK for inclusion and consideration in this update or the development of the stakeholder engagement plan. SRK has relied on the results of the stakeholder engagement conducted between December 2013 and March 2014.
- Detailed hydrological studies (surface and groundwater) including the relative risk of flooding needs to be completed and the project design in relation to floodlines determined.
- As part of this study process stakeholder engagement and specialist reviews and updates have taken place in parallel precluding stakeholder engagement from informing the specialist work. SRK's updates have been based on our experience and additional gaps, issues and impacts have been scoped accordingly.
- The specialists have identified specific information gaps and other limitations associated with their work, listed in their respective baseline/ impact assessment sections. As a result of these gaps, the level of detail presented in this report for some impacts is lower than would ordinarily be expected in an ESIA/ESMP of this nature, and as a consequence the level of confidence with the relevant impact ratings is lower. A precautionary approach has been adopted by SRK in rating the significance of potential impacts where information/data gaps exist.
- Good impact assessment is dependent on integration between specialists to ensure that baseline data, impact prediction and management measures complement rather than contradict. Every effort has been made by SRK to maximise integration, however, there may be areas within the ESIA where integration has not been optimised.

### 3.7.4 Specialists Limitations

#### Soils, land capability and land use

- No impacts on loss of ecological function were considered, as that this would be considered in biodiversity investigations.
- Impacts on hydromorphic soils are not analyzed separately from the impacts on the other soil types. This is because this assessment focuses purely on impacts associated with a loss of resource and change in land capability.

### **Air Quality**

- Minimal air quality information was available when completing the baseline and impact assessment sections.

### **Water resources**

- No hydrogeological and geophysical investigations were undertaken to assist in the aquifer characterization of the TERRA concession area, and subsequent groundwater inflows that can be encountered.
- No catchment studies were undertaken to establish run-off estimations, baseflow contributions etc. which are required to determine the impact of farming project on surface water resources.
- No floodline studies have been undertaken, which are recommended for placement of farm infrastructures in terms of possible flood events.
- No full scale hydro-census investigation work was undertaken to establish regional water use (ground and surface water), and the potential impact on those resources.
- The following limitations are based on the Environmental and Social Assessment - Water Specialist Report by SRK, March 2014:
  - There was limited data collection and evaluation of regional existing data
  - There was a lack of historical hydrochemical data (no pre-farming information)
  - There was limited information available regarding the volumes of clean water being used currently and to be used after expansion
  - There is limited information on volumes of sewage effluent to be treated and discharged.

## **3.8 Stakeholder engagement and disclosure**

Consultation and interaction with various stakeholders and stakeholder groups took place during December 2013 and January and March 2014. This consultation was conducted as part of the ESIA update undertaken by SRK. Stakeholders included representatives from local government, Ministry of Environment, Ministry of Agriculture, traditional authorities, community leaders and community members from surrounding villages. In addition to meetings and surveys, verbal presentations were made in Swahili and French. Stakeholders had the opportunity to provide written responses to questionnaire (translated into French). A list of the stakeholders consulted during this process was also compiled.

SRK undertook a number of focus group and key informant meetings in February 2014 for the ESIA update, during which stakeholders were informed about progress with the project, and were invited to raise further comment about the project. Invitation letters to these meetings were distributed by hand before the meetings were held. Verbal presentations in French and Swahili were given by the SRK facilitators, and stakeholders were encouraged to comment verbally or via a questionnaire. Information sharing and planning meetings were also held with traditional and administrative authorities representing local communities and focus group meetings were held with groups of women, youth and men. Stakeholder comments received during the ESIA conducted by SRK indicated a positive perception about the project, with perceived benefits including provision of job and business development opportunities, poverty reduction, and promotion of education, improvement to infrastructure (notably roads and electricity) and health facilities, as well as increased social mobility being major themes.

Government officials responded favourably in terms of expectations of macroeconomic benefits and improved availability, as well as pricing of maize in DRC.

Comments, issues and overall perceptions expressed by stakeholders consulted during the focus group meetings and key informant interviews undertaken by SRK in February 2014 for the ESIA update mirrored those of the 2010 ESIA. Items noted included a request for support for local farmers, improved road access, improved lives for the youth, reduced reliance on charcoal-making which impacts on the environment, and alcoholism linked to unemployment. Opportunities for collaboration by TERRA with local non-governmental and government (including police) structures were noted. Concerns raised included perceived low salaries, availability of potable water for both communities, loss of agricultural land from the project footprint as well as air pollution and dust impacts from the project. However these issues have been addressed to date. TERRA has installed two boreholes in the surrounding villages. And salaries are paid in compliance with the DRC labour code, 2002. TERRA has also undertaken many other Corporate Social Responsibility (CSR) initiatives for the surrounding villages (See Section 6 of this report for more information on the CSR initiatives).

Public disclosure of the ESIA update was undertaken through the distribution of a Background Information Document (BID) in French. The BID describes the project and provides a summary of the key findings and recommendations of the specialist studies. Stakeholders were been notified by letter in French and Swahili, hand delivered by TERRA project team members, that the BID is available for comment, where to find the reports, and how to comment.

Stakeholders had the opportunity to comment by:

- Completing the comment form available with the BID; and
- Writing a letter or sending an email by 20 March 2014 to the contact details provided.

Copies of the BID together with the notification letter and comment form will also hand delivered to the relevant authorities in Lubumbashi, the Territory Office in Kasenga and Kipushi, as well as to traditional authorities and community leaders in the project area, for distribution to community members.

A total of approximately 100 comments sheets in french were distributed to stakeholders during public disclosure of the ESIA update. To date, the key comments received from stakeholders on the ESIA update, focus mainly on the following:

- Employment opportunities for local communities
- Concern about potential impacts of project related activities on water resources in the area, particularly because water is a precious resource.

Appendix B contains the Issues and Respones Report.

## **4 Project Description**

### **4.1 Motivation for the project**

TERRA operates a rain-fed maize farming project in the Katanga Province of the DRC, using hybrid seed, fertilisers, herbicide and pesticides. TERRA is currently cultivating maize in a 1 500 ha area located around the Lubanda Lake. In the year 2011-2012 TERRA produced approximately eight thousand tons of Grade A white maize. TERRA plans to increase their production by clearing an additional 8 500 ha of land for maize plantation. The maize will be grown on a total of approximately 9 500 ha after allowances are made for access roads and related infrastructure, and will significantly increase the Katanga Province's maize production. TERRA's production will, reach approximately 80 thousand tons a year, which is equivalent to 8% of the current national maize deficit in Katanga. With the production of that magnitude, the TERRA agricultural project is expected to become the largest maize farm in the DRC.

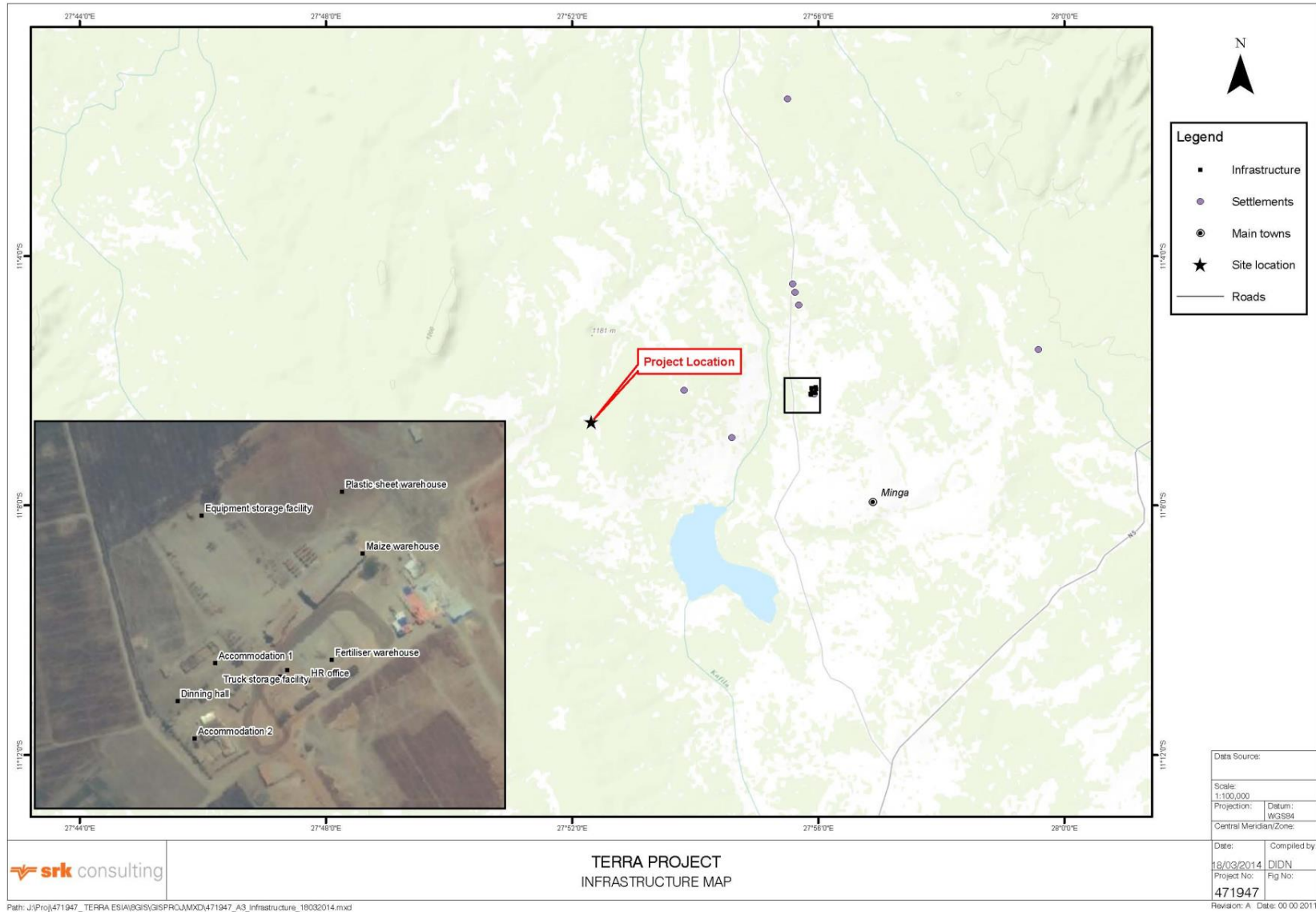
In addition to the excess demand that already exists, TERRA is expected to benefit from the opportunity created by a new legislation in Katanga that requires all mining companies in the province to supply 25kg per month of maize meal to all of their employees.

TERRA's related company African Milling Company Congo (AMCC) has invested in a 100,000 metric tonnes per year state of the art milling and storage facilities in Lubumbashi. The plant is expected to be commissioned in the first half of 2014 and will purchase all of the maize produced from the TERRA farms, which will address approximately 80% of its requirements. Additional maize inputs will be sourced from other farms and the open market. The milling facilities at AMCC will provide the population with quality maize flour, which is the staple food in Katanga at an affordable price and provide import substitution, as the Katanga province currently imports most of its maize and maize flour requirements.

### **4.2 Description of farms**

TERRA had acquired two farms under the concession contract near Minga in the Haut- Katanga Province of the DRC in the areas known as Lubanda and Katofio. These farms are known as the Lubanda and Katofio farms and are situated  $\pm$  90km east of Lubumbashi. The entire concession area covers 10,000 hectares of land. The current project covers 1,500 ha in the Lubanda concession. The farming land as well as that of associated infrastructure is indicated on Figure 4-1. The figure also shows the rivers, surroundings villages, including camp, N-5 Highway and internal roads in the vicinity of the project area.

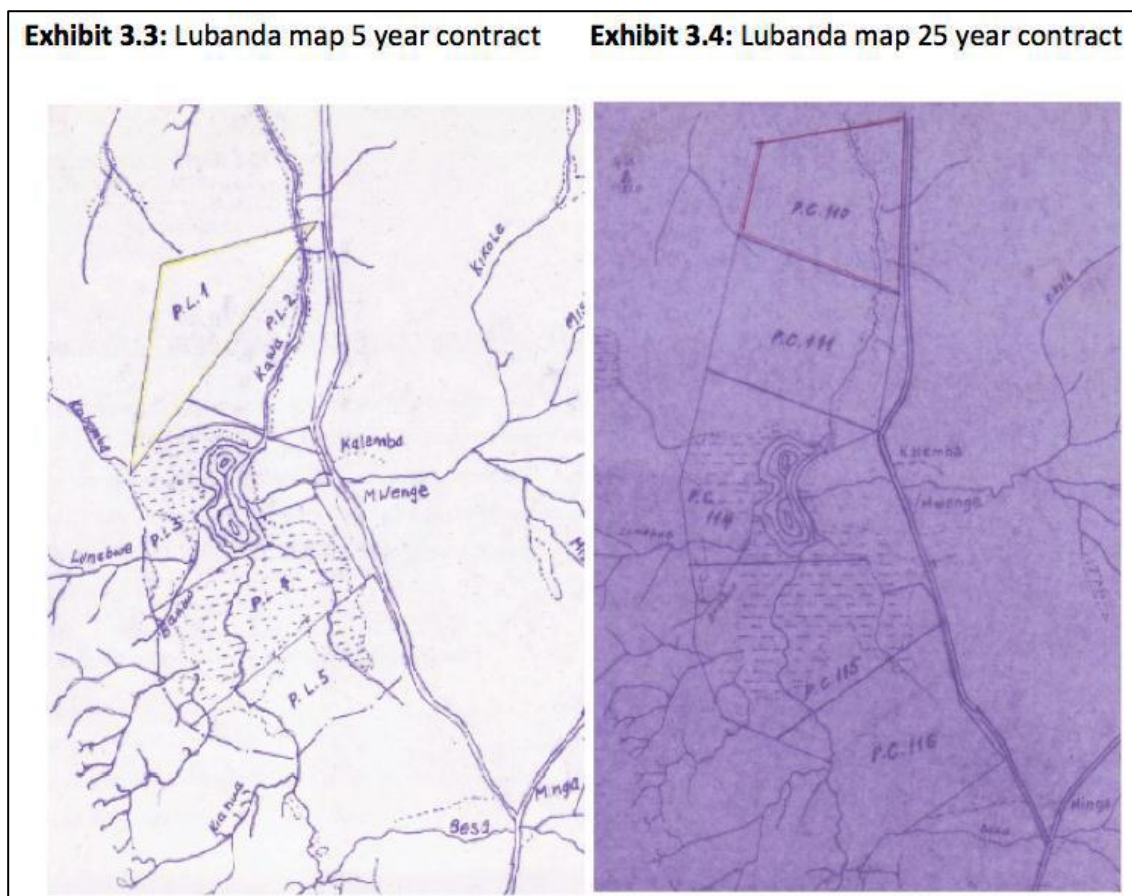




**Figure 4-1: Terra project locality map showing farming land and associated infrastructures (including existing infrastructures)**

## Lubanda farm

The original concession represented five portions of land numbered P.L. 1, 2, 3, 4 & 5, covered by the temporary 5 year occupation contract no HK 00368 to 00372 dated 26 January 2007 as indicated on the map below. The later 25 year occupation contract has the same numbers (HK 00368 to 00372) however; it refers to the five portions of land as P.C. 110, 111, 114, 115 & 116. This is shown on the map below indicating each of the 5 portions of land at 1'000ha. The 25 year concession covers a slightly larger area on the map than the 5 year contract, with the area extended further north and south. The lake is still in the centre of the total farm and is excluded from the concession area, with access to the local community maintained.



**Figure 4-2: The 5 portions of land at 1'000ha for the Lubanda farm**

## Katofio Farm

The original concession represented five portions of land numbered P.L. 10, 11, 12, 13, 14 & 15, covered by the temporary 5 year occupation contract no HK 00527 to 00531 dated 2<sup>nd</sup> of December 2008. The later 25 year occupation contract has the same number (HK 00527 to 00531) however; it refers to the five portions of land as P.C. 117, 118, 119, 120 & 121. This is shown in figure below, indicating each portion of land at 1'000ha. No development beyond planning has been done as yet on the Katofio, although the area has been secured to prevent settlers from occupying the land prior to development.

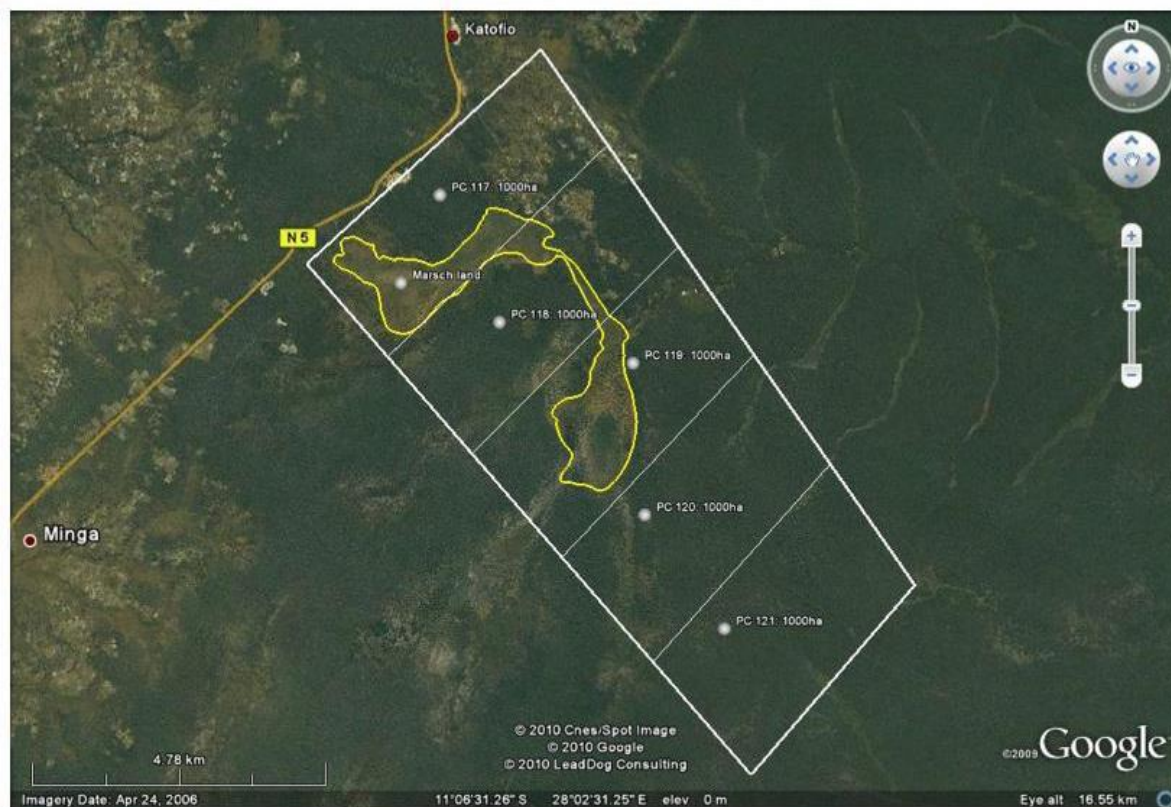


Figure 4-3: Katofios farm outlay

## 4.3 Type of crops

TERRA is cultivating maize crop and plans to also cultivate beans/soya as rotational crops.

### Maize Crop Overview

Maize is a tropical grass that is well adapted to many climates and hence has wide-ranging maturities from 70 days to 210 days. Maize plants are erect and may grow as tall as 3m, with little tillering capacity. The scientific name for maize is *Zea mays*, it is also commonly known as corn. White maize is the type of maize grown by TERRA. The seed of a maize plant is called the kernel and consists of three major parts: the fruit wall, endosperm and embryo. The kernel is made up of approximately 10% protein, 70% carbohydrate, 2.3% crude fibre and 1.4% ash. It is also a source of Vitamins A and E, riboflavin and nicotinic acid.

### Growth stages of maize

**Flowering:** During pollination and fertilisation there is a high demand for water, and the uptake of N and P is rapid, although K uptake is almost complete. If maize is flowering during hot, dry weather this places extra stress on the plant's resources and the silks may wither and burn off before the pollen reaches the ear. Hence fertilisation does not occur for all kernels and seed set is greatly reduced. This is commonly referred to as pollen blasting.

**Cob and kernel development:** Cobs, husks and shanks are fully developed by day 7 after silking. The plant is now using significant energy and nutrients to produce kernels on an ear.

**Maturity:** Approximately 30 days after silking, the plant has reached the maximum dry weight, a stage called physiological maturity. This is where a black layer is noticeable at the tip of each kernel, where

cells die and block further starch accumulation into the kernel. At this stage the milk line has completely disappeared. Kernel moisture at physiological maturity is around 30%. The grain and husks begin losing moisture while healthy stalks remain green. Eventually the leaves will dry off.

**Harvesting** can commence when the grain moisture is below 20%. – The grain is dried down to 14% for delivery to storage or market use.

### Maize crop requirement

At maturity, each plant will have consumed approximately 250 l of water. The total leaf area at maturity may exceed one square metre per plant. Each ton of grain produced removes 15 to 18 kg of nitrogen, 2 to 3 kg of phosphorus and 3 to 4 kg of potassium from the soil. No other crop utilises sunlight more effectively than maize, and its yield per ha is the highest of all grain crops at maturity.

The soils requirement for maize crop is described below:

- Well-drained loamy soils.
- Maize is relatively well adapted to a wide range of soils with pH 5.0 to 8.0.
- It does not do well in acidic soils.
- Maize is moderately sensitive to salinity, which reduces uptake of nutrients and decreases total dry matter production.
- Low soil water storage is more of a problem for maize.

## 4.4 Terra planned farming work

TERRA is currently in its operational phase with the Lubanda farm already in the production stage and Katofio scheduled to operate in near future. TERRA will operate in various phases following the planned development as illustrated in the tables below.

### TERRA Project different stage

**Table 4-1: Initial project stage (non mechanised)**

	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Clearance(ha)	9	6	25	200	400
Cultivation (ha)	9	15	40	250	650

**Table 4-2: Project second stage (Mechanised)**

	2011-2012	2012-2013	2013-2014	2014-2015
Clearance(ha)	350	200	300	1000
Cultivation (ha)	1,000	1,200	1,500	2,500

**Table 4-3: Project Future stage**

	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Clearance(ha)	1,500	1,500	1,500	1,500	1,500
Cultivation (ha)	4,000	5,500	7000	8,500	10,000

## 4.5 Cultivation practices

Maize is the main dry land crop planned on the two farms and will be planted in October to November and harvested between May and August of the following year. All mechanical cultivation, fertilizing and spraying shall be completed by the end of November before the monsoon rains start in December. The eight-row John Deere grain planter(s) will be utilized in order to achieve the aggressive planting deadlines. The company has a combined harvester that harvests eight rows at a time. The TERRA project is being cultivated by mechanised methods. The project aims to be a model for sustainable agriculture production and intends to use innovative agriculture practices to support and enhance soil fertility while simultaneously fixing organic matters and carbon in the soil. The cultivation process is described below.

### 4.5.1 Summary of the cultivation process

The maize cultivation process and associated calendar for different stages are illustrated in the table below.

**Table 4-4: Maize cultivation process and associated calendar**

Crops type	Characteristic	Comments
Land Clearing	Dozing, levelling, ect.	From May to October
Crop processing	Ploughing	From August to November
	Seedling	
Crop husbandry	Crop establishment	From November to Earlier December
	Fertiliser for sowing	
	Maintenance at crop establishment (weeding)	
Crop handling	Harvesting	From May to September
	Handling	
	Package	
	Storage	

### Preparation of land for crop to be grown

#### Clearing:

The site is prepared by cutting trees, levelling and making proper drainage. Current only 1,500 ha has been cleared. Land clearing is done by mechanical methods using heavy machinery. Land clearing and preparation will employ procedures to minimize release of greenhouse gases. Cleared biomass will not be burnt but rather chipped and ploughed into the soil during land preparation, alternatively it will be used to produce compost.

### Cultivation Process

The cultivation process includes the following practices:

#### Ploughing:

Maize needs to be planted carefully and accurately to achieve the best germination and emergence possible. To achieve the desired tilth, plough the land (Soil turning) with a disc harrow or soil stirring

plough 3 to 4 times. Each ploughing should be followed by planking to ensure fine tilth and conservation of moisture.

The tillage /ploughing and harrowing practices affect the soils physical properties. Soil tillage in a farming system refers to the physical soil cultivation practices, changing the soil's structure, hydraulic properties and stability to such an extent so that the plants will grow and produce optimally.

The soil physical properties affected by tillage/ploughing are as follows:

- Texture and structure
- Infiltration and evaporation.

The type of tillage affects the vulnerability of the soil to either wind or water erosion. Finely-structured topsoil is susceptible to both types of erosion, while a coarse structure limits erosion.

### Planting-Sowing

The grid used by TERRA is 75x25 cm which will provide the desired plant population for higher production. The population is 53,333 plants per hectare. In order to optimise agricultural yield, planting of maize is done using mechanical planters. Seeds are treated to avoid diseases and ensure better germination, before sowing. The type of seeds used by the TERRA project is shown in the table below.

**Table 4-5: List of seeds used by TERRA**

No.	Seeds	Chemical Composition	Quantity per ha	Remarks
1	seed co	709	25Kg	Maturité tardive
2	seed co	719	25Kg	Maturité tardive
3	PANAR	53	25kg	Maturité moyenne

**Note:** The seed has been treated with seed dressing against seeding diseases and pests. The seed dressing is poisonous when consumed by animals or humans. Maize does not withstand water logging; hence arrangements for drainage of excess water from the maize field should be made at the time of sowing. This is done by providing shallow surface drains at suitable intervals and main drainage channel.

### 4.5.2 Maintenance

The seedlings are maintained by application of different fertilizers and agrochemicals including:

- Herbicides
- Nematicides and insecticides
- Fertilizers

The total range of pesticides fertilizers to be used includes nitrogenous and phosphates.

#### Fertilizer application

The use of fertiliser at sowing provides the seedling with the major nutrients required in the early stages of development. Nitrogen (N) and phosphorus (P) are particularly important, and potassium (K) may also need to be applied before planting if levels are low. The fertilizers used for the TERRA farming project include:

**Table 4-6: List of fertilizers used by Terra**

No.	Name	Chemical Composition	Quantity per ha	Remark
1	Engrais composé N.P.K	10-26-20	400kg	Basal Dressing
2	Engrais simple(urée)	46%	300kg	Top Dressing

**Weeding control**

Maize crop is kept free of weeds up to 40 days after sowing; otherwise the yield is considerably reduced. Weeds within the rows can be effectively controlled by using the following herbicides as shown in the table below.

**Table 4-7: List of herbicides**

No.	Name	Quantity per ha	Nature
1	Callisto	175ml	organic
2	Dual gold	1750ml	organic
3	Gesaprim	550ml	organic
4	Nucomax	50g	organic
5	Glyphosate	700ml	organic

**Plant Protection**

The diseases of maize can be controlled by the use of resistant varieties together with the use of optimum plant populations and nitrogen applications.

**Insect Pest and control**

Various strategies are used to protect crops by suppressing the insect population and limiting damage. The first step in managing insect pests is to identify the insect and determine the numbers present. Crops are checked regularly to determine the extent of an insect infestation and assess the damage it is causing.

The insect pest and their control are illustrated in Table 4-8.

**Table 4-8: Insect pest within the TERRA concession area and their control**

No.	Name of insect	Period
1	le Borer du maïs	Growing step
2	ceron	Growing step
3	Vers gris	Growing step
4	Charançon	Storage step

This information can then be used to determine whether control is required and to decide on the most suitable management method. The following insecticides are recommended to spray on the crops:

**Table 4-9: List of Insecticides**

No.	Insecticides	Composition	Use
1	cypermethrin	Insecticide organique a base du pyrethrine	Growing step
2	Lambda-cyhalothrin	Insecticide organique a base du pyrethrine	Growing step
3	Pyrimifos-methyl	Organophosphoré a base du phosphore, de l'azote et de chaines carbonées	Both storage and crop growing
4	Phosphure d'aluminium	Aluminium et phosphore, c'est un fumigant	Storage only

It is possible to have some beneficial insects, including predators and parasitic wasps that commonly occur in maize crops. TERRA should be able to distinguish these insects from maize pests and use them as a tool for integrated pest management. When present in high numbers these beneficial insects may be effective in controlling pests and preventing yield loss. The beneficial insects exist including the bees that are protected by the non-use of insecticides harmful to them during the flowering, because they do assist the cut flowers.

#### 4.5.3 Watering

The maize crop is the rainy crop; the rainfall is sufficient in this region and provides necessary water. No irrigation is necessary for the TERRA project.

#### 4.5.4 Harvesting

When the husk covers the cobs, they dry out and turn brown and the grain hardens, this is when the crop should be harvested. Harvesting is done with a machine called combined harvester.

Harvesting of maize is done mechanically. Harvesting machines with in-field tractor-trailer combination (7 tonne capacity trailers) delivers maize to 15 tonne trailers on the side of the fields (loading zones). Two or three of these 16 tonne capacity trailers is then hauled by one tractor to the storage facility.

Mechanical harvesting of the maize will leave leaves and tops in the fields that will be burnt to avoid the growth of weeds.

#### Storing Maize

Currently maize is packaged in 50kg bags stored in a warehouse. Stored maize is susceptible to attack by pests and diseases, and can also be damaged by rodents and birds. Cleaning of the grain store to remove all traces of previous crop, preferably by disinfecting the area before use, is important. It is also necessary to monitor the condition of the stored grain throughout the storage period for insect pests, disease, temperature and moisture. Once the milling facilities at AMCC are commissioned in 2014, maize will be loaded directly into trucks and transported to the state of the art storage facilities (silos) at AMCC, which include moisture control. The figure below presents the storage facilities at AMCC.





**Figure 4-4: Maize storage facilities at AMCC**

## 4.6 Transportation

The maize is packed in 50kg bags at theTERRA site and is transported by trucks over a distance of about 90kms to Lubumbashi where it is sold. Going forward, TERRA will supply African Milling Company Congo, a newly established millier and related company, where the maize will be processed into maize flour.

### Proposed production capacity

The expected average farming production yield is eight tons per ha. Table 4-10 below presents the envisaged production after applying a 10% allowance for access roads and other related infrastructure.

**Table 4-10: Terra farming production details**

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Production forecast (tons)	10,800	18,000	28,800	39,600	50,400	61,200	72,000

### Transportation and logistics

Transport of personnel will be via road from the accommodation facilities to the farming land. Transport of the product (maize), materials, seeds and chemicals (fertilizers, pesticides) will also be via road. Fuel will be transported to site in tankers. Parts and spares will be transported via road transport.

### Access road and internal roads network

There is a gravel access road to the farming land site from the N5 (national road). The access road taken from the N-5 is approximately 2km long. Many internal roads that are connecting different points within the concession area are also used for the TERRA project.

## Wider road network

The N5 highway from Lubumbashi to Kasenga is the principal logistic arterial route connecting the project site to the road. The route is in good condition. Most traffic makes use of this highway. The project will make use of this route for transportation of materials and product to and from Lubumbashi. Inbound traffic of trucks from Lubumbashi to the project site, carrying various bags of maize, materials and others chemicals, etc.

## Type and number of transport means and their frequencies

**Table 4-11: Means of transportation used by Terra project**

Lubanda Farming operation	Mode	Destination
Maize	Trucks	AMCC
Fertiliser, pesticides, seeds and other required products	Trucks	TERRA Farm

## 4.7 Fertilizers and agrochemicals

The chemicals to be used include fertilizers, pesticides and herbicides. Fertilizers and pesticides are kept in the shed with concreted floor and sheltered against the sun before their use in the fields. The quantity corresponds to the seasonal needs.

### 4.7.1 Hazardous materials and agrochemicals

A hazardous material and agrochemicals store is proposed within the TERRA concession area, which will be designed in accordance with GIIP. The following materials will be stored onsite:

- Seeds
- Fertilizers
- Pesticides
- Herbicides

#### Lubricants

For efficient operation of the TERRA equipment and machinery, various lubricants (both oils and greases) will be required.

## 4.8 Equipments and machineries

TERRA uses a variety of equipment and machinery such as tractors, sprayers etc. during its agricultural process. The list of equipment and machinery used by TERRA for the proposed project is presented in Table 4-12.

**Table 4-12: Equipment and machinery used by TERRA for the proposed project**

Type	Model	Quantity
<b>Tractors</b>		
Tractor	125 CV	2
Tractor	165 CV	5
Tractor New Holland	30 CV	3
Tractor New Holland	75 CV	1
<b>Sprayers</b>		
Sprayers	3000 litres	2
<b>Tillage</b>		
Disc Ploughing		3
Tillage	À sock	2
Disc Harrow		7
	vibrotile	2
	defonceuse	5
<b>Planters</b>		
Disc Corn seeder planter John Deere		2
Fertilizer spreader		2
<b>Equipment affected to corn Harvesting and packaging</b>		
Beet harvester	John Deere	1
Trailer		3
Combine harvester New Holland		1
Thrower		2
Trailer (Dumper)		5
<b>Overall Machineries</b>		
Tata Truck -19 Tons	Tipper	
Tipping Traier-5 Tons	Tipper	
Tipping Trailer -10 Tons	Tipper	
Trailer 2000 lietrs	Water Tank	
Bulldozer	D6	
Back Hoe Digger (TLB)	90HP	
Generator	200 kVA	
Water Pump		

### 4.8.1 Earthworks and infrastructures

Currently the works carried out on the TERRA site during the different phases have required certain facilities and infrastructures. With the development of the project, other facilities and infrastructures are planned for farming operations such as:

- Mechanical Workshop;
- Storage facilities for crops;
- Storage facilities for pesticide, fertiliser, insecticides and other chemical used for farming;
- Fuel storage and distribution facilities ;
- Garages;
- Various access and on site roads;
- Domestic waste storage facility;
- Domestic and potable water reticulations ;
- The electric power supply facilities with the solar panels; and
- Accommodations facilities for the working force.
- Block drainage system.

Existing facilities for Lubanda Concession are shown in the table below.

**Table 4-13: Footprint area of project facilities**

Area	Facility	Area ha
Lubanda concession	Offices	50
	Garages	
	workshops for machining and equipment maintenance	
	Fuel storage facilities	
	mess halls camping	
	Residences(Labour Hostel, Officer Hostel)	
	laundries	
	warehouses for seeds, pesticides, fertilisers chemical	
	Waste Management Facility	

Relocation: It is not envisaged that there will be a any need for relocation, as this process was concluded in 2009 and it is understood that no persons currently reside within the concession areas.

Compensation: The compensation was conducted for private agricultural land within the TERRA concession area. More than the required 6 month period for relocation, TERRA allowed individuals a 24 month period, in order to ensure that affected individuals had found suitable alternative land. The details of compensation are shown on Appendix A and C.

Planned Infrastructure: The Figure 4-5 shows the different infrastructures planned for TERRA project.

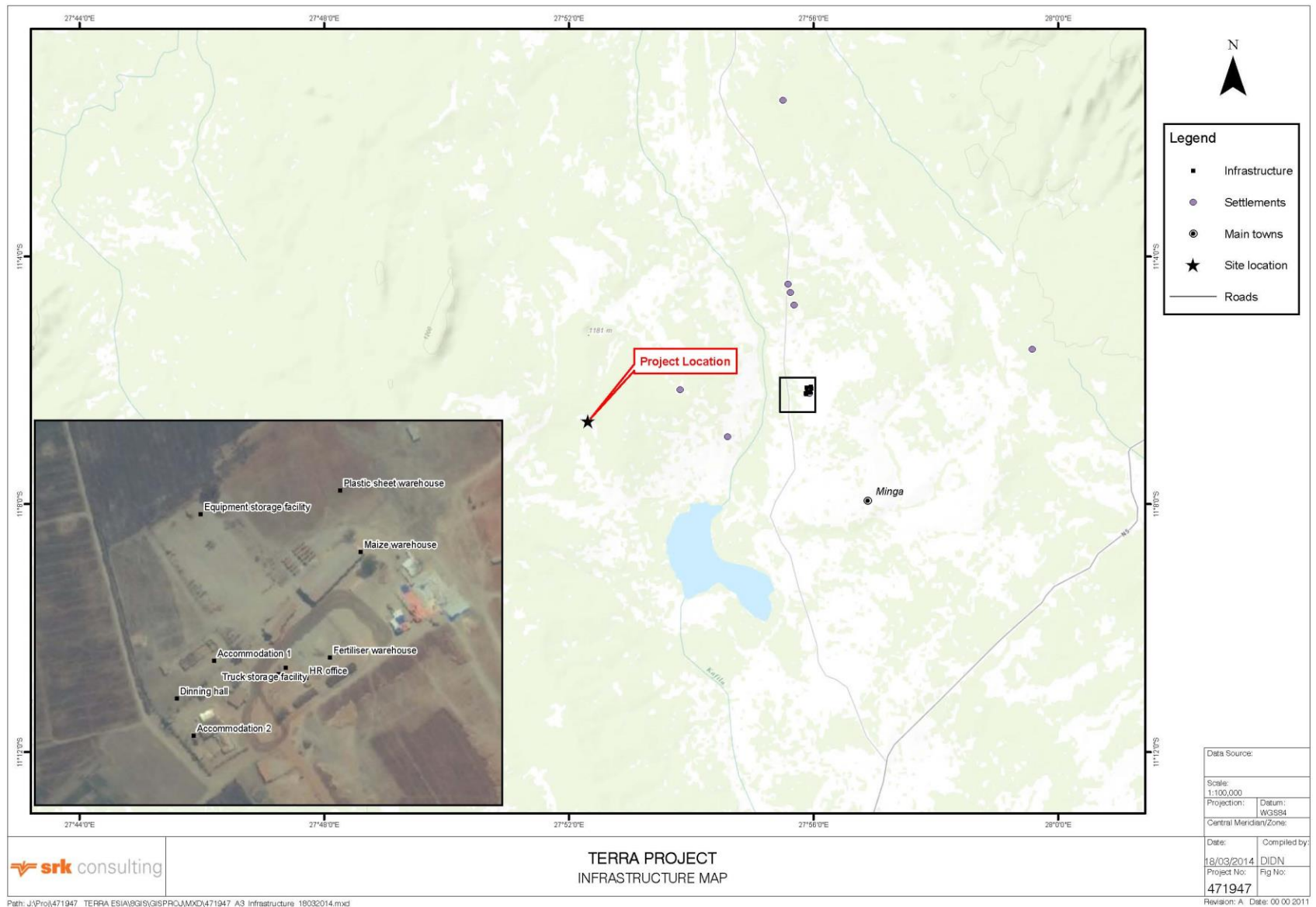


Figure 4-5: Layout of different infrastructures planned for TERRA project

## 4.9 Safety and security

### Fire prevention

All electrical equipment and other inflammable products are kept in the area free from sources of heat or fire such bushfires. The barriers zone (stopfire) is implemented around the other fuel storage. Fire extinguishers are installed at locations close to fire sources. The roads (stop fire) are created within the farming land to prevent fire expansion.

### Security

TERRA will provide security for the site. The accommodation areas, waste management facility, chemical storage area and maize storage will be fenced and access controlled through security booms or gates.

## 4.10 Water supply

The proposed project is rain fed. Groundwater from boreholes TBH 1 and TBH 2 (SRK Interim Preliminary Water Specialist Report, March 2014) is used only for domestic water supply of the camp. No surface water from any of the rivers is being used for irrigation etc. by TERRA.

The water required to meet the site camp demand is not known but it was reported that the existing boreholes are meeting the water demand and is anticipated to continue to sustain the camp into the future

### 4.10.1 Utilized Water

The main activities consuming water for the TERRA project are:

- Maize farming operation: cleaning of machines and watering of the roads for dust suppressing.
- Domestic: administration offices, workers housing, others).
- Maize being a rainy crop, no irrigation is planned for the current maize farming project.
- There are boreholes for water supply.

### 4.10.2 Watercourses

The map showing the water courses in the TERRA perimeter is presented in Figure 4-6.

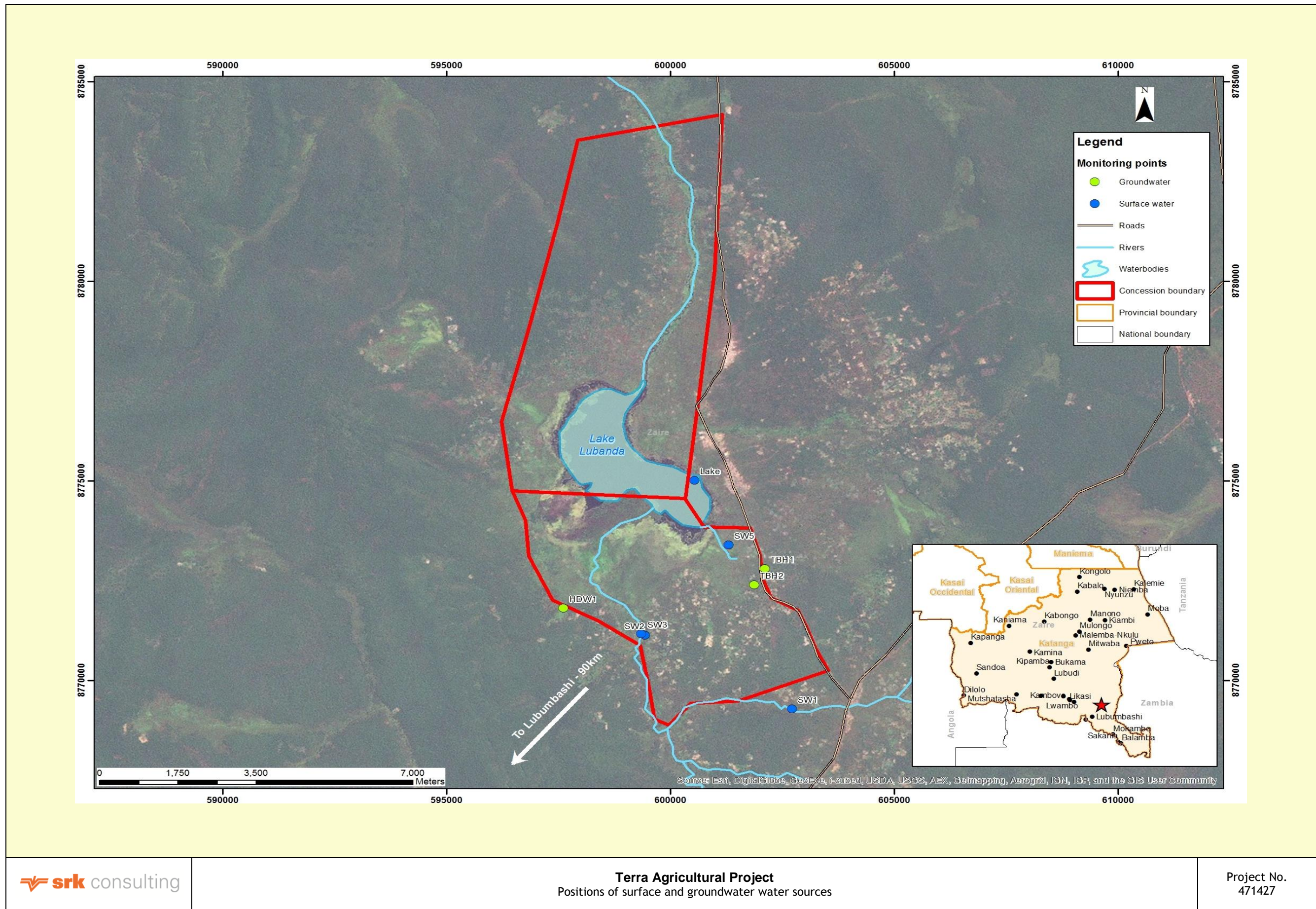


Figure 4-6: Watercourses in TERRA Concession.

### 4.10.3 Stormwater management

TERRA has dug a trench to surround the current ploughed areas. This trench is used for security purposes (to keep people and animals away from the project area) and for stormwater management. The trench has dedicated outlets to discharge the collected water into the two nearby rivers, Besa and Kafira. Apart from the perimeter trench, there is a deeper and wide (3 x 2 m) trench cutting across the cultivated land, from the site camp into Kafira River. This trench collects all the surface runoff from the cultivated land.

### 4.10.4 Surface drainage

Drainage systems for the plantation are being designed to ensure that surface water in excess of soil drainage capacity would be drained prior to causing crop damage. The design of the surface drainage system makes usage of the existing natural drainage lines and seasonal streams. This will also be considered in the extend phase so that waterways and infield drains will transfer water to the main drain network, rivers and to the Lubanda lake. In areas where it is proposed to include sub-surface drains, surface drain depth was increased, where necessary, to ensure that the drains would flow freely. Conditions considered in the design include: Drains were designed to remove water (29 mm rain per day) from a particular zone in 24 hours; 30% of the drains depths are already in place as natural depressions (topography). Drains have 0.7 m freeboard and side slopes are 1.5:1.

### 4.10.5 Waste oils and discharge of toxic wastes

Waste oils will be used as treatment oil to fencing poles to prevent termite attack. Pesticide and other toxic containers are burnt or buried in a far away from human habitation of movements.

### 4.10.6 Fuel

The installation of two (2) diesel oil storage facilities, each with capacity of 13,000 m<sup>3</sup> is planned on TERRA site.

## 4.11 Power supply

For the TERRA project power is supplied by three generators and solar panels.

## 4.12 Waste management

The type of wastes generated by the TERRA project includes:

- Organic waste: maize crops remained after harvesting, trees
- Waste water: pack house, spray and fertigation stations
- Iron/metal (nails, welding rods etc.) used oil filters, parts that are replaced from machineries/generators
- Office paper, packing boxes: from office work
- Agrochemical containers from agrochemical usage
- Used engine oil and used lubricants from farm machinery maintenance.

Wastes will be disposed of in accordance with DRC and lender requirements including the IFC EHS Guidelines. In summary, waste streams produced by the project will be handled as follows:



- Domestic waste will be disposed of in a dedicated domestic waste management facility. If possible, the domestic waste will be recycled
- Recyclable waste will be decontaminated and once declared safe, made available to local communities
- Hazardous waste will be stored in appropriate containers which in turn will be stored in a designated hazardous waste area / container. Disposal options will be investigated with suppliers and local government
- A waste management facility (WMF) is on the site including hazardous waste from the project. Co-processing (incineration) or project-generated and local waste will require feasibility assessment as the size of the farming operation increases. Package sewage treatment plants have been chosen over septic tank based on the improved treatment of sewage and larger numbers of employees which the system can deal with.

## 4.13 Employment

During the operational phase, TERRA will employ 200 contracts labour. Table 4-14 shows the employment numbers for the planned TERRA project during 2012-2020.

**Table 4-14: TERRA project planned employees (2012-2020)**

Employment Types	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Expats	14	16	23	27	37	40	48	48
National employment	38	42	59	84	117	129	143	143
Contract labour	200	250	400	500	600	700	800	800

## 4.14 Employee accommodation and facilities

TERRA provides accommodation facilities for its employees. The accommodation capacity is currently as follows:

- 10 expats
- 5 for seniors Congolese
- 30 for general workers and
- Housing for 200 labours and 40 regular staff also provided.

## 4.15 Corporate Social Responsibility

### 4.15.1 Overview

TERRA's Corporate Social Responsibility (CSR) aims to address prevalent issues, such as skills shortages, at a grass roots level, where the Company will train small groups of farmers in producing agricultural output, which would not only transfer skills but help address concerns around food security. In addition, TERRA already supports various community and educational projects, which it will continue to do to ensure the on-going development of the communities in which it operates.

### 4.15.2 Completed Projects

TERRA plays an integral role in developing communities in close proximity to its farming activities, which in turn has a positive and multiplier effect on the economy in the region. TERRA has worked with the Local Government in identifying the needs of the local community and has already donated the following:

- Two boreholes in the Lubanda villages
- Regular donation of medicines to local clinics as a contribution to health and family welfare of the surrounding villages
- Installation of 10, 50 watt solar street lights at strategic points.



**Figure 4-7: Borehole pump and Solar Lighting supplied and fitted by TERRA in Lubanda**

### 4.15.3 Current Projects

The following are earmarked projects over the next five years, where TERRA will continue to work with relevant authorities to identify priorities:

- Revamp schools and provide educational material
- Create training program for small groups farmers
- Continue solar lighting solutions for surrounding villages
- Continue water solutions.

### 4.15.4 Out-grower Scheme

Overall only 2% of total arable land in the DRC is used for agriculture crop production, with mostly subsistence farming. TERRA plans to develop an outgrower scheme in the future to assist in increasing maize production, as well as securing supply for its milling facilities. These schemes will also assist the community as they will be guaranteed off-take for their crop.

From a quality perspective, the TERRA's agronomists frequently visit the surrounding farmers and educate them about good farming practices. Down the line, TERRA is considering providing inputs to local farmers by setting a buy back agreement, which would help improve yields.

Overall, this will improve the standard of living of the surrounding village as every farmer would have a guaranteed off-take, substantially reducing the risk of any post-harvest losses. Currently it is anticipated that at least 30 villages will be benefitting from the planned scheme.

## 5 Biophysical Baseline

### 5.1 Overview

- **Biophysical:**
  - Geology
  - Topography
  - Soils
  - Land use
  - Biodiversity (fauna, flora, aquatic ecology, ecosystem goods and services and sensitive environments)
  - Water resources
  - Climate and air quality
  - Waste
  - Noise
  - Visual.

As part of the 2010 ESIA undertaken by GAC, a site survey for baseline data and environmental monitoring for data collection was carried out. Results of the monitoring are reported in the ESIA by GAC.

The subsequent ESIA by SRK included additional site visits undertaken from December 2013 to March 2014 by key specialists from SRK's project team to fill critical gaps and update the baseline information where possible. As mentioned earlier in this report SRK conducted various site visits, water sampling, social, traffic and biodiversity baseline data collection and undertook stakeholder engagements with key informants and community members in the project area. The following specialist studies were included in SRK's ESIA update:

- Air quality – desktop update of previous study by GAC;
- Noise – desktop study ;
- Water resources – site assessment and monitoring program for the current 1,500 ha and collection of selected samples;
- Ecology, ecosystem services and biodiversity (terrestrial and aquatic) –desktop study, field investigation and update of previous study by GAC;
- Economics – site assessment and update of GAC study;
- Soils and land capability – desktop study, information provided by TERRA SPRL and update of GAC study based on available information and experience;
- Traffic – traffic data collection from the DRC ministry;
- Social impact assessment – Meetings with Group Chief, meetings with local chief, as well as group meetings with community leaders, NGOs and household surveys by SRK team and update of previous study by GAC.

## 5.2 Geology

The TERRA project area is located within the Central African Copper belt. The geological basement of Central and East Africa is ancient crystalline rock consisting of sediments, lavas and intrusions, altered by repeated metamorphism. It is described as a rigid block of pre-Cambrian basement rock, bounded to the north-west by the Upemba rift and to the south-east by the Lunangwa rift. The block is sub-divided by the Lufilian Arc (SRK, 2011).

The Lufilian Arc stretches a distance of more than 500 kilometres from Kolwezi in the southern part of the DRC to Luanshya in Zambia. This arc hosts extensive high-grade copper-cobalt mineralization in the form of very large stratiform deposits. Several large high-grade copper mining operations, e.g., Kamoto in DRC and Nchanga in Zambia are present in the Lufilian Arc. The deposits occur in a sequence of sedimentary rocks that are known as the Mines Group (Lower Roan Group) and are between 1050 million and 650 million years old. The rocks of the Lufilian Arc are exposed in a series of tightly folded and thrust anticlines and synclines, generally trending east-west to southeast-northwest in southern DRC (SRK, 2011).

The stratigraphy of the area is divided into a younger Kundelungu Supergroup underlain by an older Roan Supergroup. These sediments were deposited approximately 800 million to 300 million years ago. The basin was deformed approximately 500 to 600 million years ago during the Lufilian Orogeny, and the sediments were intruded into by a series of gabbroic and granitic intrusive bodies (SRK, 2011). The geological map of the area is presented in the figure below.

The project area is entirely underlain by the Kundelungu Group, formerly called the Upper Kundelungu, of the Katangan Series. The Kundelungu is 300 m thick, comprises mainly argillaceous to sandy clastic rocks and is underlain by the 'Petit Conglomerat' a diamictite? (François, 1973; 1974; Batumike *et al.*, 2006; 2007). The depositional environment is marine but with a larger transgressive tract compared to that of the Nguba formation (Batumike *et al.*, 2006; 2007). The facies is poorly diversified and laterally homogeneous over a large area of the whole basin (Batumike *et al.*, 2006).

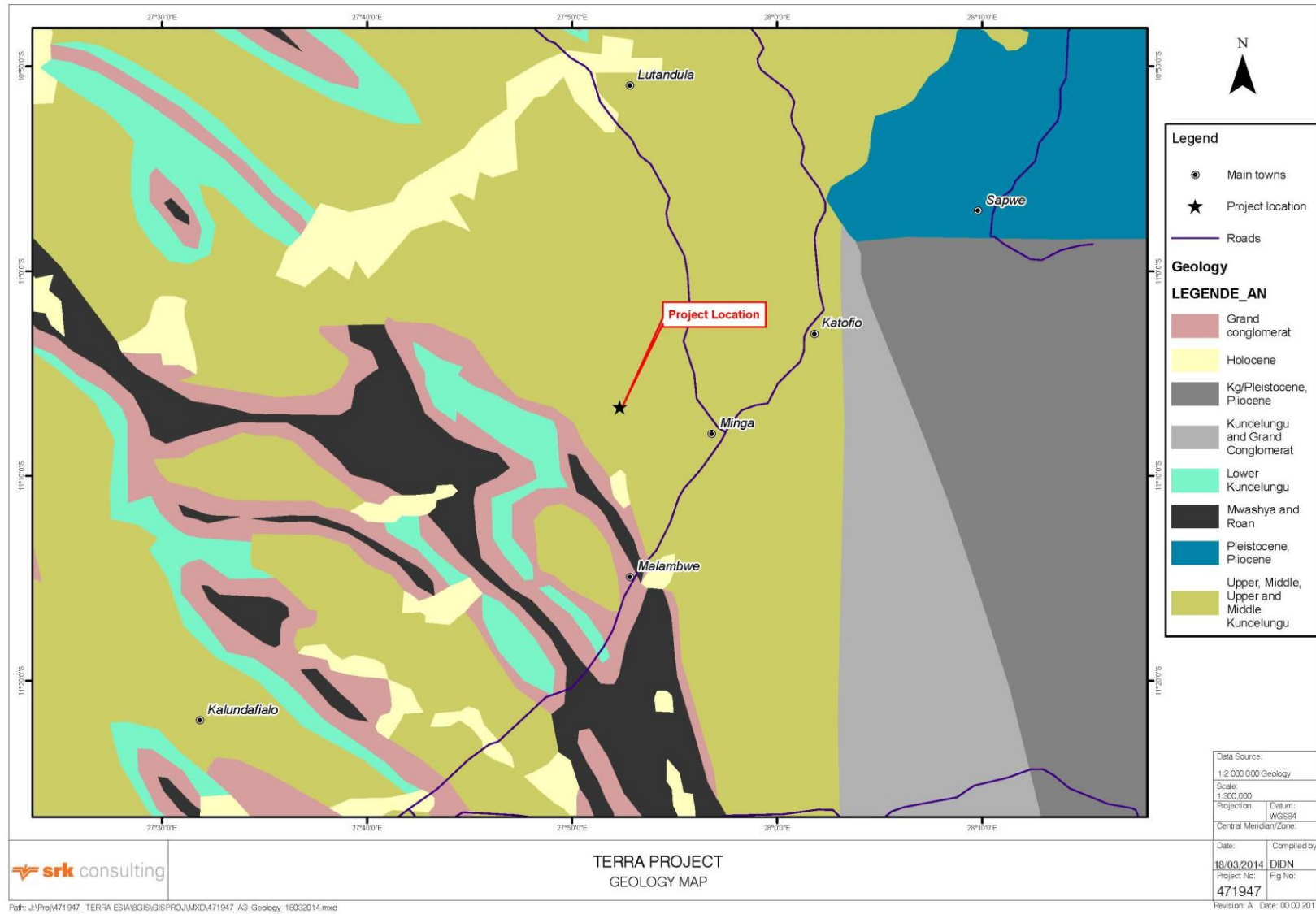
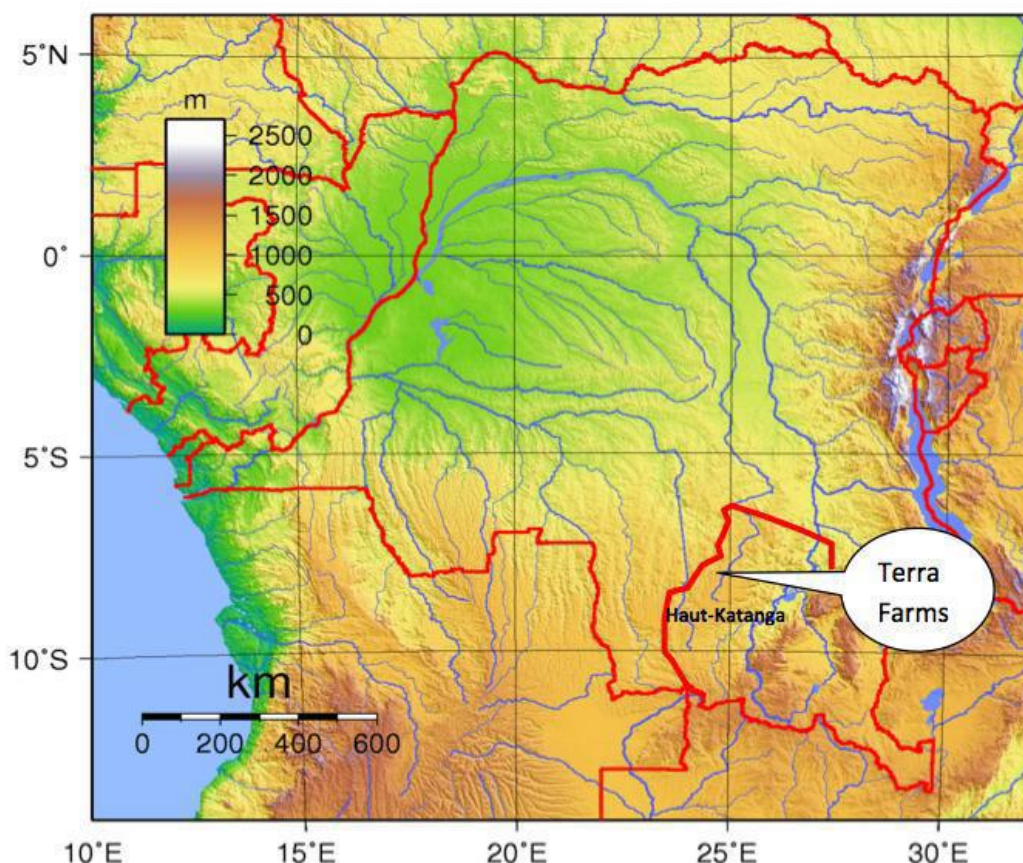


Figure 5-1: Geological map of the project area

## 5.3 Topography

The project area is characterised by a flat area with gently undulating topography at the North limit of the concession. The TERRA farms are situated in the “Highlands” from whence the Province’s name “Upper Katanga (Haut Katanga)” is derived. The area’s elevation is roughly 1’200m above sea level. The area surrounding the farms is relatively flat with lower lying areas forming marshes, swamps and lakes but sloping towards the rivers and lake. The Rivers and rivulets are numerous in the area, carrying the excess rainwater to lakes. The flat terrain and high rainfall result in the water table being shallow (close to the grounds). Wells can be dug almost anywhere on the farms. Several active wells are present in the surrounding villages as can be seen in the Figure 5-2 below.

**Exhibit 3.10: DRC Topography**



**Figure 5-2: Topography of project area**

## 5.4 Soils

### 5.4.1 Soil type and characterization

The soils in the Lubanda area can be grouped with the soils north and east of the Lubanda Lake, and extended to the south of the lake towards Minga. Upper layers with humus are visible in the total area and are the result of bush fire and the thickness increases from the savannah to the light forest areas.

North of the lake (P.C. 110 & 111) the soils are deep and sandy (less than 10% clay) with restriction in the upper layers of soil. Slightly more humus soils are found in the A Horizon (upper layer) and are greyish in colour compared with the more reddish B Horizon (below 30cm).

The area south of the lake (P.C. 116), which is currently being cleared and developed, has soils with clay contents of between 20% and 40%. These soils become less grey in colour as one moves further away from the lake and more reddish to yellow-red except for the top layer that contains more

humus. The terrain is very flat and tends to slope more towards the Kafira River than the lake. These soils seem to be rich in iron and moderately drained except in marshy spots. The area has very large termite mounds (3 to 4 per ha) with a high clay content indicating that the bottom soils have high clay content. The water table in these areas is found at a deeper level than those closer to the lake and drainage should be less of a problem.

No cultivation has yet been done on the Katofio farm and no profile holes have been made, however indications are that there are three distinctive soil types. The swamp and marshland area (P.C. 117 to 119) has the typical Hydromorphic soils that have high levels of clay, shallow water table, are dark grey to black and poorly drained.

The North-eastern area is typical savannah with light forestation and soils are red with a gravel feel. These soils do drain moderately well. Large termite mounds occur.

The south-western area tends to become somewhat sandy with fine silt content. Drainage is moderate. The alluvion are present in valleys, the flanks of wide valleys are in gentle slope and are covered by colluvial soils. The latosols polygenic are present.

In general these soils are sandy soil, rich in clay and belong to the zonal soils of type A-2, yellowish-red and well drained.

The characteristics of the soil types encountered in the perimeter are as follows:

- Humifere horizon: very often visible everywhere because of the direct influence of bushfires and its thickness increases significantly from the savannah to small forests.
- Hydromorphic soils: the soils encountered in the tides and wetlands, are black in color and are of colluvionnaire origin and are very poorly drained with horizons rich in clay.

The soils in the concession area of Lubanda are characterized by three groups of soil:

- The ferrisols or ferrasols
- The sandy formations of pilocene
- Alluvium moderns, hydromorphic

#### 5.4.2 Soil composition

The soils from the project area have been gathered at a depth between 25 and 30 cm. These samples have been collected at the various location are shown in Table 5-1.

**Table 5-1: Location of samples located**

Stations de prelevements	Cordinates	
ST03	S11 06 13,1	E 27 55 54,0
ST07	S 11 06 36.2	E 27 55 11.8
ST30	S11 06 02,6	E27 54 58.0
ST31	S11 06 29,8	E27 55 08,9
ST32	S11 06 55,2	E27 54 36,9

The soil sampling campaign has been performed by GAC during 2006 and the tests have been carried out using the XRF NITRON XLI. The values of metal contents illustrate the presence of iron but indicate that the upper horizon must be classified as "Soil" in term of pedology.

#### 5.4.3 Soil quality

Due to low (nearly no) human activity in the area, the soil is expected to be clean. Soils are not prone to erosion in the TERRA concession.



## 5.5 Land use

The site is located within an area characterised by livestock farming and rural settlements. Shifting cultivation forms the basis of the farming system in the Lubanda and Katofio area. Food crops (cassava, plantains, bananas, maize, soyabeans, beans and sweet potatoes) are produced. Typically, an average household may own 5-10ha of land but usually only 1ha or less under cultivation. In general farming is done using family labour. Fruit trees, both planted and wild are continuously being harvested during fallow periods.

Natural resources used regularly by local residents include wood, fish and wild animals, building materials, medicinal plants, and potable water. Many of the resources in the area are depleting due to pressure from unsustainable agricultural practises and cut of trees for charcoal.

## 5.6 Biodiversity

This section provides a description of the baseline biological environment and is based on the terrestrial and aquatic biodiversity and ecology study undertaken by GAC. The majority of the information was taken from the botanical and faunal baseline studies conducted in the Lubanda area as part of previous ESIA study. Additionally SRK conducted field surveys over three separate one-day site visits in the wet season during January to February 2014. The field surveys were undertaken by a team from the University of Lubumbashi, Department of Biodiversity, accompanied by Patrick Mboma of the SRK DRC office. The surveys are all based on visual observation and community interviews, and were conducted in the areas of Lubanda Lake and the surrounding farming areas around the Lubanda villages. Below is the project team that worked on the biodiversity section of this report.

Name Designation	Name Designation	Project Role	Qualifications	Years Experience
Emile Kisimba Kibuya	Lubumbashi university	Taxonomic classification	Botanist and zoologist of the laboratory of the ecology of landscape and environment of the Faculty of Science, Department of Geography of the University of Lubumbashi	40
Patrick Kafamba	Consultant (SRK DRC office, Lubumbashi)	Work site and Report writing	BSc (Geographical Sciences)	6
Amisi Mwana Y.P	Lubumbashi university	Taxonomic classification	PhD in environmental sciences, Director of laboratory of the ecology of the landscape and the environment. Professor at University of Lubumbashi University	16

Random household surveys were conducted, and a day was dedicated to driving through the project area with Professor Amisi from the University of Lubumbashi.

A desktop study was also undertaken, making use of previous studies by GAC, and other relevant documentation and reports. The material used for the desktop study was as follows:

- Ecological Report on Sites around the TERRA project, prepared by GAC, EIA, dated April 2010 *Recensement des grands mammifères et impacts humains dans les Parcs Nationaux de l'UPEMBA & des KUNDELUNGU, République Démocratique du Congo, Février 2009* prepared by United States Fish and Wild life Service; and
- *Se Nourrir en Foret Claire Africaine* prepared by Malaise 1997.

Professor Amisi was asked to review and add to species tables originally compiled by GAC in the TERRA ESIA, 2010. SRK checked these species list tables against the IUCN Red Data List and the Encyclopaedia of Life online databases to determine the conservation status of each species.

### 5.6.1 Flora

The DRC is considered to be the most biologically diverse country in Africa, with at least 11000 plant species having been recorded, of which 29% are found only in the DRC. This is partly due to the size of the country and the fact that half of the country is covered in rain forest. The concession area lies in the southern part of the country within a zone of miombo woodland. "Miombo" is a vernacular term adopted by ecologists to describe the woodland ecosystems dominated by trees of the genera *Brachystegia*, *Julbernardia* and *Isoberlinia* of the family Fabaceae, sub family Caesalpinioideae. Such woodlands extend over 2.8 million km of the southern sub humid tropical zone from Tanzania and DRC in the north through Zambia, Malawi, and eastern Angola to Zimbabwe and Mozambique in the south. These woodlands constitute the largest more-or-less contiguous block of deciduous tropical woodlands and dry forest in the world. The generally degraded state of the natural habitat in the concession area and the activities in the areas surrounding the concession area has resulted in a generally impoverished diversity of flora. The vegetation identified in the various areas of the TERRA concession site is described below.

Large trees of 8-25 m in height located in the clear degraded forest in the project area are presented in Table 5-2.

**Table 5-2: Clear degraded forest**

N°	Species	Family	IUCN red list Status
1	<i>Ficus gnaphalocarpa</i>	Moraceae	Not Assessed
2	<i>Ficus brachylepis</i>	Moraceae	Not Assessed
3	<i>Ficus capensis</i>	Moraceae	Not Assessed
4	<i>Isoberlinia angolensis</i>	Caesalpinioideae	Not Assessed
5	<i>Azelia quanzensis</i>	Caesalpinioideae	Not Assessed
6	<i>Julbernardia paniculata</i>	Fabaceae	Not Assessed
7	<i>Diplorhynchus condylocarpon</i>	Apocynaceae	Not Assessed
8	<i>Zanha golungensis</i>	Sapindaceae	Not Assessed

The table below shows a list of herbaceous shrubs between 0-1 m high in the project area.

**Table 5-3: Herbaceous: Shrub 0-1m height**

N <sup>o</sup>	Species	Family	IUCN red list Status
9	<i>Hymenodictyon parvifolium</i> Oliv.	Rubiaceae	Not Assessed
10	<i>Ficus dekdekena</i>	Moraceae	Not Assessed
11	<i>Ziziphus mucronata</i>	Rhamnaceae	Not Assessed
12	<i>Senna petersiana</i>	Caesalpinioideae	Not Assessed
13	<i>Zanthoxylum chalybeum</i>	Rutaceae	Not Assessed
14	<i>Cussonia corbisieri</i>	Araliaceae	Not Assessed
15	<i>Acalipha</i> sp	Euphorbiaceae	Not Assessed
16	<i>Setaria megaphylla</i>	Poaceae	Not Assessed
17	<i>Hyparrhenia rufa</i>	Panicoideae	Not Assessed
18	<i>Senna singueana</i>	Fabaceae	Not Assessed
19	<i>Crotalaria retusa</i>	Fabaceae	Not Assessed
20	<i>Annona senegalensis</i>	Annonaceae	Not Assessed
21	<i>Ageratum conyzoides</i>	Asteraceae	Not Assessed
22	<i>Galinsoga parviflora</i>	Asteraceae	Not Assessed
23	<i>Bidens pilosa</i>	Coreopsideae	Not Assessed
24	<i>Brachiaria brizantha</i>	iPoaceae	Not Assessed
25	<i>Digitaria nitens</i> Rendle	idem	Not Assessed
26	<i>Pennisetum polystachion</i>	Panicoideae	Not Assessed
27	<i>Aneilema beniniense</i>	Commelinaceae	Not Assessed
28	<i>Gladiolus Klattianus</i>	Iridaceae	Not Assessed
29	<i>Chlorophytum stolzii</i>	Asparagaceae	Not Assessed
30	<i>Aloe christianii</i>	Xanthorrhoeaceae	Not Assessed
31	<i>Setaria pallide-fusca</i>	Poaceae	Not Assessed
32	<i>Bauhinia thonningii</i>	Caesalpinioideae	Not Assessed
33	<i>Dioscorea dumetorum</i>	Dioscoreaceae	Not Assessed
34	<i>Cissus schmitzii</i>	Ampelidaceae	Not Assessed

The table below shows a list of species cultivated in the area.

**Table 5-4: Species cultivated in the area**

N°	Species	Family	IUCN red list Status
35	<i>Zea mays</i>	Poaceae	Not Assessed
36	<i>Phaseolus vulgaris</i>	Fabaceae	Not Assessed
37	<i>Cajanus cajan</i>	Fabaceae	Not Assessed
38	<i>Luffa aegyptiaca</i>	Cucurbitaceae	Not Assessed
39	<i>Momordica balsamina</i>	Cucurbitaceae	Not Assessed
40	<i>Capsicum frutescens</i>	Solanaceae	Not Assessed
41	<i>Lycopersicum esculentum</i>	Solanaceae	Not Assessed
42	<i>Solanum melongena</i>	Solanaceae	Not Assessed
43	<i>Hibiscus esculentus</i>	Malvaceae	Not Assessed
44	<i>Capsicum annuum</i>	Solanaceae	Not Assessed

The table below shows a list of aquatic Vegetation to *Juncellus alopecuroides* and *cyperus* in the project area.

**Table 5-5: Aquatic vegetation**

N°	Species	Family	IUCN red list Status
45	<i>Pycnus polystachyos</i>	Cyperaceae	Least Concern
46	<i>Cyperus alternifolius</i>	Cyperaceae	Least Concern
47	<i>Cyperus articulatus</i>	Cyperaceae	Least Concern
48	<i>Cyperus difformis</i>	Cyperaceae	Least Concern
49	<i>Rhynchospora corymbosa corymbosa</i>	Cyperaceae	Not Assessed
50	<i>Oryza perennis</i>	Poaceae	Not Assessed
51	<i>Cyperus dives</i>	Cyperaceae	Not Assessed
52	<i>Polygonum salicifolium</i>	Polygalaceae	Not Assessed
53	<i>Bryonia dioica</i>	Cucurbitaceae	Not Assessed
54	<i>Polygonum glandulo- pilosum</i>	idem	Not Assessed
55	<i>Dianthus angolensis</i>	Cyperaceae	Not Assessed
56	<i>Ludwigia abyssinica</i>	Onagraceae	Not Assessed
57	<i>Ludwigia Erecta</i>	Onagraceae	Not Assessed
58	<i>Nymphaea lotus</i>	Nymphaeaceae	Not Assessed
59	<i>Ludwigia sp</i>	Onagraceae	Not Assessed
60	<i>Hydrocotyle confusa</i>	Apiaceae	Not Assessed
61	<i>Crassocephalum picridifolium</i>	Asteraceae	Least Concern
62	<i>Ipomoea aquatica</i>	Convolvulaceae	Not Assessed
63	<i>Centella asiatica</i>	Apiaceae	Least Concern

N°	Species	Family	IUCN red list Status
64	<i>Mukia maderaspatana</i>	Cucurbitaceae	Not Assessed
65	<i>Phragmites mauritianus</i>	Poaceae	Not Assessed
66	<i>Phyllanthus niruri</i>	Phyllanthaceae	Not Assessed
67	<i>Acacia kirkii</i>	Acacieae	Not Assessed
68	<i>Acacia polyacantha</i>	Fabaceae	Not Assessed
69	<i>Salix subserrata</i>	Salicaceae	Not Assessed
70	<i>Floscopa glomerata</i> Eloscopa	Commelinaceae	Not Assessed

The table below shows a list of Forest mesophanerophytes or medium to large tree of 8-30 m high in the project area.

**Table 5-6: Forest mesophanerophytes or medium to large trees**

N°	Species	Family	IUCN red list Status
71	<i>Paulina piñata</i> Baker	Sapendaceae	Not Assessed
72	<i>Clausena anisata</i>	Rutaceae	Not Assessed
73	<i>Craibia anisata</i>	Fabaceae	Not Assessed
74	<i>Khaya nyasica</i>	Meliaceae	Not Assessed
75	<i>Piptadeniastrum africanum</i>	Fabaceae	Not Assessed
76	<i>Erythrina excelsa</i>	Fabaceae	Not Assessed
77	<i>Beilschmiedia schmitzii</i>	Lauraceae	Not Assessed
78	<i>Nuxia congesta</i>	Stilbaceae	Not Assessed
79	<i>Manilkara discolor</i>	Sapotaceae	Not Assessed
80	<i>Bridelia micrantha</i>	Phyllanthaceae	Not Assessed
81	<i>Parkia filicoidea</i>	Fabaceae	Not Assessed
82	<i>Rauvolfia caffra</i>	Apocynaceae	Not Assessed
83	<i>Parinari excelsa</i>	Chrysobalanaceae	Not Assessed
71	<i>Paulina piñata</i> Baker	Sapendaceae	Not Assessed

The table below shows a list of Forest mésophanérophyte or medium to large tree of 8-30 m high in the project area.

**Table 5-7: Forest mésophanérophite or medium to large tree**

N°	Species	Family	IUCN red list Status
84	<i>Brachystegia spiciformis</i>	Caesalpiniaceae	Not Assessed
85	<i>Isoberlinia angolensis</i>	Fabaceae	Not Assessed
86	<i>Azelia quanzensis</i>	Fabaceae	Not Assessed
87	<i>Pterocarpus angolensis</i>	Fabaceae	Near threatened
88	<i>Pterocarpus tinctorius</i>	Fabaceae	Not Assessed
89	<i>Julbernardia globiflora</i>	Fabaceae	Not Assessed
90	<i>Bobgunnia madagascariensis</i>	Fabaceae	Not Assessed
91	<i>Brachystegia floribunda</i>	Fabaceae	Not Assessed
92	<i>Brachystegia boehmii</i>	Fabaceae	Not Assessed
93	<i>Brachystegia longifolia</i>	Fabaceae	Not Assessed
94	<i>Brachystegia taxifolia</i>	Fabaceae	Not Assessed
95	<i>Brachystegia wangermeeana</i>	Fabaceae	Not Assessed
96	<i>Julbernardia paniculata</i>	Fabaceae	Not Assessed
97	<i>Albizia adianthifolia</i>	Fabaceae	Least Concern
98	<i>Albizia antunesiana</i>	Fabaceae	Not Assessed
99	<i>Pericopsis angolensis</i>	Fabaceae	Not Assessed
100	<i>Parinari curatellifolia</i>	Chrysobalanaceae	Not Assessed
101	<i>Anisophyllea boehmii</i>	Anisophylleaceae	Not Assessed
102	<i>Marquesia macroua</i>	Dipterocarpaceae	Not Assessed
103	<i>Pseudolachnostylis maprouneifolia</i>	Phyllanthaceae	Not Assessed
104	<i>Erythrophleum africanum</i>	Caesalpinioideae	Not Assessed
105	<i>Hexalobus monopetalus</i>	Annonaceae	Not Assessed
106	<i>Syzigium guineense</i>	Myrtaceae	Not Assessed
107	<i>Strychnos spinosa</i>	Loganiaceae	Not Assessed
108	<i>Strychnos cocculoides</i>	Loganiaceae	Not Assessed
109	<i>Strychnos innocua</i>	Loganiaceae	Not Assessed
110	<i>Strychnos pungens</i>	Loganiaceae	Not Assessed
111	<i>Annona senegalensis</i>	Annonaceae	Not Assessed
112	<i>Olax obtusifolia</i>	Olacaceae	Not Assessed
113	<i>Memecylon flavescens</i>	Melastomataceae	Not Assessed
114	<i>Vitex madiensis</i>	Lamiaceae	Not assessed
115	<i>Gardenia jasminoides</i>	Rubiaceae	Not assessed
116	<i>Ochna schweinfurthiana</i>	Ochnaceae	Not assessed
117	<i>Uapca pilosa</i>	Euphorbiaceae	Not assessed
118	<i>Pavetta schumanniana</i>	Rubiaceae	Not assessed
119	<i>Canthium crassum</i>	Rubiaceae	Not assessed

N°	Species	Family	IUCN red list Status
120	<i>Protea welwitschii</i>	Proteaceae	Not assessed
121	<i>Uapaca nitida</i>	Phyllanthaceae	Not assessed
122	<i>Cussonia quarrei</i>	Araliaceae	Not assessed
123	<i>Steganotaenia araliacea</i>	Apiaceae	Not assessed
124	<i>Psorospermum febrifugum</i>	Hypericaceae	Not assessed
125	<i>Hymenocardia acida</i>	Phyllanthaceae	Not assessed
126	<i>Flacourtia indica</i>	Salicaceae	Not assessed
127	<i>Securidaca longepedunculata</i>	<i>Polygalaceae</i>	Not assessed
128	<i>Schrebera trichoclada</i>	Oleaceae	Not assessed
129	<i>Harungana madagascariensis</i>	Hypericaceae	Not assessed

The table below shows a list of Termite mound vegetation in the project area.

**Table 5-8: Termite mound vegetation on the Project site and its surroundings**

N°	Species	Family	IUCN red list Status
130	<i>Zanthoxylum chalybeum</i>	Rutaceae	Not assessed
131	<i>Thespesia garckeana</i>	Malvaceae	Not assessed
132	<i>Ziziphus mucronata</i>	Rhamnaceae	Not assessed
133	<i>Mimusops zeyheri</i>	Sapotaceae	Not assessed
134	<i>Friesodielsia obovata</i>	Annonaceae	Not assessed
135	<i>Grewia flavescens</i>	Malvaceae	Not assessed
136	<i>Haplocoelum foliosum</i>	Sapindaceae	Not assessed
137	<i>Feretia aeruginescens</i>	Rubiaceae	Not assessed
138	<i>Euclea schimperi</i>	Ebenaceae	Not assessed
139	<i>Rourea orientalis</i>	Connaraceae	Not assessed
140	<i>Cissus schmitzii</i>	Vitaceae	Not assessed
141	<i>Boscia salicifolia</i>	Capparaceae	Not assessed
142	<i>Boscia angustifolia</i>	Capparaceae	Not assessed
143	<i>Cassia petersiana</i>	Fabaceae	Not assessed
144	<i>Hymenodictyon parvifolium</i>	Rubiaceae	Not assessed
145	<i>Ficus dekdekena</i>	Moraceae	Not assess
146	<i>Lannea stuhlmannii</i>	Anacardiaceae	Not assessed
147	<i>Adenia gummifera</i>	Passifloraceae	Not assessed
148	<i>Allophylus africanus</i>	Sapindaceae	Not assessed
149	<i>Aloe greatheadii</i>	Xanthorrhoeaceae	Not assessed
150	<i>Balanites aegyptiaca</i>	Zygophyllaceae	Not assessed
151	<i>Acalipha paniculata</i>	Euphorbiaceae	Not assessed
152	<i>Dioscorea dumetorum</i>	Dioscoreaceae	Not Assessed
153	<i>Diospiros pallens</i>	Ebenaceae	Not Assessed

The study area is dominated by miombo woodland, followed by scrub, cultivation, and wetland habitat. No species of conservation importance (i.e. Red Data and DRC legislation) were observed. Alien invasive and weedy plant species occur throughout the TERRA concession, but are primarily associated with disturbed/transformed areas such as along roads and around fields and villages

## 5.6.2 Fauna

Faunal diversity in the TERRA farming area around the Lubanda village is discussed below under separate subheadings for mammals, rodents, fishes, birds, molluscs and invertebrates.

It was principally a desktop study and incorporated findings from other baseline studies conducted in the Lubanda area as part of previous ESIA studies (GAC). High-level field surveys (visual observation and interviews) were carried out during January and February 2014 to obtain supplementary information of fauna in the area. The general degraded character of natural habitats in the concession areas has resulted in a deteriorated faunal diversity. This is particularly the case for fishes and edible game and the situation is not expected to improve at any time in the foreseeable future. The fauna identified in the various areas of the concession sites is described below:

The rivers within the study area are known to contain approximately 21 species of fish from 14 different genera:

## 5.6.3 Fish

The rivers within the TERRA concession and surrounding areas and the Lubanda lac are known to contain nine species of fishes. The table below lists these nine species (GAC report and interviews).

**Table 5-9: List of fish in Terra concession area**

<b>N°</b>	<b>Order</b>	<b>Family</b>	<b>Scientific names</b>	<b>Vernacular names</b>	<b>IUCN red list Status</b>
1	Perciformes	Cichlidae	<i>Tilapia baloni</i>	Kitutu	Least Concern
2	Siluriformes	Clariidae	<i>Clarias buthupogon</i>	Milonge	Least Concern
3	Perciformes	Anabantidae	<i>Ctenopoma multispine</i>	Nkomo	Least Concern
4	Siluriformes	Claroteidae	<i>Chrysichthys macropterus</i>	Kikenge	Data deficient
5	Siluriformes	Mochokidae	<i>Synodontis polystigma</i>	Bongwe, Kisokosoko	Least Concern
6	Cyprinodontiformes	Nothobranchiidae	<i>Nothobranchius malaissei</i>	Pili	Data Deficient
7	Cypriniformes	Cyprinidae	<i>Barbus neefi</i>	Kisepa	Least Concern
8	Cypriniformes	Cyprinidae	<i>Barbus eutaenia</i>	Ndakala	Data Deficient
9	Osteoglossiformes	Mormyridae	<i>Campylomormyrus Rhyngophorus</i>	Ndomondomo	Least Concern



#### **5.6.4 Birds**

The bird diversity of the Katanga province is estimated to 676 different species. Of these, at least 101 species are observed in the Katangan miombo open forests. Table 5.7 lists the bird species identified in the TERRA concession and surrounding areas. Out of all these bird species only 41 species of birds were directly observed in the proposed project area. This is considerably lower than what would be expected for an intact miombo woodland area and underlines the level of ecosystem degradation, notably miombo destruction, in the area concerned. However, bird diversity is considerably higher than that of mammals and fishes. This is partially explained by the diversity of habitats and the species associated with these environments. In the TERRA concession nine species of aquatic birds were directly observed on site.

**Table 5-10: List birds and aquatic birds in Terra concession**

N°	Order	Family	Scientific names	Vernacular names	IUCN red list Status
10	Passeriformes	Ploceidae	<i>Bubalornis albirostris</i>	Analabi	Least Concern
11	Passeriformes	Estrildidae	<i>Spermestes cucullata</i>	Bwilange	Least Concern
12	Passeriformes	Sylviidae	<i>Schoenicola brevirostris</i>	Katshitshi	Least Concern
13	Passeriformes	Sylviidae	<i>Phylloscopus laetus</i>	Kampruluprulu	Least Concern
14	Passeriformes	Dicruridae	<i>Dicrurus ludwigii</i>	Shimutengu	Least Concern
15	Passeriformes	Dicruridae	<i>Dicrurus adsimilis</i>	Kitengu	Least Concern
16*	Passeriformes	Dicruridae	<i>Dicrurus modestus</i>	Mutengu	Least Concern
17	Passeriformes	Hirundinidae	<i>Hirundo rustica</i>	Akamimbi	Least Concern
18*	Passeriformes	Capitonidae	<i>Diadenatum Flontatum</i>	Kipindubuluba	Not Assess
19	Gruiformes	Rallidae	<i>Amauornis flavirostra</i>	Kafulubiti	Least Concern
20	Passeriformes	Malaconotidae	<i>Dryoscopus cubla</i>	Kitemasumu	Least concern
21	Passeriformes	Muscicapidae	<i>Cossypha semirufa</i>	Mulongwe	Least concern
22	Passeriformes	Muscicapidae	<i>Oenanthe oenanthe</i>	Munapebwe	Least Concern
23	Passeriformes	Muscicapidae	<i>Oenanthe bifasciata</i>	Muninapebwe	Least Concern
24	Passeriformes	Ploceidae	<i>Quelea erythrops</i>	Anasope	Least Concern
25	Galliformes	Phasianidae	<i>Francolinus africanus</i>	Inkwale	Least Concern
26	Strigiformes	Strigidae	<i>Bubo africanus</i>	Fwifwi	Least Concern
27	Passeriformes	Cisticolidae	<i>Camaroptera brevicaudata</i>	Katende	Least Concern
28	Coraciiformes	Bucorvidae	<i>Bucorvus leadbeateri</i>	Umungomba	Vulnerable
29	Psittaciformes	Psittacidae	<i>Poicephalus meyeri</i>	Kyandwe	Least Concern
30	Piciformes	Picidae	<i>Dendropicus namaquus</i>	Mubangwapopo	Least Concern

31	Piciformes	Picidae	<i>Dendropicus fuscescens</i>	Mubangwapopo	Least Concern
32	Passeriformes	Oriolidae	<i>Oriolus auratus</i>	Ndubaluba	Least Concern
33	Coraciiformes	Bucerotidae	<i>Bycanistes bucinator</i>	Lukwekwe	Least Concern
34	Cuculiformes	Cuculidae	<i>Centropus superciliosus</i>	Mukuta	Least Concern
35	Falconiformes	Accipitridae	<i>Neophron percnopterus</i>	Ilikubi	Endangered
36	Falconiformes	Accipitridae	<i>Haliaeetus vocifer</i>	Kyembe	Least Concern
37	Falconiformes	Falconidae	<i>Falco subbuteo</i>	Kabemba	Least Concern
38	Falconiformes	Accipitridae	<i>Pernis apivorus</i>	Pungwa	Least Concern
39	Falconiformes	Accipitridae	<i>Pandion haliaetus</i>	Pungwa	Least Concern
40	Galliformes	Phasianidae	<i>Coturnix coturnix</i>	Kambelemebele	Least Concern
41	Passeriformes	Motacillidae	<i>Motacilla capensis</i>	Kalyelye	Least Concern
42	Strigiformes	Strigidae	<i>Strix woodfordii</i>	Kapulungu	Least Concern
43	Caprimulgiformes	Caprimulgidae	<i>Caprimulgus pectoralis</i>	Keundu	Least Concern
44	Caprimulgiformes	Caprimulgidae	<i>Caprimulgus pectoralis</i>	Kambasa	Least Concern
45	Caprimulgiformes	Caprimulgidae	<i>Caprimulgus natalensis</i>	Lubafwa	Least Concern
46	Coraciiformes	Coraciidae	<i>Coracias caudatus</i>	Kivila	Least Concern
47	Passeriformes	Ploceidae	<i>Quelea Quelea</i>	Masope	Least Concern
48	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	Pwele	Least Concern
49	Galliformes	Numididae	<i>Numida meleagris</i>	Ikanga	Least Concern
51	Columbiformes	Columbidae	<i>Streptopelia Semitorquata</i>	Kiba	Least Concern
<b>List of aquatic birds in the Terra area and vernacular names</b>					
52	Anseriformes	Anatidae	<i>Plectropterus gambensis</i>	Bata	Least Concern
53	Anseriformes	Anatidae	<i>Anas undulata</i>	Kyiso	Least Concern

54	Gruiformes	Rallidae	<i>Gallinula chloropus</i>	Katantamatuwa	Least Concern
55	Ciconiiformes	Ardeidae	<i>Egretta garzetta</i>	Kitwatwa	Least Concern
58	Charadriiformes	Laridae	<i>Chlidonia leucopterus</i>	Tetekela	Least Concern
59	Coraciiformes	Alcedinidae	<i>Alcedo cristata</i>	Tetekela	Least Concern
60	Ciconiiformes	Ciconiidae	<i>Anastomus lamelligerus</i>	Tote	Least Concern

\*Species genus not found in the IUCN Red Data List or Encyclopedia of Life

From the previous study GAC, Birds recorded from the TERRA concession that are considered uncommon due to localized distributions, specialized habitat requirements and/or general rarity, recorded from the study area, include *Bucorvus leadbeateri* (vulnerable) and *Centropus superciliosus*.

### 5.6.5 Mammals

Based on desktop study and publications undertaken on the intact miombo woodland in the Upper Katanga regions, mammal diversity would be expected to be relatively high; approximately 220 mammal species including 38 edible game species and edible rodent species. Mammal diversity in the TERRA concession area is far lower than this with only eight mammal species actually recorded as present on site although, this is based on interviews with the local people in the area.

Table 5-11 shows a list of mammal's species recorded in the TERRA concession area.

**Table 5-11: List of mammal's species recorded in Terra concession area**

N°	Order	Family	Scientific names	Vernacular names	IUCN red list Status
61	Carnivora	Mustelidae	<i>Aonyx capensis</i>	Kakonge	Least Concern
64	Carnivora	Viverridae	<i>Genetta trigrina</i>	Nshimba	Least Concern
65	<i>Cetartiodactyla</i>	<i>Bovidae</i>	<i>Cephalophus monticola</i>	Kabuluku	Least Concern
69	Lagomorpha	Leporidae	<i>Lepus saxatilis</i>	Kalulu	Least Concern
66	<i>Cetartiodactyla</i>	<i>Bovidae</i>	<i>Raphicerus sharpei</i>	Katiki	Not Assess
67	Pholidota	Manidae	<i>Manis tricuspis</i>	Nkaka	Near Threatened
68	Artiodactyla	Bovidae	<i>Tragelaphus spekii</i>	Mbuli	Least Concern
69	Primates	Galagidae	Galago greater galago	Kyanga	Not Assess
<b>List of rodents' species recorded for the Terra concession</b>					
70	<i>Rodentia</i>	<i>Nesomyidae</i>	<i>Cricetomys gambianus</i>	<i>Mamanambao</i>	<i>Least Concern</i>
71	<i>Rodentia</i>	<i>Sciuridae</i>	<i>Paraxerus cepapi</i>	<i>Kampanda</i>	<i>Least Concern</i>
72	<i>Rodentia</i>	<i>Thryonomidae</i>	<i>Thryonomys Swinderianus</i>	<i>Shimbiriki</i>	<i>Least Concern</i>

No Red Data mammals were recorded within the TERRA concession during the faunal surveys.

Occurrence of these mammals is limited by continued habitat disturbance and loss regionally. In the GAC report the *Lycaon pictus* species was listed. However feedback from Professor Amisi Mwana from the Lubumbashi University confirmed that this species does not occur in the region. SRK also checked the IUCN Red Data List or Encyclopaedia of Life and confirmed that this species does not occur in the region. However this will be further verified in the comprehensive ESIA.

### 5.6.6 Reptiles

Ten reptile species have been recorded as being present in the Upper Katangan regions. In the TERRA concession area only seven species were recorded. Most of the information dealing with reptiles in the Zambezi wet miombo area is outdated and no recent studies exist. Table 5-12 shows a list of reptile species recorded in the TERRA concession area.

**Table 5-12: List of reptiles in Terra concession area**

N <sup>o</sup>	Order	Family	Scientific names	Vernacular names	IUCN red list Status
74	squamata	vipéridae	<i>Bitis gabonica</i>	Kipiri	Not Assessed
75	Squamata	Pythonidae	<i>Python sebae</i>	Ulusato	Not Assessed
76	Idem	varanidae	<i>Varanus nilonthematicus</i>	Imbulu	Not Assess
77	Squamata	Varanidae	<i>Varanus niloticus</i>	Samba	Least Concern
78	Testudines	Pelomedusidae	<i>Pelusios subniger</i>	Fulwe	Lower risk/Least Concern
79	Squamata	Agamidae	<i>Amphibolurus barbatus</i>	Kolokombwa kilambulalatshumivi	Least concern
80	Squamata	Lacertidae	<i>Lacerta agilis</i>	Musorio	Least Concern

No reptile species of international/national concern were recorded during the surveys with reference to the IUCN Red Lists (IUCN, 2011).

### 5.6.7 Amphibians

Table 5-13 below shows a list of amphibian species recorded in the TERRA concession area.

**Table 5-13: Amphibians species found in the TERRA concession area**

N <sup>o</sup>	Order	Family	Scientific names	Vernacular names	IUCN red list Status
82	Anura	Pyxicephalidae	<i>Strongylopus fasciatus</i>	Bombwe	Least concern
83	Anura	Bufo	<i>Bufo veridis</i>	Tchula	Least concern

With reference to the IUCN Red Lists (IUCN, 2011), no amphibian species of international/national concern have been recorded.

### 5.6.8 Class of comestibles insects

The Table 5-14 below shows a list of comestible insect species recorded in the TERRA concession area.

**Table 5-14: Comestible insects**

N <sup>o</sup>	Order	Family	Scientific names	Vernacular names	IUCN red list Status
84	Lepidoptera	Notodontidae	<i>Elaphrodes Lactea Gaede</i>	Tunkubiu	Not Assessed
85	Lepidoptera	Notodontidae	<i>Antheua insignata gaede</i>	Tuikoto	Not Assessed
86	Lepidoptera	Notodontidae	<i>Anaphe panda (Boisduval)</i>	Masalya	Not Assessed
87	Lepidoptera	Saturniidae	<i>Cirina forda</i>	Mikoso	Not Assessed
88	Isoptera	Termitidae	<i>Macrotermes falciger</i>	Nswa	Not Assessed
89	Hymenoptera	Apidae	<i>Apis mellifera</i>	Nyuki	Not Assessed
90	Decapoda	Atyidae	<i>Caridina africana</i>	Nshinsha	Data Deficient
91*	Odonata	Libellulidae	<i>Libellula depressa</i>	Mujinga	Not Assessed
92	Orthoptera	Acrididae	<i>Nomadacris septemfasciata</i>	Kanta	Not Assessed
93	Orthoptera	Tettigoniidae	<i>Ruspolia Differens</i>	Sonsomani	Not Assessed

\*Species genus not found in the IUCN Red Data List or Encyclopedia of Life

With reference to the IUCN Red Lists (IUCN, 2011), no combustible insects species of international / national concern have been recorded.

### 5.6.9 Sensitive ecosystems

The TERRA concessions area is located approximately 90 km from the Kundelungu National Park, created by the Ordonnance-loi n°70-317, 1970 and its limits were modified in 1975 by the Ordonnance-loi n° 75-097, 1975 which added a large "Zone Annexe" to the western part of the Park that included the Lufira valley. Some 14700 hectares of the Zone Annexe along the Lufira River were classified as a Biosphere Reserve (MAB-UNESCO Program) in 1982, but it is doubtful that the site still meets the criteria of a Man and Biosphere Reserve today. In 1983 an application requesting to classify park as a UNESCO World Heritage site was rejected.

In 1991 all the big cities in the country were looted, launching an era of decline for all the protected areas of Katanga. The massive fleeing of foreigners and the suspension of many economic activities led to the ultimate discontinuation of tourism. Lack of investment and unpaid salaries resulted in many guards deserting, total neglect of the protected areas, internal poaching and illegal activities. In 1997, the troops of Laurent Désiré Kabila took control of Katanga. The soldiers who arrived at the Lusinga station took all the running vehicles and left the chief warden with a single bicycle to look after the entire park. Fortunately, the soldiers agreed to leave the park guns to the guards.

It should be noted that apart from the Kundelungu National Park, the hydrological system of the concession is dominated by the presence of Lubanda Lake which is the lowest area in the middle of the concession. In general and accordance with the DRC regulations, lacs are sensitive ecosystems.

## 5.7 Water resources

### 5.7.1 Surface water

There are no restrictions on the use of irrigation water on either of the farms but irrigation is at present only done on the Lubanda farm. Irrigation water on Lubanda is obtained from the Kafira River. The quantity and sustainability is uncertain. In the middle of May 2010 the river was still flowing strongly. There is also an open well from which irrigation water was pumped in the past. The well's capacity is said to be 60'000 litre per hour in the rainy season. The irrigation water was tested and classified as "Ideal". The water from the well will be monitored for salinity and excessive nutrients, note the colouring due to dissolved metals in the water.

The project area is characterised by a flat area with gently undulating topography. The hydrology system of the concession area is predominantly characterized by the Lubanda lac and wetland area. Three main rivers cross through the project area and all the rivers converged at the Lubanda Lake: the Kafira River, flowing in a northerly direction, the Kabemba in the East and the Kalemba River, which originates from the West cross the Lubanda village and flows eastwards to connect onto the Lubanda Lake.

Groundwater depth varies from 2 to 10m. The project area has surface water sources in the form of rivers and lake. The farming activities are not directly expected to affect these surface water bodies. By avoiding uncontrolled discharges of agrochemicals liquids and waste, implementing adequate waste management and investigating appropriate organizational measures and mitigation actions, impacts on surface water can be reduced to a low level.

#### Surface water quality

The analysis of water samples, collected by SRK experts from the Besa River, Kafira River and Lubanda Lake, was carried out at the SGS Laboratory in South Africa. Water quality sampling results were compared against WHO guidelines. The proposed preliminary locations of the sampling points are shown in Figure 5.10 and described in Table 5-15.

**Table 5-15: Terra's surface monitoring sites**

Sample ID	Location	Sampling point rationale	Project coordinates (UTM 35 South, WGS84 datum)		Sample Frequency
			Easting	Northing	
SW1	Upstream monitoring point at Besa River	Ambient water quality point	602711	8769291	Monthly
SW2	Downstream monitoring point in a channel	Discharging canal from the cultivated land into Kafira River	599425	8771132	Monthly
SW3	Monitoring point at Kafira River	Ambient water quality point	599348	8771171	Monthly
SW 4	Downstream monitoring point in a channel	Discharging canal from the cultivated land into Lake Lubanda	601293	8773398	Monthly
Lake	Lake Lubanda	Ambient water quality point	600535	8775008	Monthly

*Note: Location of surface water points sampled during SRK January 2014 site visit.*

## 5.7.2 Groundwater

Based on GIIP, all precautions necessary will be required to reduce the potential for site impacts to a minimum on ground water. While the proposed site preparation and facility for farming activities for the project are not anticipated to cause any short-term or long-term groundwater impacts, GIIP will need to be employed during the farming operation to ensure impacts (if any) are minimal and are properly mitigated.

### Groundwater quality

The proposed preliminary locations of the sampling points (Boreholes) are described in Table 5-16.

**Table 5-16: TERRA's groundwater monitoring sites**

Sample ID	Location	Sampling point rationale	Project coordinates (UTM 35 South, WGS84 datum)		Sample Frequency
			Easting	Northing	
TBH1	Water supply borehole	Groundwater level and ambient groundwater quality point	602108	8772793	Quarterly
TBH2	Water supply borehole	Groundwater level and ambient groundwater quality point	601865	8772392	Quarterly
HDW1	Community water supply Hand dug well	Groundwater level and ambient groundwater quality point	597613	8771807	Quarterly

### Existing water quality

Water quality results were provided to SRK by TERRA and where compared to World Health Organisation (WHO) drinking water standards of 2008. The water is of good quality with levels within the guideline limits with the exception of iron (with concentration ranging between 1.4 and 2 mg/l) which is above the stipulated concentration limit for drinking water of 0.3 mg/l. The analytical results are found Appendix D, SRK Interim Preliminary Water Specialist Report, 2014.

The sample locations were not provided so very little additional interpretation can be made of the results. All enquiries to TERRA to establish the locations of the sampled sites were unsuccessful.

### Hydrocensus

The primary objective of the hydrocensus was to identify the baseline water use and users within the study area. During the hydrocensus the presence of boreholes, hand dug wells and surface water bodies including rivers within and in the vicinity of the study area were located and recorded. SRK personnel were accompanied by TERRA employee to visit all the identified water sites and to confirm their status.

The coordinates were verified with a handheld GPS instrument and photographs were taken for each census point visited. Photographs were taken of each facility visited to serves a future reference. Summary of hydrocensus data is presented in Table 5-17.



**Table 5-17: Summary of hydrocensus**

Site ID	Easting	Northing	Site type	Comments
TBH 1	602108	8772793	Borehole	Production borehole equipped with a submersible pump. Pumps to storage tanks.
TBH 2	601865	8772392	Borehole	Production borehole equipped with a submersible pump. Pumps to storage tanks.
HDW 1	597613	8771807	Hand dug well	Hand dug well located outside the project boundary used by local community for domestic water source.
HDW 2	597607	8771746	Hand dug well	Hand dug well located within the project area. Used by local community.

**Boreholes**

Two production boreholes, TBH 1 (Figure 5-3 and Figure 5.6) and TBH 2 are the only domestic water source for the TERRA project. The depths of these boreholes were reported to be 75 and 100 meters below ground level (mbgl). Both boreholes are equipped with submersible pumps that deliver water into storage tanks. The pumping rates and pumping cycles of these boreholes are not known. Water levels were not measured during the site visit and no sample was collected from these boreholes. The water consumption by the site camp is not known.



	<p><b>Terra Agricultural Project</b> Production borehole TBH 1</p>	<p>Project No. 471947</p>
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**Figure 5-3: Borehole TBH 1**

**Hand dug wells**

Two hand dug wells were visited as part of the hydrocensus. Both hand dug wells were located at the southern edge of the project area with one hand dug well, HDW 1, located outside the project area. Both hand dug wells are primary source of domestic water supply for the nearby community. The positions of the hand dug wells are shown in Figure 5-4.



**Figure 5-4: Hand dug well, HDW 2**

**Rivers and lake**

Two perennial rivers and a lake were visited during the site visit. The principal river in the area is Besa River which flows east of the project area forming the eastern boundary of the project. Kafira River flows from southeast towards northwest into Lake Lubanda. Fish from Lake Lubanda is a primary source of income to some of the people located close to the lake. The Lake Lubanda is shown in Figure 5-5.



**Figure 5-5: Lake Lubanda**

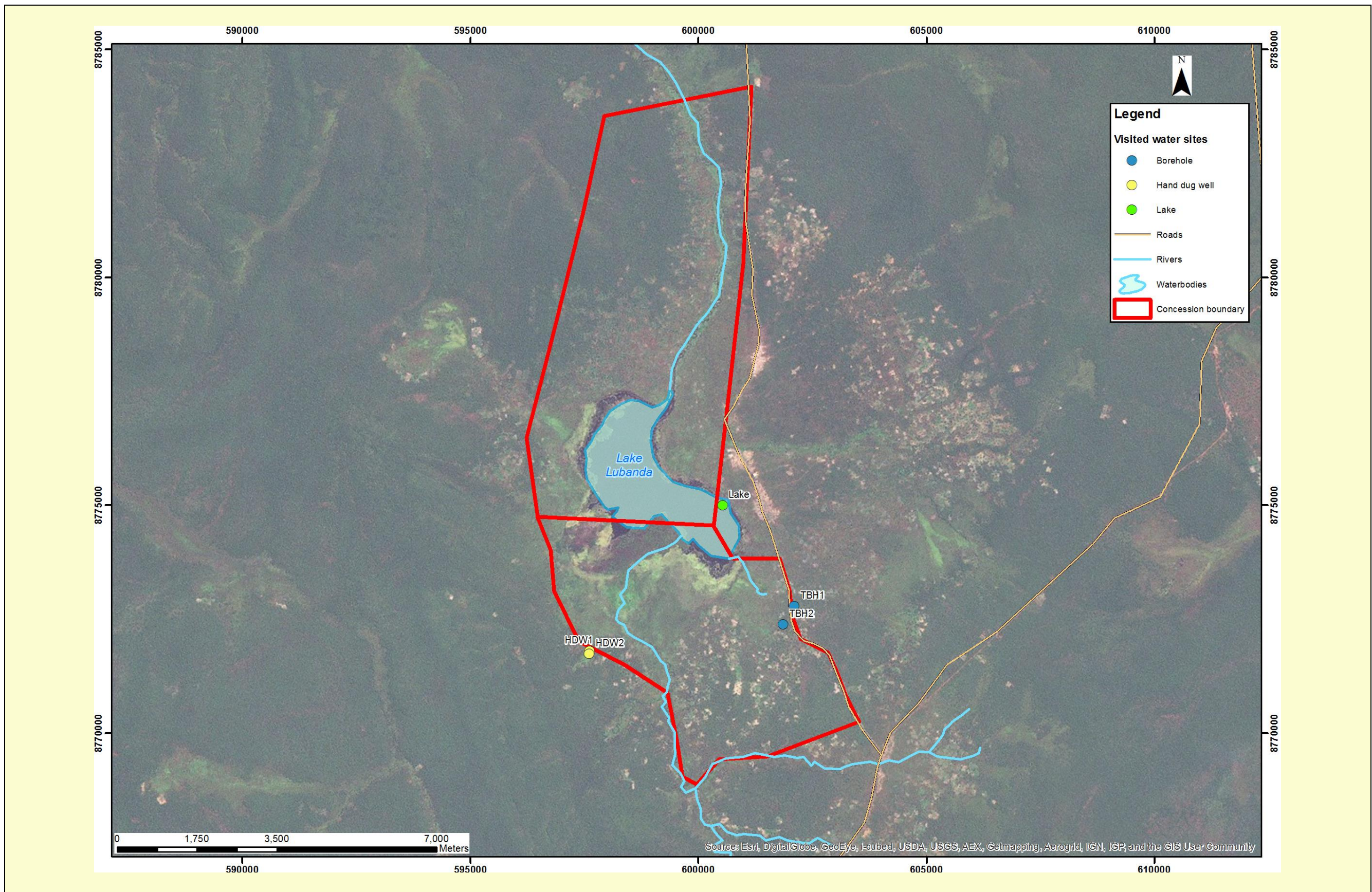


Figure 5-6: Surface and groundwater monitoring sites

## 5.8 Climate

### 5.8.1 Regional setting

The Koppen Climate Classification System was used to classify the regional climate and site conditions in the Bas Congo area. Historical data obtained from weatherbase.com was used to describe the climate conditions on a regional scale and verify conditions based on the Koppen Climate Classification. This classification system describes the regional climate as falling within the “A” Climate type (tropical moist climates). This climate type extends northward and southward from the equator to about 15 to 24 degrees of latitude. In this climate type, average monthly temperatures are greater than 18°C and annual precipitation is greater than 1500 mm.

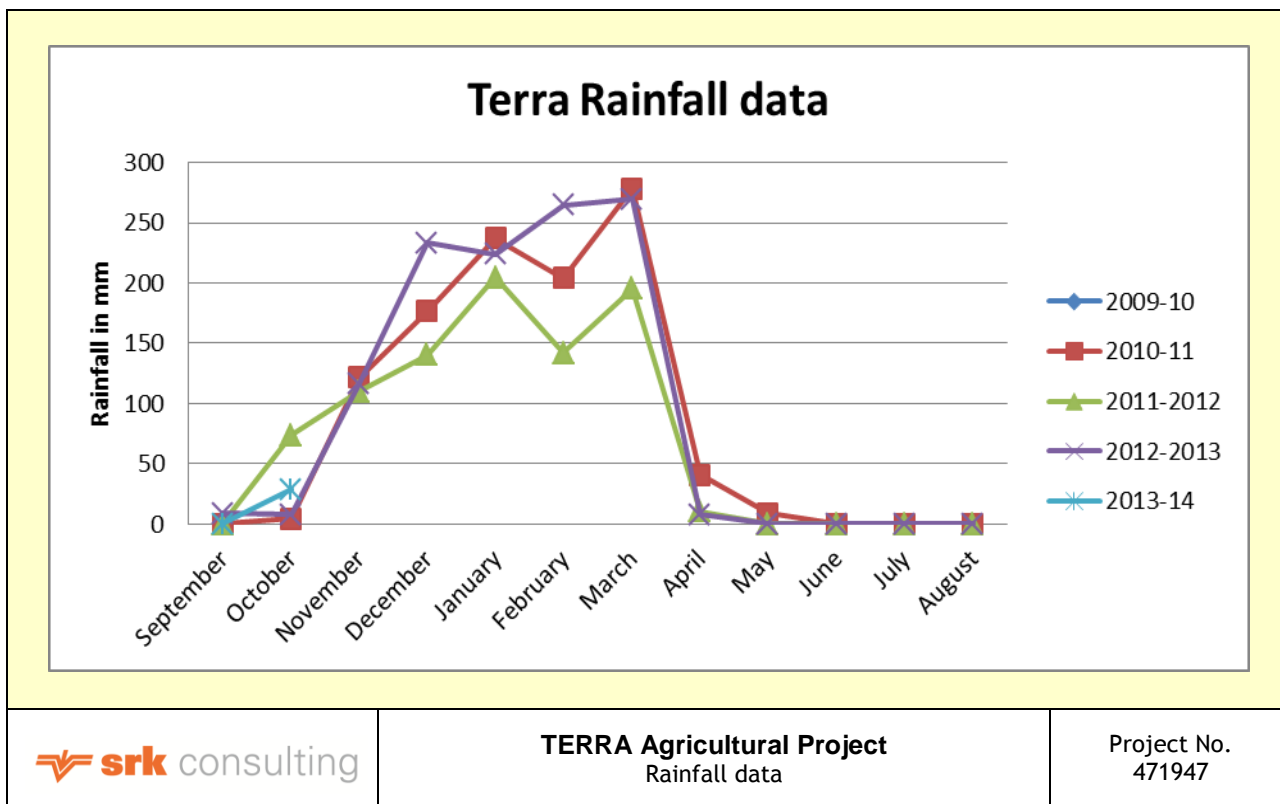
The “A” climate type has three subdivisions based on rainfall

- Af – Tropical wet with precipitation occurring all year round
- Am – Tropical monsoon climate with annual rainfall equal to or greater than Af but occur in the seven to nine hottest months
- Aw – Tropical wet and dry or savannah climate. Winter is dry and summer is wet. Annual precipitation is usually less than 1000 mm.

#### Rainfall

The TERRA project is located south of the equator within a tropical wet and dry climatic zone, with a five-month dry season (May to September) and a seven-month rainy season (October to April). Monthly/daily Rainfall data = from the on-site weather station was supplied to SRK for 2009 to 2013. During the peak of the rainy season (December to March), thunderstorms are often violent, but seldom last more than a few hours. Average rainfall is 1000mm per annum. Temperatures vary between 1 degree Celsius and 37 degrees Celsius but average temperatures are between 6 degrees Celsius in June and 33 degrees Celsius November. Humidity tends to be high with uncomfortable levels at its height from September to April and October being the worst.

The rainfall data was recorded for the rainy months only that are September to August. The rainfall between June and September every year was considered to be zero. The average annually rainfall is 1 026 mm (2010 to 2013). Figure 5-7 shows rainfall data between 2010 and 2013 in TERRA project area.



**Figure 5-7: Rainfall data between 2010 and 2013 in TERRA project area**

**Temperature**

The mean annual temperature is about 21.8°C with July and September being the coldest and hottest months respectively. The coolest month typically occurs at the peak of the dry season in July with monthly mean maximum temperatures of 16.2°C, while September is the hottest month with monthly mean maximum temperatures of 33°C. A mean annual maximum temperature of 37.2°C and a mean minimum temperature of 7.8°C have been calculated (all measurements taken at 0700 local time). Mean annual variation in temperature is 6.5°C; mean diurnal temperature range is 6.2°C.

**Insolation**

The radiation is greatest during the early Hot season (September-October), decreasing during the peak rains in November and March and rising again in the late wet season (April).

Radiation is Low compared to other wet tropical localities although more uniform throughout the year. It is greatest during the early wet season (September-October), decreasing during the peak rains in December to March and rising again in the late wet season (April). During the dry season, radiation values fall slightly.

**Winds**

South-easterly winds prevail during the dry season while north westerly winds are prevalent during the wet season. Wind speeds are generally low, less than 5 or 10 km/h.

## Evapotranspiration

The evapotranspiration is estimated to be not less than 4mm per day, hence months with less than 50mm of rain are considered as dry months.

## 5.8.2 Air quality

Due to the current lack of industrial development, air pollution levels in the area are low. Key emissions are airborne dust from vehicles on the nearby road; smoke from burning of agriculture residues and bushes; and coal and dust from household fires. Levels of emissions increase during the dry season as wind strength increases. Transportation through this area is very limited coupled with the presence of a few income generating activities, the air quality is expected to be good. Measurement of ambient concentrations of various emissions was not the subject of the assignment in question. However, quarrying sand for building, tillage and plowing activities and harvesting from TERRA farm is likely to affect air quality.

## Climate change

There is no information on the effects of climate change on the rivers in the area and potential floods. The DRC is deemed to be a sink for carbon. The clearance of large areas of biomass and burning of this material will reduce the carbon sink in the region and contribute to climate change.

## 5.9 Noise

The TERRA project will generate no significant noise levels during its farming operations. The principal noise emission source is tractors, vehicles and generators. DRC Regulation<sup>2</sup> allows ambient noise level during the day (07:00 to 19:00) of 45 dBA and during the night (19:00 to 07:00), 40 dBA. The guidelines by the IFC<sup>3</sup> and the WHO<sup>4</sup> stipulate an ambient noise level of 55 dBA and 45 dBA during respectively the day and night.

### Noise generating activities

The current farming activities in this phase do not constitute a constant, continuous source of noise quantifiable. With changing levels of activity and shifting sources of noise, noise levels will not vary considerably in magnitude and over time.

Activities listed below are potential but not necessarily significant or even audible sources of noise, depending on distance from the site. Activities which from a noise perspective, are irrelevant, have been omitted.

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<sup>2</sup> *Journal Officiel – Numéro Spécial – 1er avril 2003*

<sup>3</sup> International Finance Corporation, General EHS Guidelines: Environmental, 30 April 2007

<sup>4</sup> Guidelines for Community Noise, World Health Organisation, Geneva, 1999

**Table 5-18: Summary of sources of noise in the construction phase**

<b>Construction Activity</b>	<b>Primary sources of noise</b>
Clearance of vegetation	Diesel engine noise, bulldozing
	Diesel engine noise, bulldozing, truck movements
Road modelling and earth works	Diesel engine noise, bulldozing, truck movements
Truck movements	Diesel engine noise
Tillage	Diesel engine noise and noise produced by machinery
Harvesting	Diesel engine noise and noise produced by machinery
Generators	Diesel engine noise

## 5.10 Visual character

Visual intrusion and loss of a “sense of place” may occur directly as a result of installation of project infrastructure and changes to the landscape (due primarily to vegetation clearing and construction of associated infrastructures). Indirect impacts may also result from dust blown from exposed surfaces and farming operations such as tillage, ploughing, as well as lighting of site infrastructure in an otherwise relatively unlit environment, both of which could be visible from a considerable distance. Non waste such as building rubble and domestic waste, both directly and indirectly (due to increased population and development in the area) related to the Terra Project, is another aspect that could result in a negative change in visual character of the area. Although a waste management facility is planned as part of the Project, indiscriminate dumping of litter and rubble resulting from secondary developments could contribute to visual degradation of the area on a local scale, particularly given the current greenfields nature of the site.

The scale or intensity of the visual impact may be perceived differently depending on the sensitivity of the viewer and their location relative to the impact. Sense of place is defined as a person’s sense of belonging to a place or area. The screening effects of topography or dense, tall vegetation (such as forest) may reduce the impact slightly, though this is unlikely to have a significant effect due to the generally flat topography and lack of forested areas in the vicinity of the visually significant infrastructure.

Potential viewers consist mainly of local communities, who are expected to have relatively low sensitivity towards these changes, especially given the potential benefits in terms of job creation the project may provide them. It is, however, recognised that the perception of a visual impact is by nature highly subjective and, where one viewer may consider the impact to be negative, another might perceive the increased development and lighting of the area positively. For this reason a change to the sense of place of an area is difficult to rate according to standard methodologies. Although local people may associate a particular sense of place with the area, what is difficult to gauge is the importance people attach to that sense of place and how this will change over time should other development occur in the area, together with how potential project benefits may ameliorate any loss.

Visual disturbance and loss of sense of place impacts are difficult to manage and the loss is theoretically irreversible regardless of post-closure rehabilitation (although this will ameliorate this impact to some degree). The perception of the area may change over time with people becoming accustomed to a new sense of place and thus the actual impact is partially reversed

## 5.11 Traffic and Transportation

Traffic volumes and means of transportation along the N5 highway can be seen in Table 5-19 below. This data was sourced from the *Office Congolais des Grand Travaux* (Directorate within the Ministry of infrastructures in charge of Major Works) and reflects traffic volumes from May to June 2013.

**Table 5-19: Traffic volumes in Terra Lumbumbashi in May and June 2013**

Hours	Light cars	Light vehicle	Light truck	Heavy truck	Total
00:02-22:50	46	95	42	1	184
00:37-23:24	33	77	39	0	149
00:57-23:59	37	108	56	0	201
00:14-23:40	33	80	53	5	171
00:14-23:46	37	68	57	1	163
00:48-23:35	44	70	25	0	139
02:26-23:29	30	93	48	0	171
00:20-23:43	39	76	42	0	159
01: 05-23:27	18	77	33	3	131
01:22-23:20	34	64	37	0	135
00:39-23:57	40	80	41	2	163
00:07-23:52	51	73	44	0	168
00:08-23:34	43	86	41	2	172
00:47-23:26	53	93	31	1	178
00:29-23:44	38	74	35	2	149
04:19-23:55	30	87	42	1	160
01:02:22:43	31	77	20	0	128
01:01-23:31	24	95	25	1	145
00:03-23:17	31	66	31	1	129
06:02-23:45	24	69	38	0	131
00:03-23:09	38	80	47	0	165
<b>Total</b>	<b>754</b>	<b>1688</b>	<b>827</b>	<b>20</b>	<b>3289</b>

Traffic volumes in the study area are low, with only 3289 vehicles observed over a period of 24 hours on the N5 highway. A large portion of this traffic is attributed to light vehicles, followed by light trucks and light cars. Very few heavy trucks utilise this route.



## 6 Socio-economic Baseline

### 6.1 Country Context and History

Located in Central Africa and the largest country in Sub-Saharan Africa, the Democratic Republic of Congo (DRC) shares more than 10,929 km of border with nine countries. The country was founded as a Belgian colony in 1908 and was called Belgian Congo. Following years of both social and political instability it gained independence from Belgium in 1960. In 1965 Colonel Joseph Mobutu seized power and declared himself president, changing the name of the country to Zaire. Mobutu held power for 32 years until May 1997 when rebels, fronted by Laurent Kabila and backed by Rwanda and Uganda, removed Mobutu from power. Laurent Kabila renamed the country the Democratic Republic of Congo (DRC). A second rebellion, again backed by Rwanda and Uganda, challenged Kabila in 1998. However Kabila had support from troops from Angola, Chad, Namibia, Sudan and Zimbabwe. In January 2001 Laurent Kabila was assassinated and his son Joseph Kabila was named head of state. In October 2002 the President negotiated the withdrawal of Rwandan forces who occupied the eastern DRC. In December 2002 the Pretoria Accord was signed by the warring parties to end fighting and establish a government of national unity. A transitional government set up in July 2003 held a successful constitutional referendum in December 2005 and elections for the presidency.

In 2009, following a resurgence in conflict in eastern DRC the government signed a peace agreement with the National Congress for the Defence of the People (CNDP), a primarily Tutsi rebel group. The attempt to integrate the CNDP into the DRC military failed and this led to the formation of the M23 armed group (named after the 23 March 2009 peace agreement).

This renewed conflict has led to the displacement of large numbers of people and serious human rights abuses in the eastern DRC, approximately 1,700 km away from the project location. As of February 2013 peace talks between the government and the M23 group were on-going. The DRC also continues to experience violence within its borders from armed groups from Rwanda.

The DRC has been ranked last in the UN Human Development Index for more than 10 years.

#### 6.1.1 Regional Context

The Project is located in the Katanga Province (formally called Shaba Province during Mobutu's rule between 1971 and 1997), which is one of eleven provinces in the DRC and measures approximately 497 000km<sup>2</sup>, second in terms of surface area after the Orientale Province (503 000 Km<sup>2</sup>). A Governor administers the province with the support of Provincial Ministers. The Katanga Province shares borders with the following four provinces:

- The Kasai Occidental;
- The Kasai Oriental;
- The Maniema; and
- The South-Kivu.

Copper and cobalt mining are the most important economic activities in the province, although tin, uranium and diamond are also found in the area. Several mining companies operate in the area, with Gécamines or *Générale des Carrières et des Mines* having monopoly power over the copper-cobalt concessions in the province.

The *Université de Lubumbashi* is the biggest and most recognised university in the province. Other university-level institutions include *Institut Supérieur de Statistique*, *Institut Supérieur Pédagogique*, *Institut Supérieur des Études Sociales*, *Institut Supérieur de Commerce*, *Institut Supérieur des Techniques Médicales*, all of them state-run. The *Université Méthodiste au Katanga* is the oldest private university in the province.

The Jason Sendwe Hospital, located in Lubumbashi, is the largest hospital in the province. The Afia (Don Bosco) and Vie & Santé hospitals are among the best-equipped and staffed hospitals.

### 6.1.2 DRC Government and Judicial Structures and Political Setting

The chief of state of the DRC is President Joseph Kabila who has been in office since 17 January 2001. The new constitution states that the president is to be elected by popular vote for a term of 5 years (eligible for a second term). The last elections were in November 2011 where Joseph Kabila received 49% of the vote however there were considered to be serious voting irregularities. The head of the government is Prime Minister Augustin Matata Ponyo Mapon who has held the position since 18 April 2012. The Prime Minister and the cabinet ministers are appointed by the president. The legal age to vote is 18 and voting is compulsory.

The following political pressure groups exist within the country:

- Forces Armées de la République Démocratique du Congo (FARDC) - which is known to commit atrocities on citizens;
- Forces Démocratiques de Libération du Rwanda (FDLR)- Rwandan militia group made up of some of the perpetrators of Rwanda's genocide in 1994;
- National Congress for the Defense of the People (CNDP)- mainly Congolese Tutsis who want refugees returned and greater representation in government; and
- M23- rebel group largely made up of ex-CNDP forces.

The country's legal system is a civil system based upon the Belgian version of French Civil Law. The Supreme Court of Justice is organised into legislative and judiciary sections and consists of 26 separate justices, there is also a constitutional court. In addition to these highest courts there are a number of 'subordinate courts' namely; the State security court; court of appeals; Tribunal de Grande; magistrates courts and customary courts.

### 6.1.3 Administrative divisions, Local and Traditional Authorities

There are ten provinces in the DRC; the project is located in the Katanga Province, the capital of which is Lubumbashi, where the governor sits. The December 2005 constitution indicated that the current divisions would be sub-divided into 26 new provinces by 2009 but this is yet to occur. The project is located in the District of Haut-Katanga, one of five districts of the Haut-Katanga, which is governed by the district commissioner based at Mbanza Ngungu, the capital.

The district is then subdivided into three territories; the project is located in the Territory of Kasenga, the capital of which is Songololo and administered by the Territory Administrator. The project is located in the secteur of Kimpese which is governed by the Chef de Secteur, the capital of which bears the same name. The administrative divisions relevant for the project are presented in the Table 6-1.

**Table 6-1: Administrative and Customary structures**

Province	District	Territory	Secteur	Agglomeration	Villages	Quarters
<b>Administrative authorities</b>						
Governor	Commissioner	Administrator	Chef de Secteur	Chef d'Agglomeration	Duc de Village	Duc de uartier
<b>Customary authorities</b>						
N/A	N/A	N/A	Chef de Groupement	Chef de Clan	Chef de Village	
<b>Name of the administrative structure</b>						
Lower-Congo	Cataractes	Songololo	Kimpese	Malanga	Malanga	Malanga Ndongwa (Centre) Including Nsele quarter
						Malanga ICB
						Malanga Gare
					Zamba	N/A
					Nkumba	N/A
<b>Capital of the administrative structure</b>						
Matadi	Mbanza Ngungu	Songololo	Kimpese	Malanga		

## 6.2 Demography

### 6.2.1 Gender distribution

The people who participated in the assessment originated from villages adjacent to the farm. Survey estimates reveal that the male population (51.5%) exceeds that of the women by 1.5%, contrasting national demographic statistics – figures from Worldstat Info show that the male population in the DRC accounts for 49.8% of the population<sup>5</sup>. This perhaps gives an indication that males have travelled to the project area in search of work opportunities. The average age of the population that participated in the survey is 22, implying that people in the project area are young and part of the economically active segment.

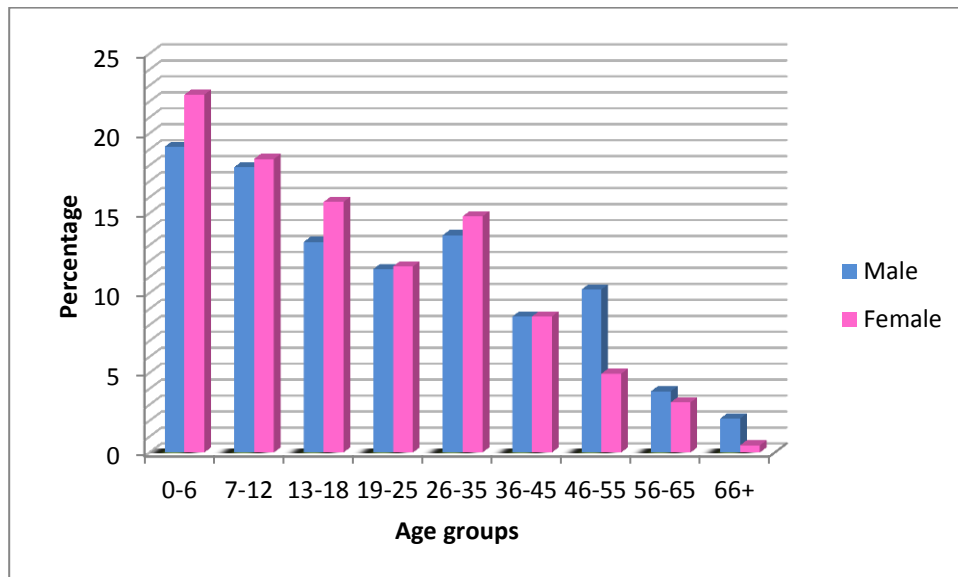
It is estimated that household heads constitute 21% of people in the survey, 91.3% of which are males, leaving a small percentage of women-headed homes. Females who head households are widowed, separated or single. Shows gender distributions in the project area.

### 6.2.2 Age groups

The population can be further broken down into different age groups. This is often a good indicator of the health status of a community, migrancy and birth rates. Figure 6-1 shows that there are less males aged 0 to 45 than females in the project area but that the opposite is true for the 45 to 66+ segment of the

<sup>5</sup> [http://en.worldstat.info/Asia/Democratic\\_Republic\\_of\\_the\\_Congo](http://en.worldstat.info/Asia/Democratic_Republic_of_the_Congo)

population. This essentially shows that the aging population is characterised by more males than females, perhaps owing to more males migrating to the area or to more females passing away at these ages.



**Figure 6-1: Age groups in the Project area**

### 6.2.3 Marital status

The assessment on marital status was done taking the following into account:

- People aged 16 years and under were excluded from the analysis as it is recognised worldwide that they are generally too young to be married, and if included, will distort results. For instance, SRK’s experience has been that people aged 5, 6, 7, 8 years are always single; and
- The widow and divorced segments of the population were also excluded from the analysis because they represent an insignificant portion of the population registered in the database.

With the above in mind, results have revealed that married persons account for the majority of the population (31%) and that the 26-34 age group has the highest percentage of married people (9%). In addition, the married population is inversely proportional to the age group; in other words, the more people get older, the fewer married people there are. Also noticeable is that the 16-25 age group has the large percentage of single people. Figure 6-2 illustrates these results.

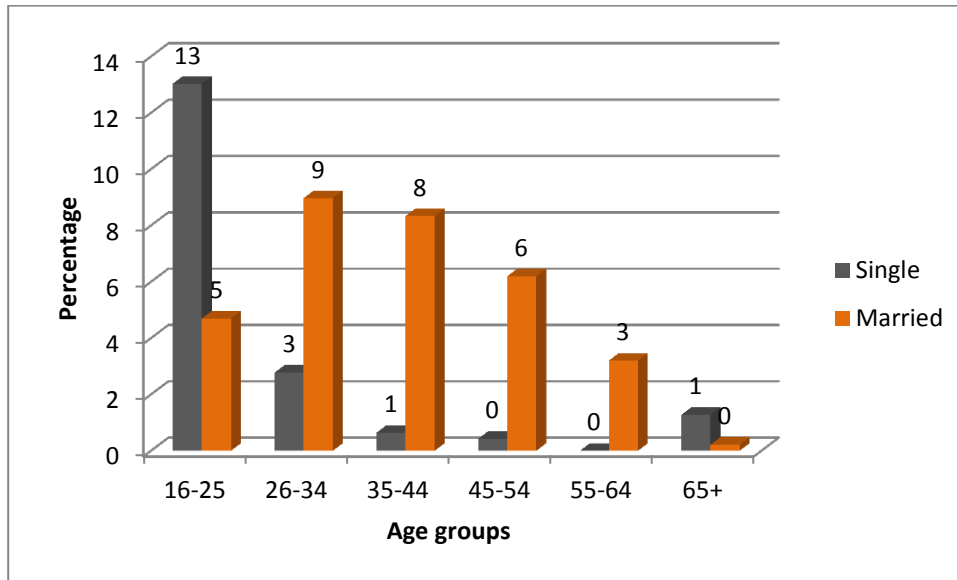


Figure 6-2: Marital status against age groups

### 6.2.1 Ethnicity

There are over 250 ethnic groups in the DRC, the biggest of which include the Lubas, the Kongos, the Mongos and the Mangbetu-Azande.

The Bembas are by far the most dominant ethnic group in the area. The baseline survey undertaken by SRK shows that close to 80% of the population living in the area is Bemba. The results also show that Lubas (8%) are the second biggest ethnic group in the area and are followed by the the Sangas (6%), the Tabwas (5%) and the Lambas (3%). These results are illustrated in Figure 6-3. The other ethnic groups represented to lesser extent are the Tetelas, the Tabwas and the Nyatende.

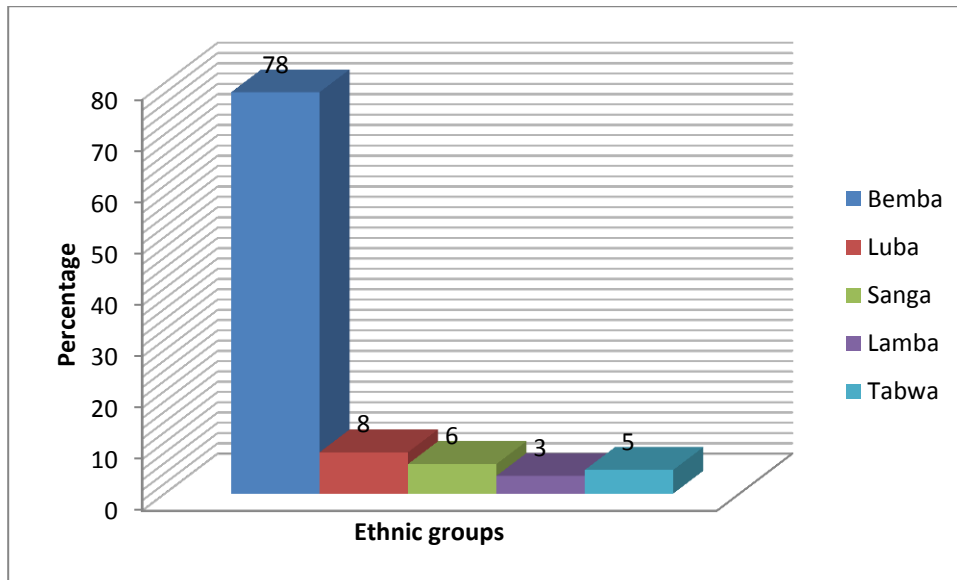


Figure 6-3: Ethnic groups in the project area

### 6.2.2 Religion

Christianity is the main religion in the study area. It provides the spiritual and social framework for the local population.

Pastors are responsible for the maintenance of the churches, as well as, facilitating ceremonies such as weddings, funerals, blessing, etc. They are regularly consulted in terms of spiritual counseling, family and community conflict resolution. Although their position is not remunerated, they receive voluntary donations and gifts in-kind from community members.

Several forms of Christianity are found in the project area. The most common of which are Catholicism, and Protestant

### 6.2.3 Languages

French is the official language and the mode of instruction at schools in the DRC. Lingala is mostly spoken in and around Kinshasa (the capital), in the west of the country. However, most people in the project area stated that Kibemba was their first language (73%). KiSwahili comes second (10%). Very few households chose French or any other language as their first language. KiSwahili is however the most spoken second language in the area (82%). Figure 6-4 shows the most spoken languages in the project area.

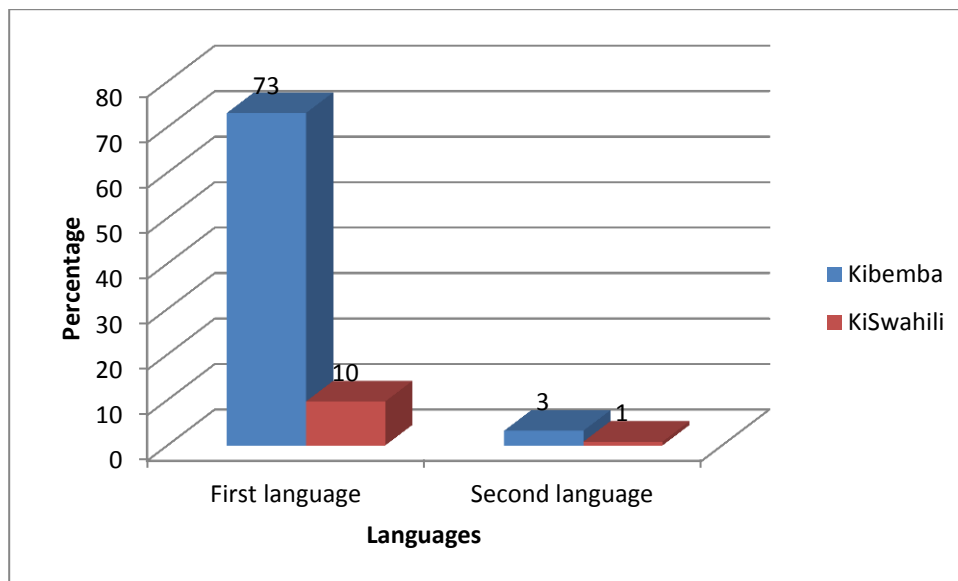


Figure 6-4: Languages spoken in the project area

### 6.3 Family dynamics

The communities that live in the project area are Bantus, and therefore follow the matriarchal system. This means that females, especially mothers, have authority over household assets, the land, and assume responsibility for the wellbeing of their families. For instance, it is common to find women chiefs in the villages adjacent to the project area such as Minga Village.

In reality however, the matriarchy is not always upheld. Chores are typically split in terms of gender and age. Men are normally the heads of the household and they decide on how household budgets are spent as well as on any decision that may affect the household. Men assume the protector role and they are expected to find employment to feed the household. Women usually assume the supporting role.

Women look after the children, cook the food, collect firewood, water and medicinal plants, clean the household and are responsible for farming. It is worth noting that although women do most of the agricultural activities, men are expected to clear the land before any agro-pastoral activity can take place. It is alleged that men and women are responsible for building the house. Supporting both men and women are boys and girls respectively. Boys are usually used to carry heavy loads such as water containers and are also used to do the herding and the hunting. Girls help their mothers cook the food and clean the house.

Nuclear family systems dominates the population in and around the project area. Young boys have to build their own houses to get married. Old people are used to living alone at old age.

## 6.4 Settlement patterns and land use

Larger settlements such as Lubanda Mitondo, Minga, and Katete Village consist of residential areas interspersed with basic social infrastructure such as school, healthcare. The village centre generally consists of a public area and a church, while the clinic, water boreholes and small businesses are scattered around the village. Cemeteries are usually located in the outskirts of the settlement.

Typically, villages are surrounded by agricultural fields and grazing occurs within the villages. The baseline assessment undertaken by SRK in February 2014 reveals that 97% of households are dependent on the land ecosystem services other than for agriculture. People use natural resources such as reeds/grass, mud, poles and wattle to build infrastructure. The different types of land uses are depicted in the Table below. The table shows that the overwhelming minority of households (12%) collect firewood for cooking. Charcoal is the main energy source for cooking.

Another significant activity for which communities need local resources for is when collecting grass for thatching. Most of the household structures were made from grass collected from the surrounding environment.

**Table 6-2: Land uses by the population in the project area**

Activity involving use of provisioning services	% of households engaging in activity	Typical frequency of use	Typical importance of resource
Collecting firewood for cooking	12%	Daily	important
Collecting grass for thatching	70%	When needed	Importance diminishing
Collecting medicinal plant	50%	When needed	Very important
Collecting wild fruits	44%	Very often (in season)	Very important
Fishing	27%	Often	Very important
Charcoal making	81%	Daily	Very important
Hunting small animals and birds	19%	Occasionally (~monthly)	Very important
Grazing of livestock	2%	often (~daily)	Important

### 6.4.1 Access to land

Land in the project area is easily accessible to households. Generally, both locals and people coming from outside the project area i.e. other regions in the DRC, are allowed to use the land free of charge provided that prior consent is given by the traditional authority – usually by the village chief. About 90% of households interviewed in the project area have access to land. Where households do not have land, it is either because they recently moved to the area or it is because they are involved in other economic activities and livelihood strategies and therefore do not require large areas of land.

## 6.5 Education and literacy

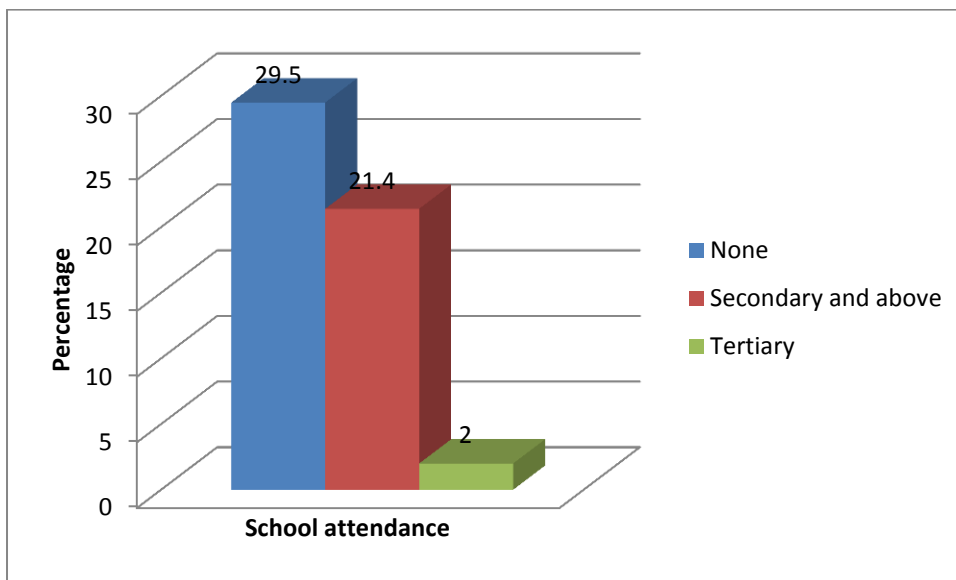
Understanding the levels of education in a community is important for many reasons. Higher levels of education make community members more “employable”, while low levels of education and high illiteracy rates amongst adults often lead to social difficulties including high levels of unemployment, and crime. At the time of writing this report, there were no statistics on education for provincial, district and local levels. SRK has thus made use of the data collected at project level during the social economic baseline to inform this section.

The category “primary school” refers to those who are and have attended primary school and “secondary school” refers to those who are and have attended secondary school. Likewise, “none” refers to those who are not and have not attended school. It is worth noting that no distinction has been made between those attending and those who have attended primary and/or secondary school. This is because the time allocated to assess the data was inadequate. SRK has had to classify participants according to ages to obtain more meaningful results. For instance, people aged between 0 and 5 are not expected to have gone to school because they are too young and have therefore been excluded from the assessment - including them would have greatly distorted the results.

Focus group meetings have revealed that there is one primary (Mawaza Primary School) and one secondary (Kikole Primary School) school in the project area. Despite the fact that parents are willing to send their children to school, many have stated that they do not have the means to do so, resulting in many children of school –going age not going to school. Fees cost approximately USD\$1.6 per month for primary school and USD\$5.5 for secondary school.

Literacy rates in the project area are low. The results show that 29.5% of the people aged 6 and older are not and have not attended school, that 21.4% of the people aged 18 and above have a secondary education or more and that 2% of the population in the area has some form of tertiary education (university, diploma and certificate). These results are illustrated in Figure 6-5.





**Figure 6-5: School attendance in the project area**

## 6.6 Health

People living in the project area sought their basic medical advice from a number of clinics, health posts, dispensaries and pharmacies. However, results from focus group meetings have revealed that these medical facilities are not adequate in terms of quality and quantity and that patients travel to Lubumbashi to treat more severe cases. TERRA facilities with transport incase of medical emergency from Lubanda to medical facilities in Lubumbashi. The basic medical facilities mentioned earlier are:

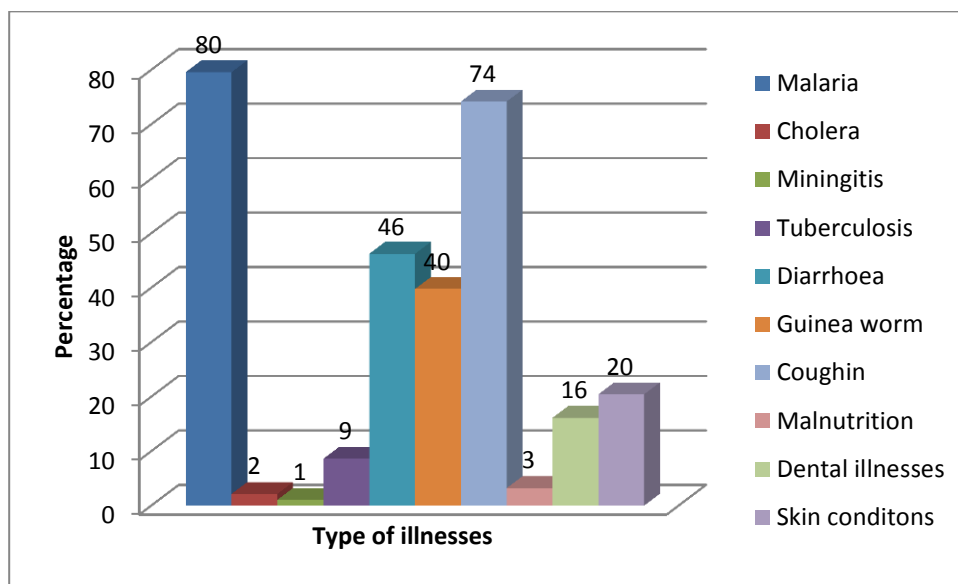
- *Centre de Santé* Lubanda
- *Centre de Santé* Lutandula
- *Centre de Santé* Saint André
- Centre de Sante Tam-Tam de Vérité
- *Centre de Sante* Lukafu
- *Centre de Sante* Minga
- *Poste de Santé* Minga
- Dispensaire Soliano
- Dispensaire Papa Mosengo.

Tariffs at these facilities range between USD\$1.5 and USD\$2, depending on the medical facility advice is sought from. A number of households (12%) have cited the lack of funds as being the primary reason for not having gone to a clinic to cure an ailment. They go to traditional healers instead when they cannot treat the illness at home. The local names, purposes and frequencies of use of the medicinal plants are shown in Table 6-3.

**Table 6-3: Medicinal plants used in the project area**

Local name of plant	Part used	Purpose	Frequency of use (when sick)
Kibobo	Roots	Headaches	Twice a day (morning and night)
Ndale	Roots	Fever	Once a day
Musase	Roots and leaves	Numerous ailments	Three times a day

Focus groups meetings have shown that diarrhoea, malaria, fever, cough and malnutrition are the main illnesses affecting children and that head and stomach aches, malaria, and coughs primarily affect women. Results from the household survey are shown on Figure 6-6. As can be seen, 80% of households agree to suffering from Malaria in 2013. Also noticeable is that 74%, 46% and 40% of households have suffered from coughing, diarrhoea and guinea worm respectively in 2013. Curiously, Sexually Transmitted Diseases (STDs) did not seem to have affected any households in 2013. This may have been as a result of people viewing discussion on STDs taboo subjects and therefore refrained from answering the question. A health assessment by a community health specialist is likely to shed more light on this matter.



**Figure 6-6: Health results from the household survey**

## 6.7 Services and Infrastructure

### 6.7.1 Housing

Results show that households would typically comprise one structure with two to three rooms including bedrooms and living room, forming a compound. People cook and shower outside. These compounds typically have members of the same family, with nephews, uncles, in-laws or cousins on occasion. SRK did not come across instances where the household was too large to be accommodated in the housing. SRK’s baseline results show that the average household size is 5 people.

Seventy six percent of the households that participated in the survey undertaken by SRK were established in the area for more than 20 years.

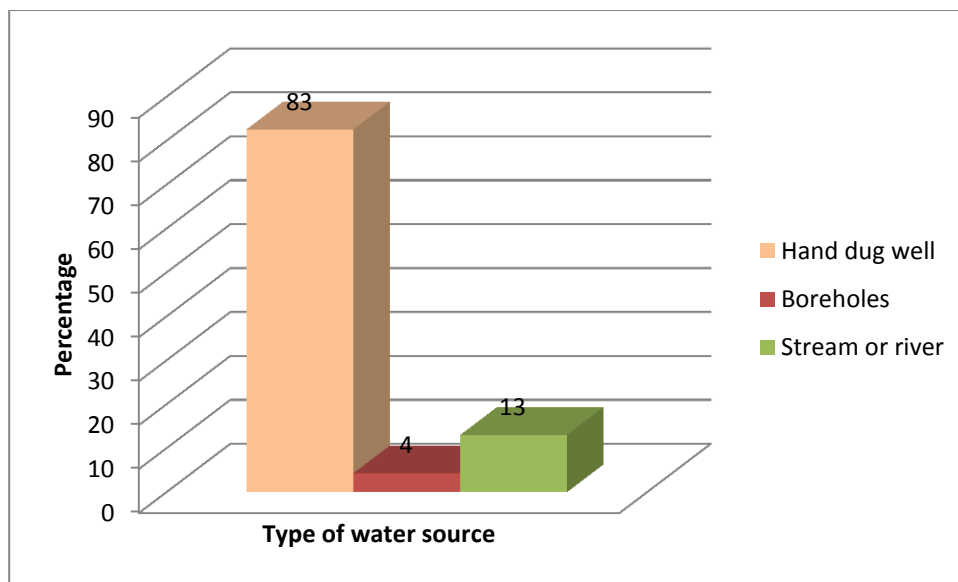
Some of the reasons given for settling in the area were:

- inherited land (39%)
- close to fields and arable land (29%)
- “other” (24%) - this relates predominantly to people who moved to the area coming from others area where there some security issues (rebel activity)
- most of the resources used to build these houses are collected from the surrounding environment (88%). This is true for everything except for corrugated iron (likely to have been purchased from trading centres such as Lubumbashi).

### 6.7.2 Water and sanitation

People in the project area get their water from two main sources, namely hand dug wells and streams/rivers. Figure 6-7 illustrates SRK’s findings with regards to the source of the water used by households. The diagram shows that hand dug wells are by far the most used water source in the project area and are followed by streams/rivers.

The water is used for a number of domestic activities including cooking, cleaning and washing. The information collected during the fieldwork shows that where water quantity is sufficient, water quality if not. It is alleged that the quality of the water worsens particularly during the wet season when silt from the river bed is disturbed and transported downstream, turning the water to a dark-reddish colour.



**Figure 6-7: Sources of water in the project area**

People’s perceptions of the quality of water are illustrated in Table 6-4. The perceptions were divided into three categories including always polluted, sometimes polluted and always clean. Most people (56%) rated their water as being “sometimes polluted” and just over one-third said that the water was “always polluted”. Only 8% of households said that their water is always clean.

**Table 6-4: Water quality rating**

Water quality	Rating (%)
Always polluted	36
Sometimes polluted	56
Always clean	8

None of the households surveyed had toilets inside the house. Close to 97% of them keep their toilets separate to the house. The biggest contributing factor may be that plumbing systems do not exist or are unaffordable. The overwhelming majority of these toilets were built using mud bricks with mud mortar for the walls and grass thatching for the roof. When full, the pit is closed using earth/sand and a new pit is sunk elsewhere. In addition to traditional pits, many people simply use the bush.

### 6.7.3 Refuse removal

Field observations have shown that refuse is discarded in the surrounding area. There are no municipal landfill sites resulting in people having to dispose of their waste where they can. A few households stated that they sink private waste pit near their houses (usually at the back) and burn the pit when full. New pit are then sunk in another location near the home.

### 6.7.4 Energy

#### Energy for cooking

Households use energy for two main activities, namely cooking and lighting. The climate in the project area is clement and therefore does not warrant people to use energy for heating. Two mediums are used by households for cooking. All the households surveyed stated that they use charcoal for cooking mostly because it is convenient – as it is readily available, and also because it is relatively cheap.

In addition to charcoals, communities also use wood collected from the surrounding environment. This is whoever the less favoured method especially during the rainy season when wood gets wet. Firewood is used by approximately 37% of households. It is worth noting that in most cases, households use a combination of both charcoal and firewood. In other words, the two energy sources are not mutually exclusive.

#### Energy for lighting

The most popular method used for lighting is the use of hand-held battery powered torches or Light-Emitting Diodes (LED) – 95%. People have stated that they were cheap to buy and service and that they were fairly durable. When not using LEDs, households relied on candles which they viewed as non-durable and expensive to replace. Field observations have also revealed that these two sources of power were not mutually exclusive.

### 6.7.5 Transport and roads

The Lubumbashi-Kasenge (N5) road is in good condition however, other roads in the project area are in a poor state. Despite this, people frequently commute between the different villages to visit friends and family or to attend to their fields. People from the area also travel to Lubumbashi (approximately 90 km from the project site) to buy goods or seek medical treatment for illnesses that cannot be treated in Lubanda. Travelling is done using public transport, bicycles, motorcycles or trucks. Cars are rarely used – only 5% of the household surveyed own vehicles. Bicycles are the most popular mode of transport (37% of the household surveyed), followed by motor-cycles (9%).

## 6.7.6 Communication

Knowing how people communicate is an important gauge of social and technological development. The more people use cell phones and the internet in an area, the more likely the area is to be developed.

Long distance communication in the project area is done by mobile phone. Cell phone ownership is slightly lower than expected. Results reveal that 31% of households have access to mobile phones. By comparison, cell phone ownership is usually in the order of 40% in many of the rural communities SRK has worked. This perhaps highlights how underdeveloped communities around the project area are.

There are no community radio stations in the area but people are usually kept informed through Radio Okapi – a radio station based in Lubumbashi, funded by the United Nations. The study has revealed that 27% of households use radios to keep informed.

SRK understands that TERRA and communities have been engaging on the possibility of facilitating a community communication system in the area from where information about future project developments and hiring procedures can be broadcasted. TERRA agreed to facilitate discussions at recent stakeholder engagement meetings.

## 6.7.7 Recreational Facilities

No public recreational facilities in the form of parks, gardens, play grounds and picnic spots are available in this area. There is one privately owned facility around the Lubanda Lake.

## 6.8 Local economy and livelihood strategies

Employment opportunities in the area are scarce. Most people therefore rely on the informal sector or on subsistence farming and animal husbandry to meet their basic needs. A key objective of the baseline was to ascertain whether households were food secure in 2013. The purpose of this was to determine whether people in the project area were faced with food shortages. The findings show that food shortages were common – 77% of households stated that they were faced with food shortages in 2013, particularly during the beginning of the year (between January and March) prior to harvesting of new crops.

The concept of budgeting is not well understood in the project area. When asked how much is earned from a specific activity on a monthly basis, household heads were not able to respond to this question with reasonable accuracy. The analysis that follows is thus an approximation.

### 6.8.1 Employment and income

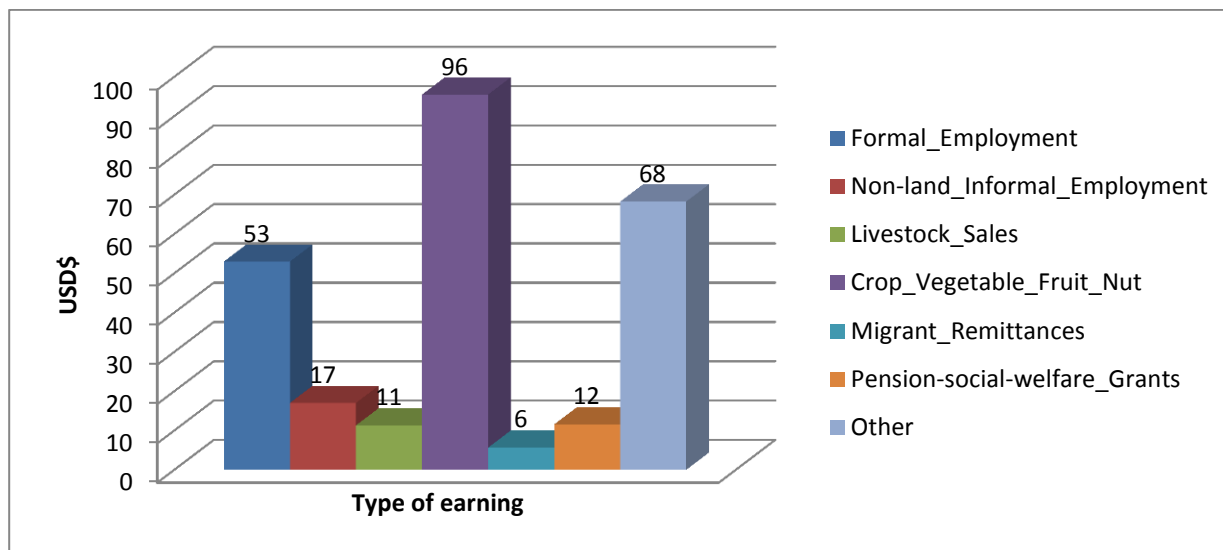
People in the project area engage in a number of livelihood activities including formal and informal employment, livestock sales, migrant remittances and pensions. Figure 6-8 shows the monthly contributions made to household budgets by activity. The category “other” refers to earnings from activities such as:

- The sale of Munkoyo (local beer)
- Sale of charcoal
- The sale of sand.

Monthly incomes from the sale of crops and fruits earn the most for households monthly (USD\$96). The most common crops include maize, cassava, and sweet potato. This finding is unexpected since formal employment wages are regular – for those formally employed, and comparatively higher. The sale of

crops is followed by the category “other” then by formal employment. Livestock sales, which contributes USD\$11 per household is the sixth most profitable activity in the area. Prices for some of the animals sold are as follows:

- Pork – USD\$22; and
- Goat – USD\$17.



**Figure 6-8: Contribution to household budgets by activity**

Skills in the project area are limited. Focus group meetings with men, women and youths revealed that the majority of artisans come from neighbouring towns such as Lubumbashi. The types of skills mentioned by survey participants include tailors, builders and drivers. There are no apprenticeship programmes in the area.

### 6.8.2 Farming

The census results states that farming is the main economic activity in the territory and is closely followed by sand exploitation. Communities in the area generally sell their crops in Lubumbashi, principally because of availability of road (N-2) in good condition. The main produce grown includes:

- Cassava
- Beans
- Ground nut
- Maize.

Subsistence farming is practiced by most households. Seventy nine percent of fields measure less than 1 hectare. Other common sizes include between 1 and 3 hectares (15%) and between 3 and 5 hectares (3%). None of these fields were irrigated and fertiliser is not used. Slash and burn is used for clearing farming areas.

Fruit trees are also common in the area. Most households (25%) stated they had fruit trees located either directly adjacent to their property or situated at a considerable distance from their houses. These fruit trees are mostly inherited and active fruit planting in the area is rare.

The diversity of animal husbandry in the area includes: goats, sheep, chicken and ducks. Livestock production is poor in the area and domestic animals are raised more for ceremonial occasions and honoured guests than for home consumption. Most of households keep a few chickens and some keep a few goats and pigs. Although livestock have been traditionally regarded as a symbol of wealth; generally animals roam freely around the project area. The livestock on site eat what is available around the site. studies have shown that livestock are more often regarded as pests of food crops than as an asset to livelihoods In villages where potable water was unavailable, rivers where the only water source for both animals and humans.

### **6.8.3 Fishing**

Rudimentary methods for fishing are used in the area and because this livelihood strategy is not monitored, statistics on quantities of fish taken from the surrounding rivers, streams and lakes are unavailable.

Locally caught fish is widely consumed and represent the most significant source of animal protein in local diets particularly for women and children. The relative importance of fishing as a source of income for men has been on the decrease. Although surplus fish may be sold locally, fishing is primarily a small scale subsistence activity.

Fishing is a seasonal occupation for both men and women with least activity during the wet months.

### **6.8.4 Hunting**

Fire arms are the most commonly used tools by poachers. Bush meat represents the most important source of protein. Hunting takes place throughout the year but declines in intensity during the peak farming season. The meat hunted ranges from small rodents to buck.

### **6.8.5 Hospitality and tourism**

There are several hotels/guesthouses without rating in the area. There are no tourist attractions in the area and so the reasons for people checking into these hotels/ guesthouses are assumed as business related and personal activities, buying or selling of goods and services.

### **6.8.6 Average expenses**

Food is by far the largest expenditure for people in the project area. Average expenses in this category have been found to be approximately USD\$ 109 per month. Expenses on healthcare and school fees are almost the same (USD\$19 and USD\$17 respectively).

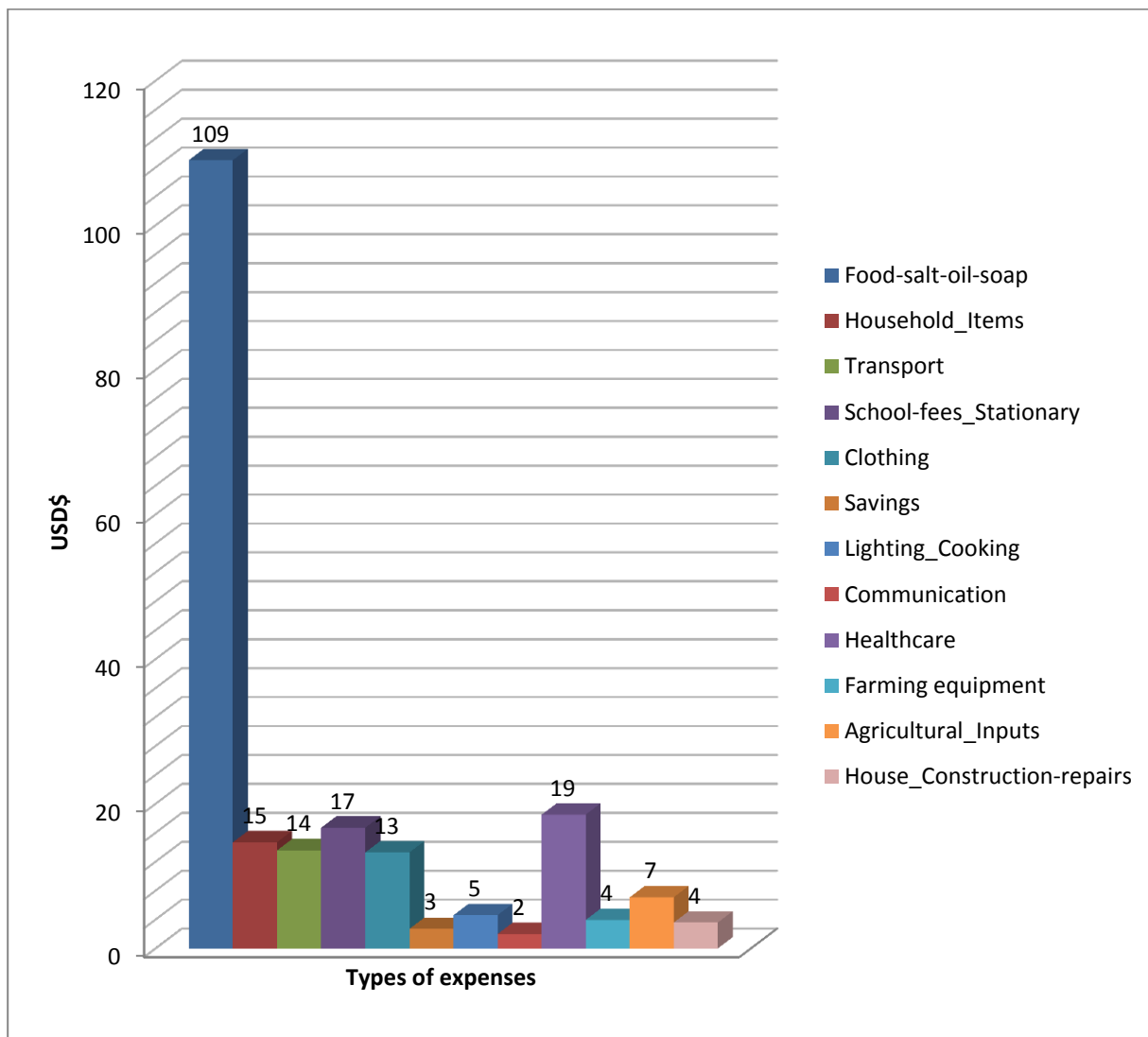


Figure 6-9: Household expenditure per category

## 6.9 Social pathologies and vulnerable people

### 6.9.1 Social pathologies

Alcoholism, prostitution and drug abuse were the main social pathologies investigated during the baseline. The reason for this is that when industrial projects are implemented, these pathologies often worsen, especially in a context where people are poor, education levels are low and job opportunities are scarce, as it is around TERRA’s project area.

The results show that 82% and 84% of households view alcoholism and drug abuse as a social problem respectively. Similarly, 84% and 9% of households view prostitution and in-migration as a social problem respectively. The latter may be due to the fact that there are no industrial operations in proximity of the project area.



## 6.9.2 Vulnerable people

In terms of the study area the vulnerable groups include the elderly, the infirm, orphans and single women who lack social and family networks. There are several vulnerable groups in the villages in the study area including:

- Children and Youth: A few children and youth (28% of the people aged between 6 and 18 years) in the study area do not and have not attended school. Poverty is one of the drivers, with children often involved in income earning activities (subsistence farming).
- Women: Among women, groups requiring particular support are single mothers, rural women and widows. In all three cases, the women often find themselves caring for a household whilst also seeking to provide a living.
- Elderly: The household survey reveals several elderly people living with their families (fathers, mothers, aunts and uncles). In most cases, they are dependent on those economically active. Supporting elderly dependents is a challenge to poor households, but the old people mostly at risk are those without support.
- Disabled persons: according to the survey, there were no disabled people in the project area.

## 6.9.3 Policing and crime

The people who contributed to this study did not mention crime as being a problem. It is on this basis that SRK believe that crime does not seem to be an issue in the project area. Unfortunately, SRK did not speak to policing and crime representatives when undertaking the baseline and so statistics on the matter could not be obtained. However, it is advisable that such assessment be undertaken because risks such as animal theft and extortion do exist in the area.

## 6.10 Priority development areas

Site interactions with stakeholders revealed that communities have high expectations about the project. These expectations are exacerbated by the lack of job opportunities and government's inability to fund development projects in the area. If not managed adequately, these expectations are likely to cause mistrust and tensions between TERRA and communities.

In this context, communities have raised the following development needs:

- The creation of job opportunities. The TERRA Project is the only large-scale project in the area and the perception is that all job seekers will be hired. The seasonal nature of farming activities and the fact that TERRA will not be in a position to employ all job seekers needs to be clearly communicated to stakeholders to avoid unfulfilled expectations
- The need for education infrastructure especially vocational school for young girl
- The need for adequate medical facilities
- The identification and implementation of private and state-led programmes to support sustainable projects, particularly in agriculture
- Assistance with agriculture activities – fertilisers, trucks
- Access to potable water.

## 6.11 Perceptions and expectations

The belief that communities will benefit from local employment is the main expectation of the project. That said, people are understanding that to operate a modern farm and mill, like TERRA and AMCC, technical skills need to be made available to people. In the interim, communities are acceptant of the fact that local community members will benefit from casual jobs (clearing, sowing and harvesting) at the beginning of the project, before technical responsibilities are assigned to them. However, they look to TERRA for technological transfer and are hoping that TERRA becomes more engaging especially when job opportunities area made available. Communities stated that the following benefits will accrue:

- Additional employment
- Local economic development
- Investment into the local economy – through taxes.

# **7 Environmental and Social Impact Assessment**

## **7.1 Introduction**

This section of the report describes the assessment of environmental and social impacts associated with the activities of the project. The section starts with an overview of the impact assessment, describing the significance of biophysical and sociological impacts. Recommended management measures are presented for each impact and these are discussed in more detail in the ESMP (refer to Section 8).

It should be noted that owing to limited information at this stage of the assessment, the impact assessment has taken the precautionary approach with negative impacts potentially rated higher than they might be when the comprehensive ESIA and ESMP is completed.

## **7.2 Impact assessment methodology**

The impact assessment will be conducted in an integrated manner that links the biophysical components with the socio-economic components of the environment. The impact assessment is divided into issue identification, impact definition, and impact evaluation. Iteration of these parts occurs in each stage of an ESIA process to varying degrees.

The basic elements used in the evaluation of impact significance are described in Table 7-1 and the characteristics that are used to describe the consequence of an impact are outlined in Table 7-2.

**Table 7-1: Key elements in the evaluation of impact significance**

Element	Description	Questions applied to the test of significance
Consequence	<p>An impact or effect can be described as the change in an environmental parameter, which results from a particular project activity or intervention. Here, the term “consequence” refers to:</p> <ul style="list-style-type: none"> <li>(a) The sensitivity of the receiving environment, including its capacity to accommodate the kinds of changes the project may bring about.</li> <li>(b) The type of change and the key characteristics of the change (these are magnitude, extent and duration).</li> <li>(c) The importance of the change (the level of public concern/ value attached to environment by the stakeholders and the change effected by the project).</li> </ul> <p>The following should be considered in the determination of impact consequence:</p> <ul style="list-style-type: none"> <li>(a) Standards and guidelines (thresholds).</li> <li>(b) Scientific evidence and professional judgment.</li> <li>(c) Points of reference from comparable cases.</li> <li>(d) Levels of stakeholder concern.</li> </ul>	<p>Will there be a change in the biophysical and/or social environment?</p> <p>Is the change of consequence (of any importance)?</p>
Probability	Likelihood/chances of an impact occurring.	What is the likelihood of the change occurring?
Effectiveness of the management measures	<p>Significance of the impact needs to be determined both without management measures and with management measures.</p> <p>The significance of the unmanaged impact needs to be determined so there is an appreciation of what could occur in the absence of management measures and of the effectiveness of the proposed management measures.</p>	Will the management measures reduce impact to an acceptable level?
Uncertainty/ Confidence	<p>Uncertainty in impact prediction and the effectiveness of the proposed management measures. Sources of uncertainty in impact prediction include:</p> <ul style="list-style-type: none"> <li>(a) Scientific uncertainty – limited understanding of an ecosystem (or affected stakeholders) and the processes that govern change.</li> <li>(b) Data uncertainty – restrictions introduced by incomplete, contradictory or incomparable information, or by insufficient measurement techniques.</li> <li>(c) Policy uncertainty – unclear or disputed objectives, standards or guidelines.</li> </ul> <p>There are a number of approaches that can be used to address uncertainty in impact prediction, including:</p> <ul style="list-style-type: none"> <li>(a) ‘Best’ and ‘worst’ case prediction to illustrate the spread of uncertainty.</li> <li>(b) Attaching confidence limits to impact predictions.</li> <li>(c) Sensitivity analysis to determine the effect of small changes in impact magnitude.</li> </ul>	What is the degree of confidence in the significance ascribed to the impact?

**Table 7-2: Characteristics used to describe impacts and impact consequence**

<b>Characteristics used to describe consequence</b>	<b>Sub-components</b>	<b>Terms used to describe the characteristic</b>
<b>Type</b>		Biophysical, social or economic
<b>Nature</b>		Direct or indirect, cumulative etc.
<b>Status</b>		Positive (a benefit), negative (a cost) or neutral
<b>Phase of project</b>		During pre-construction (if applicable), construction, operation, decommissioning or post closure
<b>Timing</b>		Immediate, delayed
<b>Magnitude</b>	<b>Sensitivity of the receiving environment/ receptors</b>	High, medium or low sensitivity Low capacity to accommodate the change (impact)/ tolerant of the proposed change
	<b>Severity/ intensity</b> (degree of change measured against thresholds and/or professional judgment)	Gravity/ seriousness of the impact Intensity/ influence/ power/ strength
	<b>Level of stakeholder concern</b>	High, medium or low levels of concern All or some stakeholders are concerned about the change
<b>Spatial extent or population affected</b> The area/population affected by the impact The boundaries at local and regional extents will be different for biophysical and social impacts.		Area/ volume covered, distribution, population Site/Local (social impacts should distinguish between site and local), regional, national or international
<b>Duration (and reversibility / sustainability)</b> Length of time over which an impact occurs and potential for recovery of the endpoint from the impact		Short term, long term Intermittent, continuous Reversible, irreversibility (negative impacts) Sustainable, unsustainable (positive impacts) Temporary, permanent
<b>Confidence</b>		<b>High, Medium, Low</b>

### Impact significance rating

Practicable management measures will be recommended that avoid, and if avoidance is not possible, then reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design. The impact significance rating system is presented in Table 7-3 and involves four parts:

Part A: Defines impact consequence using the three primary impact characteristics of magnitude, spatial scale and duration;

Part B: Uses the matrix to determine a rating for impact consequence based on the definitions identified in Part A;

Part C: Uses the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from Part B) and the probability of occurrence; and

Part D: Defines the Confidence level.

**Table 7-3: Method for rating the significance of impacts**

<b>PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE</b>		
<i>Use these definitions to define the consequence in Part B</i>		
<b>Impact characteristics</b>	<b>Definition</b>	<b>Criteria</b>
<b>MAGNITUDE</b>	Major	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor+	Minor improvement; change not measurable; or threshold never exceeded
	Moderate+	Moderate improvement; within or better than the threshold; or no observed reaction
	Major+	Substantial improvement; within or better than the threshold; or favorable publicity
<b>SPATIAL SCALE</b>	Site or local	Site specific or confined to the project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/International	Nationally or beyond
<b>DURATION</b>	Short term / reversible / unsustainable	Less than 3 years
	Medium term / partially reversible / sustainable	3 to 15 years

	Long term / irreversible / sustainable	>15 years			
<b>PART B: DETERMINING CONSEQUENCE RATING</b>					
<i>Rate consequence based on definition of magnitude, spatial extent and duration</i>					
		<b>SPATIAL SCALE/ POPULATION</b>			
		<b>Site or Local</b>	<b>Regional</b>	<b>National</b>	
<b>MAGNITUDE</b>					
<b>Minor</b>	<b>DURATION</b>	<b>Long term</b>	Medium	Medium	High
		<b>Medium term</b>	Low	Low	Medium
		<b>Short term</b>	Low	Low	Medium
<b>Moderate</b>	<b>DURATION</b>	<b>Long term</b>	Medium	High	High
		<b>Medium term</b>	Medium	Medium	High
		<b>Short term</b>	Low	Medium	Medium
<b>Major</b>	<b>DURATION</b>	<b>Long term</b>	High	High	High
		<b>Medium term</b>	Medium	Medium	High
		<b>Short term</b>	Medium	Medium	High
<b>PART C: DETERMINING SIGNIFICANCE RATING</b>					
<i>Rate significance based on consequence and probability</i>					
		<b>CONSEQUENCE</b>			
		<b>Low</b>	<b>Medium</b>	<b>High</b>	
<b>PROBABILITY (of exposure to impacts)</b>	<b>Definite</b>	Medium	Medium	High	
	<b>Possible</b>	Low	Medium	High	
	<b>Unlikely</b>	Low	Low	Medium	
<b>PART D: CONFIDENCE LEVEL</b>					
High		Medium		Low	

Notes: + denotes a positive impact.

Using the matrix, the significance of each described impact is initially rated. This rating assumes the management measures inherent in the project design are in place.

**Management recommendations and post management significance**

Practicable **management measures** were then listed, using the IFC’s management hierarchy:

“Recommendations for management should focus on *avoidance, and if avoidance is not possible, then to reduce, restore, compensate/offset negative impacts*, enhance positive impacts and assist project design.”

The significance of impacts was then re-assessed **with** assumed management measures in place (“**after management**”). Specialists also recommended and described appropriate **monitoring** and review programs to track the efficacy of management measures. These are included in the Action Plans.

An example of the table used to report the significance rating for each impact before and after the implementation of mitigation / management measures, and listing these measures, is provided as Table 7-4

**Table 7-4: Impact significance rating and mitigation measures for the Impact**

<b>Impact xx: Habitat disturbance resulting in invasion by exotic fauna and flora</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Long term</i>	<i>Site / local</i>	<i>Medium</i>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b>								
•								
<b>After Management</b>	<i>Minor</i>	<i>Short term</i>	<i>Site / local</i>	<b>Low</b>	<b>Unlikely</b>	<b>Low</b>	-	<i>Medium</i>



## 7.3 Biophysical Impacts

### 7.3.1 Impacts on soils, land capability and land use

This assessment is based on the project description provided by TERRA for the construction and operational phases only which are in line with the assumptions and limitations outlined in Section 3.

#### Impacts associated with the Construction Phase

The activities associated with dust generation during the construction phase may include:

- Site clearance, ground modelling and landscaping
- Earthworks for roads and infrastructures construction
- Tillage, ploughing and harrowing
- Agrochemical application
- Harvesting
- Storage
- Transportation.

This section describes and assesses the soil, land capability and land use impacts that are likely to occur during the operational phase as a result of the proposed project. Impacts on hydromorphic soils are not analyzed separately from the impacts on the other soil types.

**Impact associated with temporary loss of soil resource, and change in soil characteristics, land capability and land use during construction and operational phases**

Potential Impact SL1: Placement of project infrastructures, resulting in a temporary loss of soil resource, and change in soil characteristics, land capability and land use

This impact considers infrastructure which is required for the operation of the TERRA agricultural project. Soil is removed and stripped so that the proposed infrastructure can be built.

During construction, soils below the infrastructure will be lost from the landscape as infrastructure is placed onto the soils or the soils stripped for stockpiling. The loss of this resource will result in a change in land capability (bearing in mind that the focus of the FAO system (FAO, 1976) is suitability for use as agricultural soils or food production) from one that is generally moderately suitable to one that is not suitable.

The impact may manifest as construction commences and may endure through the operational phase. There is, however, the opportunity that with appropriate planning during the construction phase so that this impact could be minimized. During construction and operation, the soil resource may be lost from the landscape, albeit through the stripping and stockpiling of the soils which should occur during the construction period. This impact assessment is undertaken within the following context:

- That there are no unique soils present within the project area; and
- That there is low (nearly no) human activity in the project area so the soil is expected to be clean.

The impact may manifest as construction commences and may endure through the operating phase. As the nature of the impact will be the same during construction and operation these phases have been combined for assessment purposes.

**Table 7-5: Impact significance rating and mitigation measures for Impact SL1**

Impact SL1: Placement of project infrastructure, resulting in a temporary loss of soil resource, and change in soil characteristics, land capability and land use								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<p><b>Management Measures:</b></p> <ul style="list-style-type: none"> <li>• Minimize the disturbed footprint as far as practically possible.</li> <li>• Implement livelihood restoration and compensation measures in areas where livelihood are impacted by the loss of agricultural lands.</li> <li>• The proposed TERRA project focuses on the construction and operational phases only. Therefore the site clearing and earthwork activities will also be carried out phase by phase in order to reduce soil erosion.</li> <li>• Leguminous cover crops also assist soil conservation and moisture retention by:               <ul style="list-style-type: none"> <li>○ Intercepting of rainfall (absorbing the energy of the raindrops, thus reducing runoff)</li> <li>○ Retarding erosion by decreasing surface velocity</li> <li>○ Restraining soil movement</li> <li>○ Improvement of soil porosity</li> </ul> </li> <li>• Increasing biological activity in the soil</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Site / Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>

### Impact associated permanent loss of resource, and potential in soil characteristics, land capability and land use during construction and operational phases

Potential Impact SL2: Site clearance resulting in a permanent loss resource, and potential in soil characteristics, land capability and land use as a result of increased erosion

The removal of the protective vegetation cover and disturbance of soil surface will bring soil erosion with the rainfalls. Soil erosion is a major soil degradation process affecting the soil quality not only by directly reducing nutrient and organic matter levels, but also by affecting soil properties such as infiltration rates.

Erosion occurs mainly during site clearing and farming establishment when the soil is left uncovered for building camp, workshop, storage facilities, construction of infrastructures, access roads, drainage works. The top layer of soil is the most vulnerable and unfortunately tends to be the moist fertile soil. Increased erosion could lead to a loss of a soil resource in the area of the erosion and possibly an increase in the sediment load where the eroded soils are deposited.

Soil suspended as solids in the water column can physically enter waterways and obstruct them. Soil erosion can also transport agrochemicals such as fertilizers, herbicides and pesticides which adhere to the suspended solids.

**Table 7-6: Impact significance rating and mitigation measures for Impact SL2**

Impact SL2: Site Clearance resulting in a permanent resource loss, and potential in soil characteristics, land capability and land use as a result of increased erosion								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE <sup>+</sup> / <sub>-</sub>		Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>High</b>	<b>Definite</b>	<b>High</b>	-	<i>Medium</i>
<p><b>Management Measures:</b></p> <ul style="list-style-type: none"> <li>Minimize the disturbed footprint as far as practically possible.</li> <li>Minimize the area of disturbance.</li> <li>Implement storm water control measures to reduce water velocity should mitigate erosion. These controls could include: <ul style="list-style-type: none"> <li>Berms, bunds, sediment control structures and diversions around the farming land facility and roads.</li> <li>Where water is discharged to the environment, energy dissipaters such as gabions, established vegetation etc. should be included in the design;</li> <li>Where needed, minimize exposed soil; and</li> <li>Erosion can also be limited by ensuring that mobile vehicles and human movement is limited to dedicated access ways, with off road travel authorized when required for critical farming operations.</li> <li>Implement livelihood restoration and compensation measures in areas where livelihood are impacted by the loss of agricultural lands.</li> <li>Implement appropriate topsoil stockpile management.</li> </ul> </li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Site / Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>

### Impact associated permanent loss of soil resource, and change in soil characteristics, land capability and land use during construction and operational phases

Potential Impact SL3: Spillage of agrochemicals, hydrocarbons and seepage from waste resulting in permanent loss of soil resource, and change in soil characteristics, land capability and land use

There is the potential that during farming operations, spillage of agrochemicals such as fertilizers, herbicides pesticides, and hydrocarbons (fuel and lubricants) could affect the soils over a wider footprint than that disturbed by the actual activity. Where this occurs, phytotoxins could potentially accumulate in soils resulting in these soils no longer having the potential to support plant growth. There are a number of activities which could result in this occurring as described briefly below:

- Spills of the various hydrocarbons used for fuel and lubrication requirements
- Inadequate methods of storage and disposal of hazardous waste resulting in seepage of effluent
- Breakdown of mobile equipment away from a workshop requiring the equipment to be repaired in areas where there may not be adequate protection from hydrocarbon spills.

**Table 7-7: Impact significance rating and mitigation measures for Impact SL3**

<b>Impact SL3: Spillage of agrochemicals, hydrocarbons and seepage from waste resulting in permanent loss of soil resource, and change in soil characteristics, land capability and land use</b>								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site / Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• Establishment of facilities for the safe storage of agrochemicals and hydrocarbons.</li> <li>• Prepare procedures to ensure that agrochemicals and hydrocarbons are correctly handled to reduce risk of spillage.</li> <li>• The provision of appropriate secondary containment in areas where hydrocarbons, solvents and other potentially hazardous materials are stored.</li> <li>• Implement emergency preparedness and response measures plan as described in Section 8.</li> </ul>								
<b>After Management</b>	<b>Minor</b>	<b>Medium-term</b>	<b>Site / Local</b>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>

### 7.3.2 Biodiversity

This section describes the biodiversity related impacts for the project area.

The DRC is considered to be the most biologically diverse country in Africa, with at least 11000 plant species having been recorded, of which 29% are found only in the DRC. This is partly due to the size of the country and the fact that half of the country is covered in rain forest. The concession area lies in the southern part of the country within a zone of miombo woodland. "Miombo" is a vernacular term adopted by ecologists to describe the woodland ecosystems dominated by trees of the genera *Brachystegia*, *Julbernardia* and *Isobertia* of the family Fabaceae, sub family Caesalpinioideae. Such woodlands extend over 2.8 million km of the southern sub humid tropical zone from Tanzania and DRC in the north through Zambia, Malawi, and eastern Angola to Zimbabwe and Mozambique in the south. These woodlands constitute the largest more-or-less contiguous block of deciduous tropical woodlands and dry forest in the world. The generally degraded state of the natural habitat in the concession area and the activities in the areas surrounding the concession area has resulted in a generally impoverished diversity of flora.

#### **Impact associated loss of habitats of diverse species of flora and fauna during construction phase**

Potential Impact B1: Loss of habitats of diverse species of flora and fauna due to site clearing and earthmoving activities

The vegetation dominating the immediate vicinity of the TERRA farms is savannah with grasses such as *Hyperhenia*, *Panicum* and *Imperata* species. The forest trees in the area are of the Zambezi type (Miombo), *Brachystegia* and *Pterocarpus* species. The diversity of mammals in the project area is low and that of bird's moderate, while insects showed higher diversity. Habitat loss will result from various activities, including the clearing of natural areas during site preparation of the farming land, infrastructure, roads, camp, road construction and landfill. Approximately 10,000 ha of miombo will be lost via site clearing.

The proposed development is unlikely to impact directly on the incidence of uncontrolled veld fires, but is likely to have indirect positive or negative impacts on uncontrolled fires, depending on how the influx of people and associated clearing of land and fuel wood harvesting, is controlled.

**Table 7-8: Impact significance rating and mitigation measures for Impact B1**

<b>Impact B1: Loss of habitats of diverse species of flora and fauna due to site clearing and earthmoving activities</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Minor</i>	<i>Long term</i>	<i>Site / local</i>	<b>High</b>	<b>Definite</b>	<b>High</b>	-	<i>High</i>
<p><b>Management Measures:</b></p> <ul style="list-style-type: none"> <li>• Site clearing to be conducted sequentially, not all at once.</li> <li>• All cleared or degraded areas of miombo that do not form part of TERRA's operations must be rehabilitated to a stable ecological state.</li> <li>• A Biodiversity Action Plan (BAP) should be developed to inform TERRA protection and management of biodiversity in the entire concession, taking cognisance of ecosystem services currently utilised by the local communities. The initial Biodiversity Action Plan should be informed by comprehensive baseline surveys of mammals, birds, insects, amphibians, reptiles and fish (to complement the existing flora data) undertaken in both the wet and dry seasons. The BAP must be updated at least every 5 years to facilitate adaptive management, or more frequently if required.</li> <li>• Ensure through assessment that its concession contains no environmental and social values, such as unique biodiversity, watershed protection, soil stabilization or archaeological site. This will provide rational basis for use and protection of biodiversity.</li> <li>• The development of this phased out over 8 years (for 10,000ha). TERRA should plan its development every year over a large period of time. By clearing smaller blocks, it will minimize the impact on the fauna as they will have time to move. The phasing out of the farming development will also help identify and control impacts such as low biomass to manage.</li> <li>• There is loss of villagers farms, the compensation have done.</li> <li>• Loss of Non-Timber Forrester Product (NTPs) (masuku, fingo, and many other species) can be resolved by leaving some bush area. This bush can act as a buffer zone and can be used as a shelter for the animals that are going to be used for pest control.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	-	<i>Medium</i>

### Impact associated with loss of aquatic habitat due site clearing, earthmoving and agrochemicals usage activities during construction phase

Potential Impact B2: Loss of aquatic habitat due site clearing, earthmoving and agrochemicals usage activities

None of the aquatic habitats in the project area are classified as critical in terms of IFC PS6 (2012), but are noted as important habitats. Faunal diversity in the TERRA farming area around the Lubanda village is discussed in Section 5 of this report.

It was principally a desktop study and incorporated findings from other baseline studies conducted in the Lubanda area as part of previous ESIA studies (GAC). Additionally Professor Amisi from the University of Lubumbashi reviewed the species tables and biodiversity section of this report. SRK undertook high-level field surveys (visual observation and interviews) during January and February 2014 to obtain supplementary information of fauna in the area. The general degraded character of natural habitats in the concession areas has resulted in a deteriorated faunal diversity. This is particularly the case for fishes and edible game and the situation is not expected to improve at any time in the foreseeable future. The rivers within the TERRA concession and surrounding areas and the Lubanda lac are known to contain nine species of fishes and two species of amphibians namely *Strongylopus fasciatus* and *Bufo veridis*. Impacts thereon should be avoided and mitigated to the greatest extent practically possible. Biodiversity offsets are not deemed to be necessary.

**Table 7-9: Impact significance rating and mitigation measures for Impact B2**

Impact B2 Loss of aquatic habitat due site clearing, earthmoving and agrochemicals usage activities								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Long term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>No spoiling of material to take place to the west of the existing (most western) road to the proposed spoil site, to avoid impacts to the extensive swamp and Swamp forest system west of the road.</li> <li>A stormwater management plan must be developed for both the construction and operational phases of the project, with particular attention paid to minimising increased sedimentation of the rivers and lake.</li> <li>A BAP should be developed to inform TERRA's protection and management of biodiversity in the entire concession, taking cognisance of ecosystem services currently utilised by the local communities.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term</i>	<i>Site/ local</i>	<b>Medium</b>	<b>Unlikely</b>	<b>Low</b>	-	<i>Medium</i>



### Impact associated with fragmentation of habitats during construction phase

Potential Impact B3: Fragmentation of habitats and ecological processes due to positioning of project infrastructure

The TERRA project will be constructing new infrastructure within the project footprint. As mentioned above and in Section 5 of this report various fauna and flora species exist within the project area. Due to farming activities and the construction of infrastructure, fragmentation of these habitats will occur. Fragmentation of habitats includes the following phenomena:

- Reduction in the total area of the habitat;
- Decrease in the ratio of species;
- Isolation of one habitat fragment from other areas
- Breaking up one patch of habitat to several smaller patches; and
- Decrease in the average size of each patch of habitat.

A Biodiversity Action Plan (BAP) should be developed to inform TERRA's protection and management of biodiversity in the entire concession, taking cognisance of ecosystem functioning and to avoid or minimise the fragmentation of habitats.

**Table 7-10: Impact significance rating and mitigation measures for Impact B3**

Impact B3: Fragmentation of habitats and ecological processes due to positioning of project infrastructure								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE <sup>+</sup> / <sub>-</sub>		Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Long term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	-	<i>Medium</i>
<p><b>Management Measures:</b></p> <p>A Biodiversity Action Plan (BAP) should be developed to inform TERRA's protection and management of biodiversity in the entire concession, taking cognisance of ecosystem functioning and to avoid or minimise the fragmentation of habitats.</p>								
<b>After Management</b>	<i>Minor</i>	<i>Long term</i>	<i>Site / local</i>	<b>Medium</b>	<i>Unlikely</i>	<b>Low</b>	-	<i>Medium</i>

### Impact associated with degradation of aquatic habits during construction phase

Potential Impact B4: Degradation of aquatic habitats due to altered hydrological regimes and surface or groundwater quality

The hydrological regimes of the Lubanda Lake are likely to be impacted by modification of the landscape surrounding them and associated surface run-off upon construction of new roads. Pollution events could occur if sources are not managed appropriately. None of the aquatic habitats in the project area are classified as critical in terms of IFC PS6 (2012), but are noted as important habitats. Faunal diversity in the TERRA farming area around the Lubanda village is discussed in Section 5 of this report.

The general degraded character of natural habitats in the concession areas has resulted in a deteriorated faunal diversity. This is particularly the case for fishes and edible game and the situation is not expected to improve at any time in the foreseeable future. The rivers within the TERRA concession and surrounding areas and the Lubanda lac are known to contain nine species of fishes and two species of amphians namely *Strongylopus fasciatus* and *Bufo veridis*. Impacts thereon should be avoided and mitigated to the greatest extent practically possible. Biodiversity offsets are not deemed to be necessary.

**Table 7-11: Impact significance rating and mitigation measures for Impact B4**

Impact B4: Modification or degradation of aquatic habitats due to altered hydrological regimes and surface or groundwater quality								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Long term</i>	<i>Site / local</i>	<b>High</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• A stormwater management plan to be developed for all project components to address stormwater run-off volumes, velocity, water quality to minimise impacts on natural areas.</li> <li>• Leak and spill management systems to be in place at all potential major sources of pollution such as agrochemicals, fuel, lubricant and hazardous product storage facilities, vehicle servicing areas, and workshops.</li> <li>• All plant components and vehicles to be serviced within the designated workshop areas.</li> <li>• A BAP should be developed to inform TERRA's protection and management of biodiversity in the entire concession.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term</i>	<i>Site local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>

### Impact associated with introduction of alien invasive plants during construction phase

Potential Impact B5: Introduction of alien invasive plants due to site clearing and disturbance of vegetation

The clearing of land is likely to result in the introduction of alien invasive plants into the study area. The spread of invasive species in the study area is likely to negatively impact the existing endemic species and biodiversity.

**Table 7-12: Impact significance rating and mitigation measures for Impact B5**

Impact B5: Introduction of alien invasive plants due to site clearing and disturbance of vegetation								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Long term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Minimise cleared or disturbed areas.</li> <li>• The specification for plant (machinery) contractors must include the washing of plant prior to it being displaced to the study area.</li> <li>• A BAP should be developed to inform TERRA's protection and management of biodiversity in the entire concession, including the minimising land clearing activities.</li> <li>• Promote the systematic eradication of invasive plant species infestations, especially in areas disturbed by development. Revegetation must use plants that are indigenous to the immediate area.</li> <li>• Ensure that only trained people handle and make use of herbicides.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Long term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Unlikely</b>	<b>Low</b>	-	<i>medium</i>

**Impact associated with loss or disturbance of species during operational phase**

Potential Impact B6: Loss or disturbance of species of special concern due to site clearing and farming activities

Species of special concern covered under this impact include protected, Red List, and endemic species.

Some species will either be disturbed or lost during the operational phase due to site clearing activities and associated increased vehicular traffic, sessile fauna and noise sensitive birds including resident nesting species. Impacts on species of special concern should be avoided and mitigated to the greatest extent practically possible. Biodiversity offsets are not deemed to be necessary.

**Table 7-13: Impact significance rating and mitigation measures for Impact B6**

Impact B6: Loss or disturbance of species of special concern due to site clearing and farming activities								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE <sup>+</sup> /-		Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Long term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Site clearing to be conducted sequentially and from one corner of the site to the other, to enable highly mobile species to leave the farming area.</li> <li>• No fauna are to be hunted or destroyed by any project personnel.</li> <li>• An environmental education training programme to be developed and implemented, including regular refreshersessions.</li> <li>• Effective penalties (*e.g. fines) must be imposed for the hunting or harm to fauna by any staff.</li> <li>• A BAP to be developed to inform TERRA’s protection and management of biodiversity in the entire concession.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Medium term</i>	<i>Site / local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>

### 7.3.3 Water resources

#### Surface water

This section describes the surface and ground water related impacts that may arise from project activities.

#### Impact associated with potential runoff during operational phase

Potential Impact W1: Potential increase of runoff due to change in vegetation covers, from natural ecosystem to maize crops

The expansion of the additional 9 500 ha of agricultural land by TERRA will result in the replacement of natural ecosystem with rain-fed maize crops. The removal of natural vegetation will modify the partitioning of the water on the surface and reduce the infiltration of rainwater.

Due to limited ground cover in the cultivated land, runoff will be increased leading to increased erosion of topsoil and development of rills and gullies within the cultivated land. If unmanaged, this process is likely to result in land degradation over time. Increased run-off may also contribute to flooding along the banks of local rivers and Lake Lubanda.

**Table 7-14: Impact significance rating and mitigation measures for Impact W1**

Impact W1: Potential increase of runoff due to change in vegetation covers, from natural ecosystem to maize crops								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Long term &gt;15 years</i>	<i>Regional</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium</b>	-	<b>Medium</b>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Technologies for reducing the energy of run-off water will be implemented so that run-off does not carry significant sediments from the cultivated land.</li> <li>Cultivation will be perpendicular to the slope to minimize run-off.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Regional</i>	<b>Low</b>	<b>Definite</b>	<b>Low</b>	-	<b>Low</b>

## **Impact associated with the potential increase of soil erosion in cultivated land and sedimentation in the waterways during operational phase**

Potential Impact W2: Potential increase in soil erosion on cultivated land and sedimentation in waterways

The cultivation or tilling of the soil during ploughing season and leaving it without vegetation cover may increase the rate of soil erosion. The dislocated loose soil particles can be carried away by runoff water and eventually reach surface water resources such as Kafira and Besa Rivers as well as Lake Lubanda. These sediments may impact the quality of water resources which will in turn affect water users. This process may also reduce lake storage and impact wildlife habitats in and around the lake and rivers.

An increase in sediment deposition in the Lubanda Lake might reduce aquatic species diversity in affecting commercial and recreational services provided by the lake. The sediments stored in the lake and rivers might contain some pollutants which might become available and assimilated in the water resources.

As TERRA will apply fertilizers and pesticides as part of their agricultural practices, sediments washed from the cultivated land might contain toxic pesticides and nutrients bounded in the clay and silt particles.

**Table 7-15: Impact significance rating and mitigation measures for Impact W2**

<b>Impact W2: Potential increase in soil erosion on the cultivated land and sedimentation in the waterways</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>High</b>	<i>Definite</i>	<b>High</b>	-	<b>High</b>
<p><b>Management Measures:</b></p> <ul style="list-style-type: none"> <li>• Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes.</li> <li>• Technologies for reducing the energy of run-off water will be implemented so that run-off does not carry significant sediments from the cultivated land.</li> <li>• Cultivation will be perpendicular to the slope to minimize erosion and run-off.</li> <li>• The impact of the hydrological and drainage system due to the site clearing can be attenuated by a good management of available fresh water to minimize soil erosion and nutrient losses.</li> <li>• Legumes cover can be used to help minimize soil erosion by reducing the depressive power of raindrops and acts as an impediment to surface runoff.</li> <li>• Detailed hydrological studies should be carried out for each phase of the proposed farm development to help determine the flood area and help design the sizes of the drains and culverts.</li> <li>• The status of surface and ground water should also be monitored. TERRA should develop a water management plan.</li> <li>• Leave a riparian reserve of about 20 meters around the river and lake for the purpose of minimizing the amount of sediments entering the river system and erosion of riverbanks.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Low</b>	<i>Possible</i>	<b>Medium</b>	-	<b>Medium</b>

### Impact associated with potential increase in groundwater recharge during operational phase

Potential Impact W3: Potential increase in groundwater recharge due to the change in land cover, from forest ecosystem to cultivated land

The conversion of natural ecosystem to rain-fed agricultural land by clearing vegetation on the identified 9 500 ha of land is likely to reduce the rate of evapotranspiration. The change in land cover from natural miombo forest to cultivated land will provides more water for groundwater recharge and baseflow. The increased recharge is attributed to replacement of deep-rooted forest by shallow-rooted seasonal maize crops. Increased recharge will also raise the level of the water table causing waterlogging and mobilisation of salt which were previously accumulated beneath the native vegetation.

Raised water levels suggest increased hydraulic gradients to the streams. Increase in recharge will also increase the baseflow in the rivers which is likely to increase flood risk.

**Table 7-16: Impact significance rating and mitigation measures for Impact W3**

Impact W3: Potential increase in groundwater recharge due to the change in land cover, from forest ecosystem to cultivated land								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	+	<b>Medium</b>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Surface and groundwater monitoring should be implemented on an ongoing basis to determine changes in water quantity.</li> <li>• TERRA should prepare and implement an emergency preparedness and response plan to deal with flooding.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Low</b>	+	<b>Medium</b>



**Impact associated with potential leaching of nutrients from the soil due to the application of fertilizers during operational phase**

Potential Impact W4: Potential leaching of nutrients from the soil due to the application of fertilizers in the cultivated land

TERRA is currently adding NPK (10-26-26) and Urea (46 -0-0) to their maize crops to improve the yields of their crops. These two fertilizers are chiefly composed of nitrogen, potassium and phosphorus. These nutrients are applied on annual basis to improve the crop yields. During rain, these nutrients are washed into the water resources and some seep into the groundwater through unconsolidated materials and fractured zones.

Nitrogen and phosphorus eroded from the cultivated land might accelerate algal production in the Lake Lubanda resulting in the variety of problems which might include fish kills and recreational opportunities. Apart from harming aquatic ecosystem, nitrate also poses health risk to communities using the lake for livelihood (e.g. fishing) and domestic purposes (e.g. washing and drinking).

**Table 7-17: Impact significance rating and mitigation measures for Impact W4**

Impact W4: Potential leaching of nutrients from the soil due to the application of fertilizers in the cultivated land								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ / -	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>High</b>	<b>Definite</b>	<b>High</b>	-	<b>Medium</b>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes, silt traps and prompt re-vegetation, where possible.</li> <li>Technologies for reducing the energy force of run-off water such as installation of diversion channels, sedimentation ponds, rock filter or plastic dams will be implemented so that run-off does not carry significant sediments from the cultivated land.</li> <li>Cultivation will be perpendicular to the slope to minimize iron and run-off.</li> <li>Control the use of fertilizers.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	-	<b>Medium</b>

### **Impact associated with potential contamination of water resources due to application of pesticides and phosphates during operational phase**

Potential Impact W5: Potential contamination of water resources due to application of pesticides and phosphates associated with sediments

A wide variety of pesticides are being applied in the cultivated maize crops to control insect pest, fungus, and diseases. The pesticides include:

- **Herbicides** - Callisto, Dual gold, Gesaprim, Nucomax, Glyphosat
- **Insecticide** - Actara, Regant (Anti-termitte)
- **Fungicide** - Amistar

These pesticides are applied seasonally during maize plantation and some of these pesticides travel far from where they are being applied. Pesticides might migrate to Lubanda Lake and Besa and Kafira rivers through runoff or into groundwater through percolation and leachate. Pesticides can also be carried by air or sediments and deposited into the water bodies. In the water bodies, residues that reach the surface water system might harm freshwater and aquatic organism, damaging the recreational and commercial fisheries of the Lubanda Lake. The presence of the pesticides in the water might also affect the health of the people who use the water for domestic purposes.

The presence of pesticides in the water or soil medium within the study area is not known. The persistence and toxicity of the pesticides used by Terra in their project is not known.

Some of the pesticides persists in the soil particles, therefore, even after the closure of the project, some of the pesticides will remain in the project area even though in a small quantities.

**Table 7-18: Impact significance rating and mitigation measures for Impact W5**

<b>Impact W5: Potential contamination of water resources due to application of pesticides and phosphates associated with sediments</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<sup>+</sup> /-	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Long term &gt;15 years</i>	<i>Regional</i>	<b>High</b>	<i>Definite</i>	<b>High</b>	-	<i>Medium</i>
<p><b>Management Measures:</b></p> <ul style="list-style-type: none"> <li>• Construction of settlements ponds.</li> <li>• Use of biodegradable pesticides.</li> <li>• Reduce the pesticides dosage.</li> <li>• The use of agrochemicals is very expensive thus the application of the fertilizer should be based on the crop requirements. Mulch from the decomposed biomass can be used. The use of organic fertilizer will minimize the impacts of the chemicals in the soil, waterways, and lighten the fertilizers budget.</li> <li>• For pest control, TERRA can use chemical, cultural, biological and physical practices to control the infestations.</li> <li>• The agrochemicals should be well stored and handled to avoid spills.</li> <li>• Workers should be warned of the danger of these products and trained on the way to handle them, use them, and dispose of their used containers.</li> <li>• The application of pesticides and fertilizers should be in strict accordance with the manufacturers' instructions and generally established safety procedures. Every chemical product must have their Material Safety Data Sheet (MSDS).</li> <li>• TERRA should have these procedures and instructions available as a form of "company Instruction for application of Pesticides and Fertilizers".</li> <li>• TERRA should consider the preparation of such instructions which would incorporate all elements including of safe handling of some of the chemicals and integrate in these instructions the guide for "Pesticide handling and application".</li> <li>• All petrochemicals should be stored, handled and disposed of to avoid spoilage, and thus avoid soil and waterways pollution. TERRA will have to put in place an oil/water separator next to the workshop drainage system. TERRA has to put in place a Spill Response Plan".</li> <li>• TERRA should not make use of POP or Persistent Organic Pollutants banned under Stockolm convention which came into force.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Regional</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>

**Impact associated with potential water contamination during operational phase**

Potential W6: Potential water contamination due leakages from storage areas and accidental spills of fuel and chemicals

TERRA makes use of vehicles and agricultural machinery which can leak hydrocarbons and lubricants and chemicals if not maintained or managed.

TERRA also current storing fertilisers and pesticides in zinc shelters which are not bunded and have no cement slab to minimize pollution of groundwater from any leakages. No stormwater management strategy is in place around the fuel and chemical storages to control or minimize pollution of surface and groundwater resources from leakages from the storage facilities.

Accidental spills or any leakages of hydrocarbon and other chemical spills may contribute to the deterioration of groundwater quality, depending on the nature, extent, frequency and duration of such spills.

**Table 7-19: Impact significance rating and mitigation measures for Impact W6**

<b>Impact W6: Potential water contamination due leakages from storage areas and accidental spills of fuel and chemicals</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Medium</b>	<b>Unlikely</b>	<b>Medium</b>	-	<b>Low</b>
<p><b>Management Measures:</b></p> <ul style="list-style-type: none"> <li>• Establishment of facilities for the safe storage of agrochemicals and hydrocarbons</li> <li>• Fuel and chemicals will be stored in a secured area.</li> <li>• Fuel will be stored in a steel tank, preferably supplied and maintained by the fuel supplier and above the ground</li> <li>• Leakage of fuel and other chemicals will be avoided</li> <li>• All storages for fertilizers, pesticides and fuel will be located in an adequately bunded areas capable of preventing contamination of surface and groundwater resource</li> <li>• Refuelling and maintenance of vehicles will be undertaken within the specific depots</li> <li>• All repairs done on machinery using hydrocarbons as fuel will have a drip tray placed strategically to avoid incidentally spills</li> <li>• Spill clean-up procedure will be implemented.</li> <li>• Where contaminants are transported, emergency contaminant and mitigation measures must be developed to minimize impacts should accidental spillages occur along the transport routes</li> <li>• Equip all trucks and equipment carrying fuels or oil with spill response materials and train personnel in the use of such materials</li> <li>• Store all potential sources of contamination in secure facilities with appropriate Storm Water management systems in place to ensure that contaminants are not released to the water resource through Storm Water runoff</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>Low</b>	-	<b>Low</b>

## Groundwater

### Impact associated with contamination of groundwater as a result from seepage during operational phase.

Potential Impact WR7: Contamination of groundwater resulting from seepage from farm land, sewage and other waste

The use of agrochemicals for farming land and septic toilets or septic tanks during the operational phase may impact groundwater quality through seepage if these systems are not appropriately managed. Waste (including hazardous waste) will also be generated and similarly may lead to groundwater contamination if it is not appropriately stored and disposed of. Although no current users of groundwater have been identified and the baseline quality of this resource has not been assessed, large volumes of groundwater are expected to exist in the area.

The installation of a package plant sewage treatment system and construction of a waste landfill site during the operational phase can be proposed, and would reduce the probability of this impact occurring once they are in operation.

**Table 7-20: Impact significance rating and mitigation measures for Impact WR7**

Impact WR7: Contamination of groundwater resulting from seepage from farming land, sewage and other waste								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE <sup>+</sup> /-		Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Short Term</i>	<i>Regional</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Manage waste in accordance with the Waste Management Plan</li> <li>• Prioritize construction of a properly lined and designed waste landfill site and sewage treatment system as early as possible during construction</li> <li>• Proper sanitation to be provided to all staff as human gastrointestinal parasites and pathogens can be spread to wildlife via water</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short Term</i>	<i>Site / local</i>	<b>Low</b>	<i>Unlikely</i>	<b>Low</b>	-	<i>Low</i>

### 7.3.4 Air Quality

This section describes the air quality related impacts that may arise from the project activities during the construction and operational phases.

#### Impacts associated with PM<sub>10</sub> emissions during the Construction Phase

Particulate matter (PM) comprises of airborne particles that include dust, smoke and soot. Particulate matter can either be emitted naturally (e.g. windblown dust of roads) or be generated through human activity (e.g. stack emissions). It is defined by size, with coarse particles being between 2.5-10 microns, fine particles less than 2.5 microns and ultrafine particles less than 0.1 microns.

**Potential Impact AQ1:** PM<sub>10</sub> emissions during construction activities pose a risk to human health and affect vegetation

Particulate matter has adverse effects on humans such as respiratory illnesses (asthma and bronchitis) or cardiovascular diseases. It also can affect vegetation in two ways, firstly, by inhibiting the plant’s photosynthetic properties by coating the leaves, blocking the penetration of natural light. Secondly, various chemical compounds e.g. metals in the particulate matter could be deposited onto soils and absorbed by vegetation, hindering plant growth. The uptake of metals by plants has the potential to contaminate the vegetables and fruit that may be consumed by humans and animals.

PM<sub>10</sub> emissions are expected to have an impact on villages during the construction phase. Activities associated with construction will include land clearing, vehicle exhaust emissions and vehicle entrainment of dust. PM<sub>10</sub> emissions may affect the project area but will decrease exponentially with distance away from the sources and in areas beyond the project footprint. Activities very close to villages might have high impacts and will be of concern during the time taken for the construction activities to be completed.

**Table 7-21: Impact associated with PM<sub>10</sub> emissions during construction activities**

Impact AQ1: PM <sub>10</sub> emissions during construction activities pose a risk to human health and affect vegetation.								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Short Term</i>	<i>Site/ Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Apply dust suppressants to sections of roads used routinely by vehicles that pass through and close to villages. Dust suppression should be undertaken more frequently during the dry season depending on the frequency of road use.</li> <li>Design road alignments to minimise travel distances and eliminate unnecessary traffic.</li> <li>Locate stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction.</li> <li>TERRA should prepare and implement a traffic management plan that includes measures such as speed limits for project vehicles.</li> <li>TERRA should develop and implement an air quality monitoring program.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short Term</i>	<i>Site/ Local</i>	<b>Low</b>	<b>Possible</b>	<b>Medium-Low</b>	-	<i>Medium</i>

**Impact associated with increased PM<sub>10</sub> emissions during operational phase**

Potential Impact AQ2: Increase in PM<sub>10</sub> emissions resulting from land clearing, earthworks, burning of biomass and vehicular movement

**Sources of impact**

Expected impacts on air quality during the operational phase of the proposed project are:

- Dust generated during clearing and farming activities
- Emissions from vehicles, generators and machines
- Burning of biomass
- Site clearing will generate biomass which is traditionally burned causing air pollution.

Dust generation from farming activities is an important concern during operational phase. Dust particles generally less than 10 µm will be suspended, resulting in visible deposition close to the activities.

The quantity of any emissions released during the operational phase will generally be very low, but will vary on an hourly and daily basis as activity progresses. Fugitive dust emissions will increase during land clearing and site preparation phases, especially during dry season. Fugitive dust emissions will also increase during the more active operational periods as a result of increased vehicle traffic on the site.

The dust generated during the activities will be mostly inorganic and of an inert nature. The impact of dust generation will depend on weather conditions, wind velocity and precipitation rate.

During the project development, the site clearing, the construction of internal roads, and the establishment of the farming land will generate a large amount of biomass which is traditionally burnt. The burning of this biomass will cause a massive atmospheric pollution with elevated total suspended particulates. In addition to air pollution, burning of biomass releases CO<sub>2</sub> into the atmosphere and contributing to climate change.

**Table 7-22: Impact significance rating and mitigation measures for Impact AQ2**

Impact AQ 2: Increase in PM <sub>10</sub> emissions resulting from land clearing, earthworks, burning of biomass and vehicular movement								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	<sup>+</sup> / <sub>-</sub>	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Short Term</i>	<i>Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Cover vehicles carrying dusty materials to prevent materials being blown from the vehicles;</li> <li>• Set speed limits to minimize the creation of fugitive dust within the project boundary;</li> <li>• Development of routine air quality monitoring program within the farm.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short Term</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>Low</b>	-	<i>Low</i>

### Impact associated with increase in gas (SO<sub>2</sub>, NO<sub>x</sub>, CO and VOCs) during the operational phase

Potential Impact AQ3: Increase in gas (SO<sub>2</sub>, NO<sub>x</sub>, CO and VOCs) emissions resulting from vehicle exhaust emission and biomass burning

Operational activities caused by vehicles result in PM10 emissions. These emissions pose a health risk to people living and working in the project area. The extent and severity of this impact will be determined by detailed baseline monitoring when it has been completed.

Expected impacts on air quality during the operational phase of the proposed project are:

- Dust generated during clearing and farming activities
- Emissions from vehicles, generators and machines
- Burning of biomass
- Site clearing will generate biomass which is traditionally burned causing air pollution.

Dust generation from farming activities is an important concern during operational phase. Dust particles generally less than 10 µm will be suspended, resulting in visible deposition close to the activities.

During the project development, the site clearing, the construction of internal roads, and the establishment of the farming land will generate a large amount of biomass which is traditionally burnt. The burning of this biomass will cause a massive atmospheric pollution with elevated total suspended particulates. In addition to air pollution, burning of biomass releases CO<sub>2</sub> into the atmosphere and contributing to climate change

**Table 7-23: Impact significance rating and mitigation measures for Impact AQ3**

Impact AQ3: Increase in gas (SO <sub>2</sub> , NO <sub>x</sub> , CO and VOCs) emissions resulting from vehicle exhaust emission and biomass burning								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	<sup>+</sup> / <sub>-</sub>	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Short Term</i>	<i>Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Limit vehicle idling and keep vehicles well maintained to minimize particulate and gaseous emissions.</li> <li>• Where possible, biomass burning should be considered and a schedule should be maintained to allow for pollutants to disperse into the atmosphere in a short amount of time.</li> <li>• Biomass burning should be conducted during the day and during the summer months; and</li> <li>• Development of routine air quality monitoring program.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short Term</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>Low</b>	-	<i>Low</i>



### Impacts associated with health risk to workers and communities during operational phase

Potential Impact AQ4: PM<sub>10</sub> emissions during the operational activities pose health risk to workers and communities

Some operational activities may result in PM<sub>10</sub> emissions. These emissions pose a health risk to people living and working in the project area. Due to the lack of reliable baseline data it is not possible to determine the extent and severity of this impact. Expected impacts on air quality during the operational phase of the proposed project are:

- Dust generated during clearing and farming activities
- Emissions from vehicles, generators and machines
- Burning of biomass
- Site clearing will generate biomass which is traditionally burned causing air pollution.

Dust generation from farming activities is an important concern during operational phase. Dust particles generally less than 10 µm will be suspended, resulting in visible deposition close to the activities.

**Table 7-24: Impact associated with PM<sub>10</sub> during operational activities**

AQ4: PM <sub>10</sub> emissions during the operational activities pose health risk to workers and communities								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	<sup>+</sup> / <sub>-</sub>	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Long Term</i>	<i>Site/ Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Apply dust suppressants to sections of roads used routinely by vehicles that pass through and close to villages. Dust suppression should be undertaken more frequently during the dry season depending on the frequency of road use.</li> <li>• Design road alignments to minimise travel distances and eliminate unnecessary traffic.</li> <li>• Locate stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction.</li> <li>• TERRA should prepare and implement a traffic management plan that includes measures such as speed limits for project vehicles.</li> <li>• Site clearing should be conducted in a systematic manner to reduce the area exposed to wind erosion.</li> <li>• TERRA should develop and implement an air quality monitoring program.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Long Term</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>Low</b>	-	<i>Low</i>

### 7.3.5 Noise

This section describes the noise related impacts that the project could have on the communities in the project area.

#### Noise generating activities

The current farming activities in this phase do not constitute a constant, continuous source of noise quantifiable. With changing levels of activity and shifting sources of noise, noise levels will not vary considerably in magnitude and over time.

Activities listed below are potential but not necessarily significant or even audible sources of noise, depending on distance from the site. Activities which from a noise perspective, are irrelevant, have been omitted.

**Table 7-25: Summary of sources of noise in the construction phase**

Construction Activity	Primary sources of noise
Clearance of vegetation	Diesel engine noise, bulldozing
	Diesel engine noise, bulldozing, truck movements
Road modelling and earth works	Diesel engine noise, bulldozing, truck movements
Truck movements	Diesel engine noise
Tillage	Diesel engine noise and noise produced by machinery
Harvesting	Diesel engine noise and noise produced by machinery
Generators	Diesel engine noise

The potential impacts on residents of Mwenga, Lubanda, Minga and Katofio villages, as the closest receptor to the farming operations and therefore most affected, are rated low, before and after implementation of the recommended mitigation measures.

### Impact associated with continuous noise on Mwenga, Lubanda, Minga and Katofio villages during the operational phase

Potential Impact N1: Continuous noise impact on Mwenga, Lubanda, Minga and Katofio villages Village resulting from farming activities

The TERRA project will generate no significant noise levels during its farming operations. The principal noise emission source is tractors, vehicles and generators. DRC Regulation<sup>6</sup> allows ambient noise level during the day (07:00 to 19:00) of 45 dBA and during the night (19:00 to 07:00), 40 dBA. The guidelines by the IFC<sup>7</sup> and the WHO<sup>8</sup> stipulate an ambient noise level of 55 dBA and 45 dBA during respectively the day and night.

The current farming activities in this phase do not constitute a constant, continuous source of noise quantifiable. With changing levels of activity and shifting sources of noise, noise levels will not vary considerably in magnitude and over time.

**Table 7-26: Impact significance rating and mitigation measures for Impact NV1**

Impact N1: Continuous noise impact on Mwenga,Lubanda,Minga and Katofio villages Village resulting from farming activities								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Short term</i>	<i>Local</i>	<b>Low</b>	<i>Possible</i>	<b>Low</b>	-	<i>Low</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Restrict construction and operation activities to daytime hours 07:00 am to 07:00 pm.</li> <li>• Monitor noise in surrounding villages. Conduct one survey of 24 hour duration per month. Determine night-time impact.</li> <li>• Increase in ambient level due to project noise should not be allowed to exceed 5 dB.</li> <li>• Any complaints about noise received from communities must be logged in a Complaints Register.</li> <li>• Feedback on new entries and on actions in response to complaints must be a fixed item on weekly or monthly management meeting agendas .</li> <li>• Carry out additional attenuation measures as required and as appropriate.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short term</i>	<i>Local</i>	<b>Low</b>	<i>Unlikely</i>	<b>Low</b>	-	<i>Low</i>

<sup>6</sup> *Journal Officiel – Numéro Spécial – 1er avril 2003*

<sup>7</sup> International Finance Corporation, General EHS Guidelines: Environmental, 30 April 2007

<sup>8</sup> Guidelines for Community Noise, World Health Organisation, Geneva, 1999

### 7.3.6 Impacts on visual character

#### Impacts associated with the loss of sense of place during construction phase

Potential Impact V1: Loss of sense of place affecting local communities due to site clearing and construction activities

Sense of place is defined as a person’s sense of belonging to a place or area. Visual intrusion and loss of a ‘sense of place’ may occur directly as a result of installation of project infrastructure. Indirect impacts may also result from dust blown from exposed surfaces and from blasting creating a plume, as well as lighting of site infrastructure in an otherwise relatively unlit environment, both of which could be visible from a considerable distance. Potential viewers consist mainly of local communities, who are expected to have relatively low sensitivity towards these changes, especially given the potential benefits in terms of job creation. It is, however, recognised that the perception of a visual impact is by nature highly subjective and, where one viewer may consider the impact to be negative, another might perceive the increased development and lighting of the area positively. For this reason, a change to the sense of place of an area is difficult to rate according to standard methodologies. Although local people may associate a particular sense of place with the area, what is difficult to gauge is the importance people attach to that sense of place and how this will change over time should other developments occur in the area, together with how potential project benefits may ameliorate any loss.

Visual disturbance and loss of sense of place impacts are difficult to manage and the loss is theoretically irreversible regardless of post-closure rehabilitation (although this will ameliorate this impact to some degree). The perception of the area may change over time with people becoming accustomed to a new sense of place and thus the actual impact is partially reversed.

**Table 7-27: Impact significance rating and mitigation measures for Impact V1**

Impact V1: Loss of sense of place affecting local communities due to site clearing and construction activities								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Short-term</i>	<i>Regional</i>	<b>Low</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Minimize the disturbed footprint as far as practically possible.</li> <li>Prepare and implement a soil management plan to include measures for stripping and stockpiling of soil.</li> <li>Re-vegetate and landscape disturbed areas as soon as possible, to reflect the surrounding topography and vegetation as much as possible.</li> <li>Leave a riparian reserve/buffer of about 20 meters along rivers and around the lake.</li> <li>Clear vegetation in phases so that only those areas required for immediate development are cleared.</li> <li>Develop and implement a detailed waste management plan for the project.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short-term</i>	<i>Regional</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>

**Impacts associated with the loss of sense of place during operational phase**

Potential Impact V2: Loss of sense of place for local communities from project infrastructure

Changes in visual character and sense of place for local communities as described above will continue through the operational phase of the project. During operation the physical presence of infrastructure will contribute most to the impact and dust plumes during normal operating conditions will be less of a contributor. As noted above, there is a high level of subjectivity in defining visual and sense of place impacts, although it can be anticipated that communities will become more accepting of the visual impact with time.

**Table 7-28: Impact significance rating and mitigation measures for Impact V1**

Impact V2: Loss of sense of place for local communities from project infrastructure								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Regional</i>	<b>Low</b>	<b>Definite</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Minimize the disturbed footprint as far as practically possible.</li> <li>• Prepare and implement a soil management plan to include measures for stripping and stockpiling of soil.</li> <li>• Re-vegetate and landscape disturbed areas as soon as possible, to reflect the surrounding topography and vegetation as much as possible.</li> <li>• Leave a riparian reserve/buffer of about 20 meters along rivers and around the lake.</li> <li>• Clear vegetation in phases so that only those areas required for immediate development are cleared.</li> <li>• Develop and implement a detailed waste management plan for the project.</li> <li>• Use directional lighting in areas operating at night, if communities are affected by lighting.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Regional</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Medium</i>

### 7.3.7 Waste Management

This section describes the waste related impacts that the project could have on the water and soil quality and health and safety of communities in the project area during the operational phase. Not enough information was available at this stage about waste handling and storage therefore it will be examined and rated further in the final ESIA.

During construction it is expected that the waste streams generated will include the following:

- Paper, card, toner and other office consumables from offices.
- Plastic, card, wooden pallets and polystyrene from packaging of goods delivered to site.
- Steel and plastic drums/containers of agrochemicals products.
- Tyres, waste oils and obsolete parts from vehicle maintenance.
- Waste material from road maintenance.
- Spent non-hazardous chemicals, including herbicides, pesticides and their containers.
- Batteries and fluorescent tubes.
- Medical waste.
- Biomass.

Potential impacts resulting from inappropriate waste storage, handling and disposal include contamination of ground and surface water and soils through seepage of effluent containing contaminants.

#### Impact associated with with handling, storage and disposal of waste

Potential Impact W1: Impact associated with handling, storage and disposal of waste

During construction it is expected that the waste streams generated will include the following:

- Paper, card, toner and other office consumables from offices.
- Plastic, card, wooden pallets and polystyrene from packaging of goods delivered to site.
- Steel and plastic drums/containers of agrochemicals products.
- Tyres, waste oils and obsolete parts from vehicle maintenance.
- Waste material from road maintenance.
- Spent non-hazardous chemicals, including herbicides, pesticides and their containers.
- Batteries and fluorescent tubes.
- Medical waste.
- Biomass

A waste management facility (WMF) has been established onsite to receive waste including hazardous waste from the project however this WMF is rudimentary. Co-processing (incineration) of project-generated and local waste will require feasibility assessment as the size of the farming operation increases. Package sewage treatment plants have been chosen over septic tank based on the improved treatment of sewage and larger numbers of employees which the system can deal with.

Potential impacts resulting from inappropriate waste storage, handling and disposal include contamination of ground and surface water and soils through seepage of effluent containing contaminants. Waste oils are used as treatment oil for fencing poles to prevent termite attack. Pesticide and other toxic containers are burnt or buried in a far away from human habitation of movements.

**Table 7-29: Impact significance rating and mitigation measures for Impact Wa1**

<b>Impact Wa1: Impact associated with handling, storage and disposal of waste</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Short term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Domestic waste should be properly disposed of to avoid an invasion of scavengers such as rodents.</li> <li>• A register of hazardous waste should be maintained.</li> <li>• Ensure that the WMF complies with GIIP requirements for waste management.</li> <li>• Develop and implement waste management plan.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short term</i>	<i>Site / local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>

### 7.3.8 Traffic

This section describes the traffic related impacts that the project could have on the road network and associated intersections in the vicinity of the site and N-5 Highway.

The following impacts have been identified as a result of operations activities of the project:

- An increase in traffic volumes, in particular heavy vehicles, on the N-5 between Lubumbashi and Kasenga impacting on utilisation capacity.
- Impact on the road pavement due to potential overloading.
- Increased traffic volumes resulting in increased road accident rates and therefore impact on road safety.
- The transportation of abnormal loads during the phase of the development.

#### Impact associated with farming activities related during operational phase

Potential Impact T1: Impact of farming activities related traffic on utilisation capacity on the N-5.

During the operational phase materials, equipment, and personnel will need to be transported to the project site by means of road transportation resulting in more traffic on the N-5. Transportation of personnel is likely to occur at discreet times, resulting in peak flows, whereas transportation of materials and equipment would be more evenly spread over the course of a day.

Factors that could reduce total vehicle movements per day include:

- Widening of the N-5 at the access road to allow for turning lanes would reduce the potential for accidents and congestion at this intersection.
- Clear signage and traffic calming measures on the N-5 warning motorists of the intersection would reduce potential traffic safety impacts at this intersection.
- Truck staging area and/or rest area would enable trucks to exit the N-5 safely, and enable site staff to schedule deliveries in an orderly manner.

**Table 7-30: Impact significance rating and mitigation measures for Impact T1**

Impact T1: Impact of construction related traffic on utilisation capacity on the N5								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	<sup>+</sup> / <sub>-</sub>	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Short term</i>	<i>Site / local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium</b>	-	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• TERRA to provide driver training awareness for staff operating vehicles</li> <li>• TERRA to include driver training awareness in the contractual agreement with contractors</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short term</i>	<i>Site / local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>



## 7.4 Socio-economic Impacts

### 7.4.1 Overview

This section of the report evaluates the potential socio-economic impacts and benefits that may arise due to TERRA Project activities. The impacts in this section have been grouped according to the cause of the impact, or the impact. For example, the operation will require vast expanses of land for cultivation, the impact of this land take will be economic displacement. The potential impacts include the following:

- **Impact 1:** Land take;
- **Impact 2:** Expectations of economic opportunities and improved living conditions;
- **Impact 3:** Employment and associated benefits;
- **Impact 4:** Opportunities for social investment;
- **Impact 5:** Operational Activities; and

### 7.4.2 Impact 6: Farm Revenue & Import Substitution. **Land take**

**Impact associated with the loss of access to productive land and livelihood activities (economic displacement) through the project's acquisition of land during construction phase**

Potential Impact LT1: Loss of access to productive land and livelihood activities (economic displacement) through the Project's acquisition of land

Economic displacement refers to the loss of productive assets (including land and crops), usage rights or livelihood capacities as a result of acquisition and transformation of land for Project purposes. Currently the Project occupies 1,500 ha of land and will require an additional 8,000 ha of land over the next 5 years for additional cultivation activities.

To date, TERRA has compensated 272 households for the loss of approximately 389 ha of agricultural land. The number of affected households and land that will be affected by future land take has not been quantified, however it is anticipated that the Project footprint will inevitably reduce the amount of land available that could potentially have been used for future agriculture activities, impact on current cultivated subsistence fields and remove Miombo woodland which is used for firewood and the production of charcoal.

International experience has demonstrated that significant loss of land is the main form of impoverishment of displaced rural households. Prior to the occupation or clearing of any agricultural land, TERRA will implement consultation and compensation measures as identified in the Land Acquisition and Compensation Policy Framework (LACPF).

Economic displacement should be minimized through careful organization of the Project layout to limit land take of productive lands. Where economic displacement is deemed unavoidable, TERRA will compensate eligible households for their loss in a manner that ensures the households have the resources to re-establish displaced livelihoods to an equivalent or improved level of benefit. TERRA will endeavor, wherever possible, to offer land-based compensation and assistance strategies, including assistance in acquiring or accessing replacement land, including access to grazing land and water resources; physical preparation of farm land; agricultural inputs; small-scale credit; and access to markets. Financial compensation for land and other economic assets should be calculated at the market value plus the transaction costs related to restoring the assets.

The process of compensation and livelihood restoration should be managed through the LACPF which is aligned with IFC Performance Standard 5 on Land Acquisition and Involuntary

Resettlement. In order to guide future compensation activities, TERRA has developed a LACPF to outline the process and commitments that TERRA will implement for any households impacted by economic displacement. Any affected households will also be adequately consulted before the impacts occur.

**Table 7-31: Impact significance rating and mitigation measures for Impact LT1**

<b>Impact LT1: Loss of access to productive land and livelihood activities (economic displacement) through the Project's acquisition of land</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Long-term</i>	<i>Site/Local</i>	<b>High</b>	<b>Possible</b>	<b>High -</b>	-	<i>High</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>It will be important for TERRA to implement various management measures in order to mitigate the potential impacts resulting from the loss of access to ecosystem services. These should include the following: <ul style="list-style-type: none"> <li>Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services;</li> <li>Provide safe access to Lubanda Lake;</li> <li>Limit Project footprint to minimize land acquisition and displacement of productive lands.</li> </ul> </li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium -</b>	-	<i>Medium</i>

## **Impact associated with loss of access to ecosystem services in construction and operational phases**

### Potential Impact LT2: Loss of access to ecosystem services

Currently numerous households in both the surrounding communities make use of various ecosystem services within the project area. This includes gathering of firewood, collecting thatching grass, fishing in streams and Lubanda Lake, gathering medicinal plants, recreational activities, hunting of bushmeat and collecting wood for charcoal production.

These ecosystem services provide households with an important source of fuel, food, water and play an important role in several livelihood activities. The operation and development of the project will lead to significant land clearing activities as well as reduced access to the concession area resulting in a loss of access to these ecosystem services.

The loss of access to these services may result in decreased food security, loss of income and reduced opportunities for recreational activities.

It will be important for TERRA to implement various management measures in order to mitigate the potential impacts resulting from the loss of access to ecosystem services. These should include the following:

- Conduct a detailed assessment of the current ecosystem services available in the concession area and understand the extent to which these are utilised by the community;
- Ensure that the impact on ecosystem services is minimized wherever possible;
- Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services;
- Where thatching grass is impacted, TERRA should provide alternative roofing material to households. This process should be managed through the LACPF;
- TERRA should compensate households where medicinal plants are lost. If culturally accepted, TERRA should provide households with alternative medication;
- Maintain safe access to Lubanda Lake; and
- Where loss of income is incurred TERRA should compensate households and develop livelihood restoration initiatives detailed in the LACPF.

**Table 7-32: Impact significance rating and mitigation measures for Impact LT2**

Impact LT2: Loss of access to ecosystem services								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Short-term (&lt;18mnths)</i>	<i>Site/Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Influx is typically a difficult impact to manage and/or mitigate; therefore, it is only possible to mitigate the impacts caused by influx. TERRA will attempt to manage influx through the Influx Management Plan. Furthermore, it will be possible to develop a strategy as a component of the SDP to address issues related to and potentially enhanced by Project-induced influx. This strategy will be developed in order to clearly define how TERRA, in conjunction with local government and relevant stakeholders, intend to manage the impacts caused by influx where possible. More detail is included in Impacts EO2 – EO5.</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short-term (&lt;18mnths)</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low -</b>	-	<i>Low</i>
Operation								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Long-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Low</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>It will be important for TERRA to implement various management measures in order to mitigate the potential impacts resulting from the loss of access to ecosystem services..</li> <li>Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Long-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium -</b>	-	<i>Low</i>

### 7.4.3 Expectations of Economic Opportunities and Improved Living Conditions

#### Impact associated with influx and spontaneous settlement due to perceived employment opportunities and infrastructure development during construction and operational phases

Potential Impact EO1: Influx and spontaneous settlement due to perceived employment opportunities and infrastructure development

The development of a large scale agricultural project and related infrastructure, such as roads, power lines, and telecommunications, can lead to increased influx, and, in some circumstances, to spontaneous settlement, particularly in places where basic services and infrastructure are poor or absent prior to project development. Project-induced influx is usually fuelled by migrants attempting to benefit from perceived employment opportunities, improved infrastructure, and access to a range of social services.

The development of a substantial project can mean a high public profile even before project activities commence. Such speculation raises expectations of, and interest in, the potential benefits of a project (IFC, 2009). The pattern of influx reflects expectation levels. Expectations are often elevated during the construction phase, when labor demand is the highest. Influx may peak at this time. Of course, many migrants may not secure jobs – some may leave, but others may remain in hopes of future benefits. As the Project moves from construction to operations, a smaller and more skilled labor force is required, hence reducing employment opportunities, and in time dampening expectations, which may result in out-migration.

Furthermore, influx often leads to the emergence of informal settlements, which can disrupt established settlements and social networks, and which may be hazardous to households, particularly when settling near dangerous and restricted areas such as power lines or roads utilized by heavy traffic. It is anticipated that influx and opportunistic settlement will peak during the construction phase when demand for unskilled local labor is at its highest.

Influx is typically a difficult impact to manage and/or mitigate; therefore, it is only possible to mitigate the impacts caused by influx. TERRA will attempt to manage influx through the Influx Management Plan. Furthermore, it will be possible to develop a strategy as a component of the SDP to address issues related to and potentially enhanced by Project-induced influx. This strategy will be developed in order to clearly define how TERRA, in conjunction with local government and relevant stakeholders, intend to manage the impacts caused by influx where possible. More detail is included in Impacts EO2 – EO5.

TERRA will also adopt and disseminate a clear and decisive employment policy to prevent unrealistic expectations and discourage opportunity seekers from settling in the area. In order to prevent informal settlement, restricted areas and other potentially hazardous areas should be demarcated and monitored.

**Table 7-33: Impact significance rating and mitigation measures for Impact EO1**

<b>Impact EO1: Influx and spontaneous settlement due to perceived employment opportunities and infrastructure development</b>								
<b>Construction Phase</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Implement measures described in TERRA's Influx Management Plan</li> <li>• Develop a clear and concise employment and recruitment policy that prioritizes local recruitment</li> <li>• Identify and support community development programs that address challenges raised by population influx and spontaneous settlement.</li> <li>• Support local government capacity for integrated development planning</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low -</b>	-	<i>Low</i>
<b>Operations Phase</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Implement measures described in the Influx Management Plan</li> <li>• Develop a clear and concise employment and recruitment policy that prioritizes local recruitment;</li> <li>• Identify and support community development programs that address challenges raised by population influx and spontaneous settlement.</li> <li>• Support local government capacity for integrated development planning.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium -</b>	-	<i>Medium</i>

**Impact associated with increase of social pathologies due to influx and the presence of construction workers during construction and operational phases**

Potential Impact EO2: Increase of social pathologies due to influx and the presence of construction workers

A significant proportion of current in-migration into the Project area is impacted by a range of factors which are not Project-induced or related to TERRA activities. Hence, it is a cumulative impact. It is difficult to differentiate between Project-induced in-migration and other forms of in-migration that could possibly increase social pathologies in the area. Local communities could also experience an increase in social pathologies, particularly prostitution and alcohol abuse, due to the presence of construction workers. The construction camp will house approximately 200 people during the construction phase of the Project.

An influx of people who have access to relatively high disposable income coupled with the presence of construction workers may increase or at least maintain existing social pathologies, such as alcoholism, substance abuse and prostitution. The likelihood of such pathologies is, however, higher if workers are migrants removed from their families, social and cultural contexts.

This potential impact is likely to be most pronounced during the construction phase of the Project when demand for labor is at its highest and the construction camp is operational.

Although TERRA will not be directly involved in the treatment of social pathologies, it is important that the Contractor Management Plan, which defines the proper behavior of employees (including contractors), is strictly enforced. In addition, employees should be prohibited from abusing alcohol and drugs, and stringent measures should be put in place to address offenders.

These principles should be supported by the Community Health and Safety Plan (CHSP) that addresses social pathologies in neighboring communities through promoting education and awareness programs. These programs should be developed in consultation with local government health departments and relevant NGOs and community-based organizations (CBOs).

**Table 7-34: Impact significance rating and mitigation measures for Impact EO2**

<b>Impact EO2: Increase of social pathologies due to influx and the presence of construction workers</b>								
<b>Construction</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Enforce the Contractor Management Plan</li> <li>• Implement the CHSP initiatives, such as education and awareness programs that address social pathologies in neighboring communities.</li> <li>• Monitor employee and contractor compliance with company policy regarding alcohol and substance abuse</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<i>Possible</i>	<b>Low -</b>	-	<i>Low</i>
<b>Operations Phase</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Enforce the Contractor Management Plan</li> <li>• Implement the CHSP initiatives, such as education and awareness programs that addresses social pathologies in neighboring communities.</li> <li>• Monitor employee and contractor compliance with company policy regarding alcohol and substance abuse;.</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>



**Impact EO3: Increased pressure on natural resources resulting from project-related influx during construction and operational phases**

Potential Impact EO3: Increased pressure on natural resources resulting from project-related influx

In the study area, local communities rely on various direct ecosystem goods and services such as harvesting of food, fishing, and materials for fuel and construction, as well as indirect regulatory systems and supporting systems such as water supply and nutrient cycling respectively. Influx may have a wide range of negative impacts on natural resources including increased demand for water, fuel, wood, and building materials, which may affect quality of life, human wellbeing and basic survival. It is therefore essential that influx is managed to protect ecosystem services and to ensure the wellbeing of the local communities.

While influx is difficult to control, TERRA will attempt to reduce project induced influx by implementing measures detailed in the Influx Management Plan.

Furthermore, TERRA will develop an SDP and attempt to identify opportunities to enhance the availability and access to various natural resources such as water. Furthermore, where possible, TERRA will attempt to provide training and employment in an attempt to diversify the local economy and reduce the reliance on natural resources. These measures will be developed keeping in mind the cumulative impact of influx in the Project area and the potential role local government can play.

**Table 7-35: Impact significance rating and mitigation measures for Impact EO3**

Impact EO3: Increased pressure on natural resources resulting from project-related influx								
Construction								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
Before Management	Major	Short-term	Site/Local	Medium	Definite	Medium	-	Medium
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Implement the management measures detailed in the Influx Management Plan</li> <li>Develop a SDP to identify possible alternatives to current natural resources</li> </ul>								
After Management	Moderate	Short-term	Site/Local	Low	Possible	Low	-	Low
Operations Phase								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
Before Management	Major	Medium-term	Site/Local	Medium	Definite	Medium	-	Medium
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Implement the management measures detailed in the Influx Management Plan</li> <li>Implement the SDP initiatives</li> </ul>								
After Management	Moderate	Medium-term	Site/Local	Medium	Possible	Medium	-	Medium

**Impact associated with increased pressure on social services and infrastructure due to influx and opportunistic settlement during construction and operational phases**

Potential Impact EO4: Increased pressure on social services and infrastructure due to influx and opportunistic settlement

Many settlements in the Project area lack adequate healthcare and education facilities. Schools in the project area lack adequate water and sanitation facilities, teaching materials (including textbooks and desks), while many health posts do not have access to potable water, electricity or mattresses and bedding.

An influx of people into the area will increase the demand for existing services and infrastructure that are already under pressure to deliver adequate services to the local population. This impact, if not adequately managed, will exacerbate and worsen poor service delivery in the area.

It is assumed that Project-related in-migration will occur during construction and operations, although at varying degrees. During construction, the Project will require unskilled labor to assist with land clearings, etc., while during operations the Project will require larger numbers of skilled labor. It is assumed that recruitment of locals during construction will trigger in-migration into the area. Experience elsewhere in Africa suggests that this will continue into operations.

Where in-migration is attributed to project activities, TERRA will implement the measures detailed in the Influx Management Plan. These measures should, however, be implemented by TERRA and supported a range of stakeholders including local government and traditional leadership.

Where in-migration is attributed to broader economic development of the region, it is the government's responsibility to assist with managing in-migration and its social impacts (IFC, 2007). Given the government's limited capacity and resources, TERRA may be required to assist where possible.

In addition, TERRA can provide support and capacity building to service providers (i.e., public schools and clinics) through the SDP. This will however only treat the impacts of in-migration and not the causes.

**Table 7-36: Impact significance rating and mitigation measures for Impact EO4**

<b>Impact EO4: Increased pressure on social services and infrastructure due to influx and opportunistic settlement</b>								
<b>Construction</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Short-term (&lt;18mnths)</i>	<i>Site/Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Implement the management measures detailed in the Influx Management Plan</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short-term (&lt;18mnths)</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low -</b>	-	<i>Low</i>
<b>Operations Phase</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Implement the management measures detailed in the Influx Management Plan</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Low -</b>	-	<i>Medium</i>

**Impact associated with increased prevalence and spread of communicable diseases due to Project related influx and the presence of construction workers during construction phase**

Potential Impact EO5: Increased prevalence and spread of communicable diseases due to Project related influx and the presence of construction workers

The project can contribute to the spread of communicable diseases, among other things through the in-migration of men into the Project area who may “mix” with the local population. Furthermore, the temporary construction camp could lead to an increase in the spread of communicable diseases.

HIV/AIDS, Sexually Transmitted Infections (STIs) and Tuberculosis (TB) could become significant public healthcare challenges in the immediate Project area. STIs, if present and untreated, can greatly increase the risk of HIV transmission. In the Project area, healthcare services have limited capacity to manage the increasing cases of these communicable diseases.

The origin of the workforce is important as diseases may be introduced into communities. Higher TB prevalence and potentially drug-resistant TB strains are more common in employees from other locations. Pandemic influenza is another consideration, with movement of people on a global basis in and out of area.

TERRA will attempt to minimise project induced in migration into the area by implementing measures detailed in the Influx Management Plan. TERRA will also implement and enforce the Contractor Management Plan in an attempt to minimize interaction between foreign construction workers and local communities.

TERRA, through the CHSP, will also adopt management measures in order to mitigate the potential exposure of local communities to communicable disease. This will potentially include:

- Working with the local government and implementing partners to support an integrated HIV and TB prevention and management program that considers the workplace and local communities;
- Support intensive information, education and communication (IEC) campaigns in partnership with local community partners; and
- Support capacity building for the local government, NGO and community partners who would provide HIV and TB prevention, diagnosis and treatment services.

**Table 7-37: Impact significance rating and mitigation measures for Impact EO5**

<b>Impact EO5: Increased prevalence and spread of communicable diseases due to Project related influx and the presence of construction workers</b>								
<b>Construction</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Major</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• Implement measures in the Influx Management Plan to reduce project induced influx</li> <li>• Implement and enforce the Contractor Management Plan</li> <li>• Adopt measures as detailed in the CHSP to promote community health initiatives</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>

## 7.4.4 Employment and Associated Benefits

### Impact associated with generation of employment during construction and operational phases

#### Potential Impact EB1: Generation of employment

Employment provides many socio-economic benefits to employees and their dependents, including:

- Improved material wealth and standard of living;
- Enhanced potential to invest in and improve access to social services such as education, health services, etc.; and
- Employment and training of unskilled workers facilitates skills development and improves the future employment prospects of such workers.
- Secure wage employment can also contribute towards a sense of independence, freedom, and pride, and it may promote a good work ethic.
- TERRA will create various types of employment:
- **Direct employment for the workforce:** The project will require positions involving low to medium-skilled activities as well as those with specialized tasks. TERRA will prioritize local employment based on competency and job availability in line with the Employment Capacity Plan. If certain technical skill sets are unavailable locally, workers will be recruited from outside areas. The table below provides an overview of the proposed employment requirements.

**Table 7-38: Proposed employment numbers**

Type of employment	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Expats	14	16	23	27	37	40	48	48
National employment	38	42	59	84	117	129	143	143
Contract labour	200	250	400	500	600	700	800	800

- **Indirect employment at the supplier companies:** Much of the farming equipment is likely to be sourced abroad. Local companies will possibly perform services such as land clearing, road construction, transportation and catering. The extent of indirect employment and income that will be created through the outsourcing of services to local contractors is difficult to determine at this stage but has the potential to be significant, and will receive priority attention.
- **Induced employment:** The income created through direct and indirect employment will create down-stream income if the money is used to buy goods and services at a local level (i.e., the multiplier effect). Many of the employees and suppliers, and hence beneficiaries of income generated, are locally based and not highly mobile, and a significant portion of their income is thus likely to be spent at a local level. However, the limited number of existing businesses and thus spending opportunities in the study area will restrain the induced employment and income generation, as will the fact that a portion of the income might be used to support relatives in other areas. On the other hand, the increase in demand for goods and services locally will also induce new businesses to open.

The following mitigation measures, in line with the Employment and Capacity Plan, can further enhance the benefits of local employment generation, especially at a direct and indirect level:

- Employ local workers if qualified applicants with the appropriate skills are available. Formalize this policy in company HR guidelines and contractors' agreements.

- Purchase goods and services at a local level, if available. Formalize this policy in company purchasing guidelines and contractors’ agreements.
- Work closely with the community before and during the Project to identify and communicate required skills and resources that the local community could provide. This will take place in meetings with focus groups and/or representatives within the communities, and will commence before construction of the Project is initiated.
- Implement labor-intensive rather than capital-intensive work methods wherever possible and feasible.

**Table 7-39: Impact significance rating and mitigation measures for Impact EB1**

<b>Impact EB1: Generation of Employment</b>								
<b>Construction</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low +</b>	+	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• Implement the measures detailed in the Employment and Capacity Plan prioritizing local employment and training</li> <li>• Formalize this policy in company HR guidelines and contractors’ agreements</li> </ul>								
<b>After Management</b>	<i>Major</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium +</b>	+	<i>Medium</i>
<b>Operations</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium +</b>	+	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• Implement the measures detailed in the Employment and Capacity Plan prioritizing local employment and training</li> </ul>								
<b>After Management</b>	<i>Major</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium +</b>	+	<i>Medium</i>

## 7.4.5 Social Investment Opportunities

### Impact associated with improved infrastructure in the study area due to social investment activities during construction and operational phase

Potential Impact SI1: Improved infrastructure in the study area due to social investment activities

It is anticipated that the majority of TERRA's social investment budget will be targeted at improving infrastructure in the Project area. This may include improved water delivery and quality as well as improved education and health infrastructure. Currently, social services in the Project area are severely under resourced and infrastructure is in a state of disrepair.

It is assumed that social investments will commence on a small scale during the construction phase of the Project and will be fully initiated during the operations phase.

TERRA will develop a SDP that outlines service delivery and infrastructure development support initiatives. These initiatives should be developed in consultation with local government, local communities, NGOs and CBOs so as not to create paternalistic dependence on TERRA.

Where possible, TERRA should look to partner with local government and improve the quality and sustainability of existing services and infrastructure.

**Table 7-40: Impact significance rating and mitigation measures for Impact SI1**

Impact SI1: Improved infrastructure in the study area due to social investment activities								
<b>Construction</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Minor</i>	<i>Short-term (&lt;18mnths)</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low +</b>	+	<i>Low</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>Implement management and enhancement measures as per the SDP (to be developed)</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term (&lt;18mnths)</i>	<i>Site/Local</i>	<b>Low</b>	<b>Definite</b>	<b>Medium +</b>	+	<i>Medium</i>
<b>Operations</b>								
	<b>Magnitude</b>	<b>Duration</b>	<b>Scale</b>	<b>Consequence</b>	<b>Probability</b>	<b>SIGNIFICANCE</b>	<b>+ /-</b>	<b>Confidence</b>
<b>Before Management</b>	<i>Minor</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low +</b>	+	<i>Low</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>Implement management and enhancement measures as per the SDP (to be developed)</li> </ul>								
<b>After Management</b>	<i>Major</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Definite</b>	<b>Medium +</b>	+	<i>Medium</i>

### 7.4.6 Operational Activities

#### Impact associated with potential disturbance of cultural heritage sites and graves during construction phase

Potential Impact OA1: Potential disturbance of cultural heritage sites and graves

Currently no areas of cultural significance or graves have been identified in the concession area. However, during operational activities, particularly land clearing activities, there is a possibility that new, unrecorded; areas will be discovered and/or disturbed.

The disturbance of cultural heritage sites and graves is a serious issue and often perceived by local communities as a lack of respect and appreciation of cultural values and tradition.

TERRA will implement the measures detailed in the Cultural Heritage Management Plan and Chance Find Procedure. Some of the key points include the following:

- The project infrastructure shall be aligned to avoid any known grave sites and sites which otherwise has cultural significance.
- All Contractors shall take note of the cultural heritage sites determined and take measures to ensure that these areas are not disturbed by the construction or site clearing teams.
- Contractors shall make provision for accidental discovery of archaeological sites and graves within the construction area.
- TERRA will avoid the removal of cultural heritage sites and graves where possible.
- The chance find procedure will be adopted should unidentified graves or cultural heritage sites be discovered.

**Table 7-41: Impact significance rating and mitigation measures for Impact OA1**

Impact OA1: Potential disturbance of cultural heritage sites and graves								
Construction								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium -</b>	-	<i>medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>• Implement measures in the Cultural Heritage Management Plan and Chance Find Procedure</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<b>Possible</b>	<b>Low</b>	-	<i>Low</i>



**Impact associated with pollution of surface and groundwater due to operational activities**

Potential Impact OA2: Pollution of surface and groundwater due to operational activities

The hydrology system of the concession is predominantly characterized by the Lubanda Lake and its associated wetland areas. Three main rivers cross through the project area; the Kafira River, the Kabemba River and the Kalemba River. These rivers, as well as Lubanda Lake, are used as a source of potable water to the surrounding villages. Other sources of water used in the project area include hand-dug wells and boreholes provide by TERRA.

Although these water sources are already degraded, TERRA’s operational activities, including land clearing and the use of fertilizers and pesticides, have the potential to cause further pollution, siltation and degradation of these water sources if not correctly managed.

TERRA will develop and initiate management and mitigation measures as detailed in the Water Management Programme (WMP). This includes proper transport, handling, use and storage of potentially hazardous materials such as fertilizers and pesticides as well as measures to prevent erosion and run off into existing surface water.

TERRA will also be required to implement a water monitoring and reporting regime as detailed in the WMP.

**Table 7-42: Impact significance rating and mitigation measures for Impact OA2**

Impact OA2: Pollution of surface and groundwater due to operational activities								
Construction								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>Develop and initiate management and mitigation measures as detailed in the Water Management Programme (WMP)</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>
Operations								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Major</i>	<i>Long-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>High -</b>	-	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>Develop and initiate management and mitigation measures as detailed in the Water Management Programme (WMP)</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Possible</i>	<b>Medium</b>	-	<i>Medium</i>

### Impact associated with increased road safety risks due to increased traffic during construction phase

Potential Impact OA3: Increased road safety risks due to increased traffic

It is not anticipated that the Project will significantly increase traffic volumes in the Project area, however, it is anticipated that a small increase will occur. Furthermore, construction vehicles and large trucks will be used during both the construction and operations phase.

Community members particularly at risk are those walking and cycling on the main routes through the area. Children walking to and from school will also be at risk.

TERRA will implement the management measures of Traffic Safety section of the CHSP.

**Table 7-43: Impact significance rating and mitigation measures for Impact OA3**

Impact OA3: Increased road safety risks due to increased traffic								
Construction								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Medium -</b>	-	<i>Medium</i>
<b>Management Measures:</b> <ul style="list-style-type: none"> <li>Implement the management measures of Traffic Safety section of the CHSP</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Medium</b>	<b>Possible</b>	<b>Low</b>	-	<i>Medium</i>

### 7.4.7 FarmRevenue & Import Substitution

#### Impact associated with increased direct revenue to national government

Potential Impact MR1: Reduced import reliance and increased direct revenue to national government

The government is expected to derive revenue from the operation through various forms of taxes and duties that are applicable to companies, including import duty, corporate tax, exports of agricultural products and value added tax.

A portion of this revenue to government should filter back into the local governance structures which in turn should be utilized for social development:

- The project is expected to produce approximately 76,000 tons of maize by 2018/19. This maize will be sold to AMCC and is expected to provide approximately 80% of the milling facilities needs. AMCC will supply maize flour to the local population. The locally produced maize is expected to help address the large maize flour deficits in the province and reduce the reliance on imports.

Government income is determined by tax regimes and world market prices for commodities. As such, no mitigation measures are recommended for this impact.

**Table 7-44: Impact significance rating and mitigation measures for Impact MR1**

Impact MR1: Increased direct revenue to national government								
Construction								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Minor</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<i>Possible</i>	<b>Low +</b>	+	<i>Low</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• None</li> </ul>								
<b>After Management</b>	<i>Minor</i>	<i>Short-term</i>	<i>Site/Local</i>	<b>Low</b>	<i>Possible</i>	<b>Low +</b>	+	<i>Low</i>
Operations								
	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+ /-	Confidence
<b>Before Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Definite</i>	<b>Medium +</b>	+	<i>Medium</i>
<b>Management Measures:</b>								
<ul style="list-style-type: none"> <li>• None</li> </ul>								
<b>After Management</b>	<i>Moderate</i>	<i>Medium-term</i>	<i>Site/Local</i>	<b>Medium</b>	<i>Definite</i>	<b>Medium +</b>	+	<i>Medium</i>

## 8 Environmental and Social Management Plan

### 8.1 Introduction

The purpose of the ESMP is to ensure that social and environmental impacts, risks and liabilities identified during the ESIA process are effectively managed throughout all phases of the project. The ESMP specifies the mitigation and management measures to which TERRA is committed, and shows how the Project will mobilise organizational capacity and resources to implement these measures. The ESMP also shows how mitigation and management measures will be scheduled.

The key objectives of the ESMP are to:

- Formalize and disclose the programme for environmental and social management; and
- Provide a framework for the implementation of environmental and social management initiatives.

Good practice principles require that every reasonable effort be made to reduce and preferably to prevent negative impacts, while enhancing positive benefits, especially within the communities most directly affected by the proposed project. These principles are guiding the ESIA process.

The ESMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of:

- Development and site clearing; and
- Operation.

It is necessary to note that the ESMP is a living document that will be periodically reviewed and updated. It will also be necessary to update this version in the Comprehensive ESIA and ESMP. The ESMP should be read in conjunction with the assumptions, limitations and exclusions noted in Section 3 of the ESIA and ESMP. The Comprehensive ESIA and ESMP will align and incorporate EMPP commitments as required.

As part of ongoing implementation, this ESMP will be publicly disclosed during the stakeholder engagement process. An opportunity will be offered to participating stakeholders to provide comment.

Figure 8-1 below illustrates the principle of continual improvement in development of a policy framework, environmental and social management planning, which are implemented through a number of plans, programmes and operating procedures using the company's governance structure. Implementation is monitored on a regular basis to determine environmental and social performance and conformance and corrective action is taken where necessary. Management review is undertaken on an ongoing basis to determine whether the system reflects the requirements and commitments of the company. These combined elements comprise the ESMS.



Figure 8-1: Key elements of an ESMS

## 8.2 ESMS Framework

This section outlines the sustainability structure that would ideally support the implementation of the ESMP.

### 8.2.1 Responsibility and accountability

#### TERRA Organisationl Structure

The following organogram provides a high level overview of TERRA.

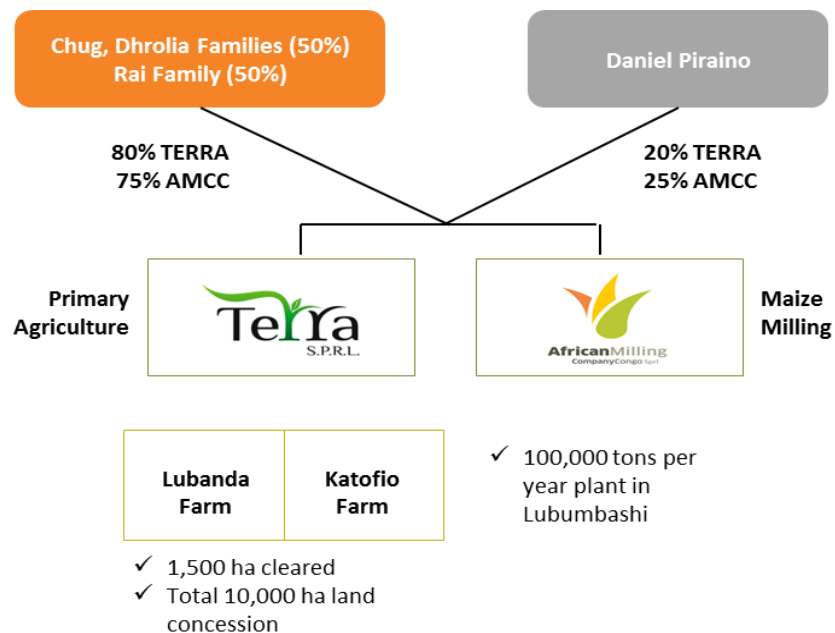


Figure 8-2: High level TERRA shareholding structure

## **Recommendations for roleplayers in ESMP implementation**

### **TERRA / developer / owner should:**

- Ensure that the ESMP is intergrated into the company's ESMS;
- Implement the ESMS including the ESMP in accordance with DRC legal requirements and international standards (e.g. Equator Principles, IFC Performance Standards, and World Bank Group EHS Guidelines);
- Ensure the Contractors (e.g. security provision, transport) implement the ESMP, and undertakes its work to meet DRC legal requirements, and the requirements of international standards;
- Meet the requirements of lenders as specified in covenant documentation;
- Report to stakeholders on performance on a regular basis; and
- Undertake capacity building with project stakeholders including government on environmental and social issues including rights and responsibilities.

### **Contractors and sub-contractors should:**

- Implement the ESMP in accordance with DRC legal requirements and international standards (e.g. Equator Principles, IFC Performance Standards, and World Bank Group EHS Guidelines); and
- Ensure adequate training of staff in environmental and social management.

### **The TERRA head office should:**

- Monitor TERRA ESMS implementation and risk management; and
- Provide appropriately qualified technical resources to support TERRA in environmental and social management.

### **Shareholders should:**

- Monitor TERRA performance in relation to its covenants within loan agreements, legal requirements and GIIP; and
- Monitor TERRA liabilities.

### **Communities should:**

- Monitor implementation of the ESMP by TERRA;
- Actively participate in stakeholder forums including any development foundations; and
- Make use of the TERRA grievance mechanism to communicate issues with the company.

### **Government and Ministry of Environment, should:**

- Monitor legal compliance;
- Monitor the ESMP implementation and review performance reporting;
- Ensure transparent and efficient decision making on permit applications; and
- Sanction poor performance and non-compliance where appropriate through directives (penalties and fines).

## **Recommendations on responsibility and accountability**

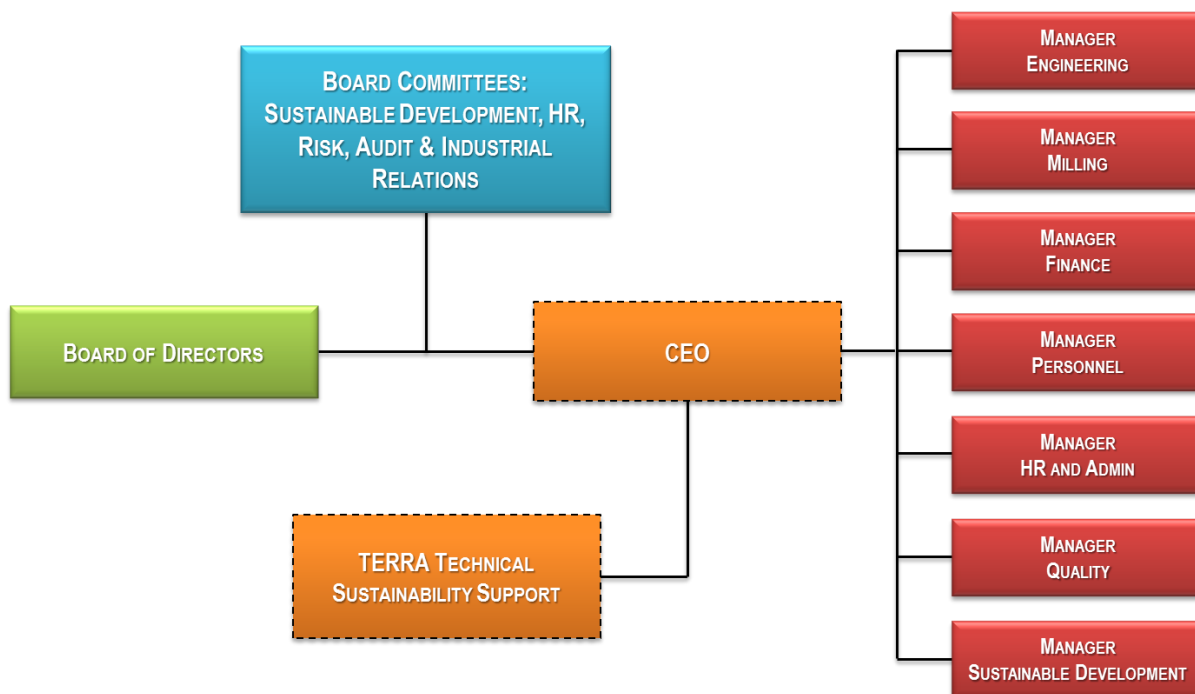
The sections immediately below provide recommendations for alignment of TERRA organisational structures to facilitate the mainstreaming of sustainability implementation. It should be noted that the

orgnaograms presented below provide a preffered scenario and organisational strucutre. Where possible TERRA should attempt to create key positons where they do not already exist and/or train existing staff to allow them to carry out the roles and responsibilities presented below.

**General management**

Figure 8-3 shows the ideal organisational structure for management. The key positions involved in sustainability management (environment, health and safety, community, labour)<sup>9</sup> are outlined in black dashes. Direct and indirect reporting lines are shown as solid and dashed blue lines respectively.

It is clear that numerous staff members will have defined responsibilities for managing sustainability issues; however ultimately it is the CEO that is responsible for implementation. The Board and specifically the Board Committees are accountable to stakeholders for sustainability performance. The manager Sustainable Development is responsible for implementing the policy and strategy, and reports primarily to the CEO, and indirectly to the General Manager, and the Board Committees specified in the organogram below.

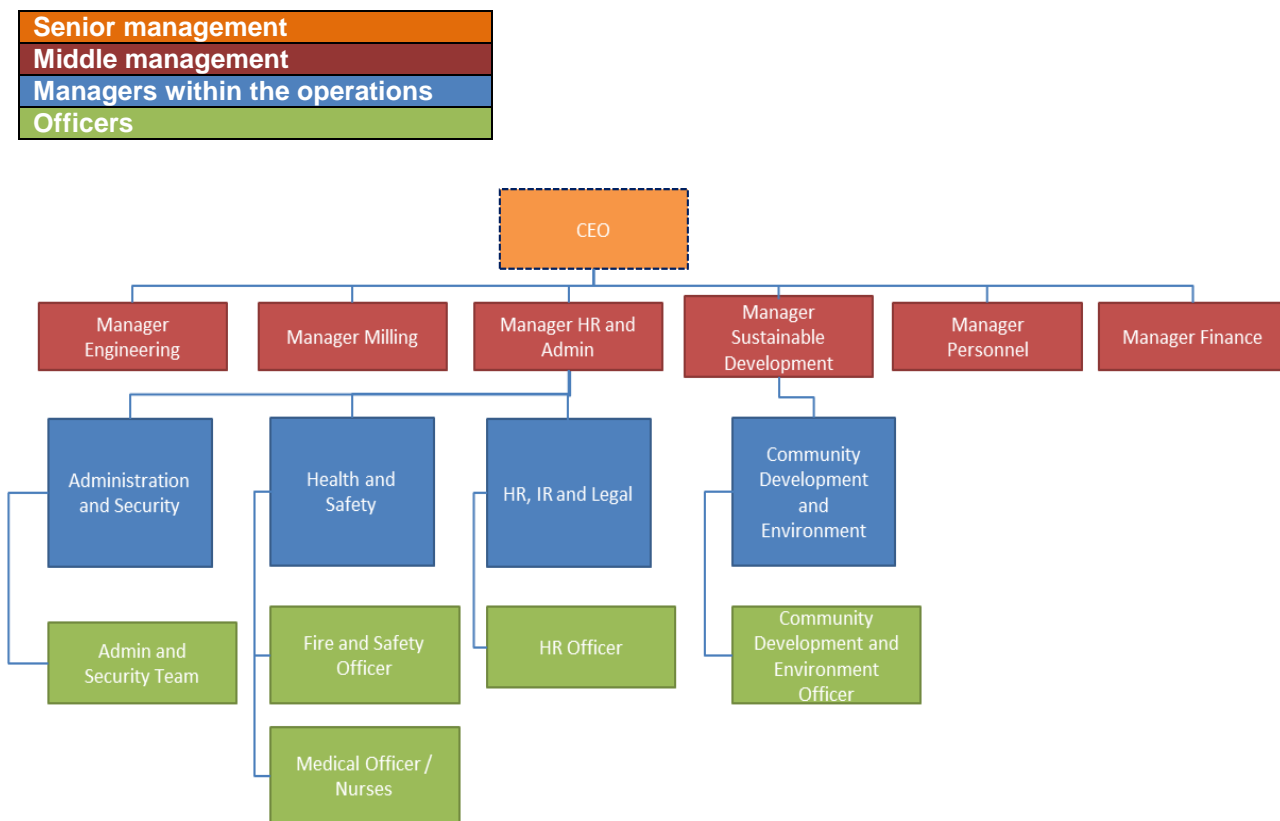


**Figure 8-3: Proposed organizational structure for TERRA management**

<sup>9</sup> Note that as ‘sustainability’ is a cross-functional issue that does not reside only with one person and that it should be integrated into the governance and decision making processes of the organisation, the position is referred to as “Sustainable Development” Manager. This encompasses the environment, communities and stakeholder engagement, health and safety, and the related provisions of labour (such as human rights, equal opportunity, child labour, skills development) etc. Refer to the table on responsibilities and accountabilities for further details on this.

**Structure for operations**

Figure 8-4 shows the proposed organizational structure during operations, showing the reporting lines of staff to be involved in sustainability management (environment, health and safety, community, labour).



**Figure 8-4: Proposed organisational structure of staff involved in sustainability management**  
**Responsibilities and reporting lines of key staff members and governance bodies**

This section was compiled by SRK with reference to various guidelines and documents, including:

- International frameworks and standards including the:
  - ISO 26000 guideline on Social Responsibility;
  - ISO 14001 standard on Environmental Management Systems;
  - Draft Framework for Integrated Reporting;
  - Global Reporting Initiative’s G4 Guidelines for Sustainability reporting; and
  - International Finance Corporation’s Performance Standards on Environmental and Social Sustainability.

Responsibility for sustainability management in particular the implementation of the management system will fall under the responsibilities of numerous levels and functions in the organisation. It should be noted that TERRA will have management control and reporting will be consolidated into the TERRA annual report. It is not envisaged that TERRA will have a separate annual reporting structure. The legal function will be outsourced, with reporting taking place to the Financial Manager.

Accountabilities, reporting lines and responsibilities of key roles and governance bodies are indicated in Table 8-1 below.



**Table 8-1: Responsibilities and reporting lines**

Function/ Position/ Structure	Accountable to / reporting line	Responsibilities
<b>Board (TERRA)</b>		
Chairman	Stakeholders	<ul style="list-style-type: none"> <li>Has ultimate accountability for sustainability performance at TERRA</li> <li>Ensures that sustainability is integrated into company strategy, governance and decision-making</li> </ul>
Board Committee on Sustainable Development, Risk and compliance.	Chairman Stakeholders	<ul style="list-style-type: none"> <li>Approve policy and strategy related to sustainability</li> <li>Provides oversight of sustainability management</li> <li>Ensure the company takes a stakeholder approach to governance and decision making</li> <li>Oversee the production and disclosure of a public annual report on sustainability performance to stakeholders[1]</li> <li>Ensure that the company's risk strategy, policy and management incorporates sustainability issues, both positive and negative</li> </ul>
Board Committee on Audit	Chairman Stakeholders	<ul style="list-style-type: none"> <li>Oversee the company's risk strategy and management</li> <li>Recommend an external assurance provider for the disclosure of performance on material sustainability issues</li> <li>Review the public disclosure of sustainability issues in the annual/sustainability report and public disclosures to ensure that it is reliable and does not conflict with the financial information.</li> </ul>
<b>Senior Management</b>		
CEO	Managing Director	<ul style="list-style-type: none"> <li>Ensure sustainability is integrated into company management and decision-making processes such as management meetings and reporting, and risk management</li> <li>Ensure sustainability is integrated into numerous operational functions such as operation of the mill and project site, human resources, supply chain (including security), sustainable development, finance and legal.</li> <li>Allocate adequate human and financial resources to enable effective functioning and continual improvement of the Sustainability Management System</li> <li>Establish and maintain a governance system to monitor performance of the Sustainable Development team</li> <li>Attend stakeholder forums such as community meetings, as appropriate, to demonstrate senior management support</li> </ul>

<sup>[1]</sup> Using international guidelines such as the Integrated Reporting Committee's Draft Framework on Integrated Reporting and Global Reporting Initiative's G4 guidelines on sustainability reporting.

Function/ Position/ Structure	Accountable to / reporting line	Responsibilities
Head Engineering  Head Miller  Project Manager - Farm	CEO	<ul style="list-style-type: none"> <li>• Implement the sustainability management system in the project site operations, which will include the environmental and social management plan and action plan, and other components.</li> <li>• Hold the managers and their teams in the plant and project site responsible for sustainability performance, notably the Administration Manager, Risk manager, Human resource Manager and Security Manager, the Human Resources and Industrial Relations Manager, and the Environmental and Sustainability team.</li> <li>• Ensure sustainability is integrated into plant and project site management and decision-making processes such as management meetings and reporting, and risk management</li> <li>• Attend stakeholder forums such as community meetings, as appropriate, to demonstrate senior management support</li> </ul>
Financial Manager	CEO	<ul style="list-style-type: none"> <li>• Incorporate financial resources related to the implementation of the sustainability management system (e.g. salaries, skills development and training, equipment, liabilities, social development initiatives, independent audit/assurance etc.) into company financial systems</li> </ul>
<b>Management</b>		
Sustainable Development Manager	Directly: Head Engineering  Indirectly: Country Manager	<ul style="list-style-type: none"> <li>• Develop and implement an Environmental and Social Management System that adheres to national and international standards.</li> <li>• Manage the support team of environmental, health and safety, and community coordinators to implement the ESMS.</li> <li>• Prepare monitoring reports for submission to the General Manager and to stakeholders.</li> <li>• Ensuring integration of environmental and social functions throughout the operation.</li> </ul>
Legal advice (outsourced)	Financial Manager	<ul style="list-style-type: none"> <li>• Ensure that assessment of compliance with National Law and International standards, frameworks and codes of practice takes place regularly</li> </ul>
Procurement	Administration Manager	<ul style="list-style-type: none"> <li>• Integrate ethical, social, environmental and gender equality criteria, and health and safety, in purchasing, distribution and contracting policies and practices. In particular assess human rights issues, including child and forced labour, in supplier selection and management.</li> <li>• Development and implementation of a supplier and contractor code of practice for sustainability management, in liaison with the Human Resources and Sustainable Development Managers.</li> <li>• Carry out appropriate due diligence and monitoring of suppliers to ensure compliance or movement towards compliance with company policies and plans.</li> <li>• Work with suppliers to improve sustainability performance through awareness raising and capacity building</li> </ul>

Function/ Position/ Structure	Accountable to / reporting line	Responsibilities
Human Resources Manager	CEO	<ul style="list-style-type: none"> <li>• Implement workplace policies, procedures, and management plans, notably recruitment, severance arrangements, skills development, training and awareness and retrenchment.</li> <li>• Ensure that policies and procedures incorporate the provisions of national labour law and international standards such as those of the International Labour Organisation, ISO26000, IFC Performance Standard 2 on Labour and Working Conditions, and the World Bank Group Environmental, Health and Safety Guidelines.</li> <li>• Implementation of the policies will cover direct, contracted and supply chain workers, and will include provisions covering human rights, non-discrimination, fair remuneration, equal opportunity, vulnerable people, skills development, grievance management, health and safety, forced and child labour, and the right to collective bargaining.</li> <li>• Implement a transparent and non-discriminatory grievance procedure to manage workplace concerns</li> </ul>
<b>Sustainable Development Department/Team</b>		
Environmental Officer/s	Environmental and Sustainability Manager	<ul style="list-style-type: none"> <li>• Implement environmental policies, procedures, and management plans.</li> <li>• Review and analysis of monitoring results and preparation of reports to management and stakeholders.</li> <li>• Planning of and carrying out environmental training programs for employees and contractors.</li> <li>• Obtaining and maintaining all necessary environmental permits in liaison with the Legal service.</li> <li>• Management of the environmental related components of the grievance mechanism.</li> <li>• Inspections/audits of environmental protection requirements by employees and sub-contractors.</li> <li>• Sampling and data capture in accordance with the environmental monitoring program and analysis of results.</li> <li>• Assistance with the preparation of environmental monitoring reporting and permit applications.</li> </ul>
Health and Safety Officers	Environmental and Sustainability Manager	<ul style="list-style-type: none"> <li>• Implementation of health and safety policies, procedures, and management plans, notably the workplace health and safety plan.</li> <li>• Review and analysis of monitoring results and preparation of reports to management and stakeholders.</li> <li>• Planning of and carrying out safety training programs for employees and contractors.</li> <li>• Obtaining and maintaining all necessary safety permits.</li> <li>• Management of the safety related components of the grievance mechanism.</li> <li>• Inspections/audits of safety requirements by employees and sub-contractors.</li> <li>• Sampling and data capture in accordance with Safety monitoring program and analysis of results.</li> <li>• Assistance with the preparation of reporting and permit applications.</li> </ul>

Function/ Position/ Structure	Accountable to / reporting line	Responsibilities
Community Development Officer	Sustainable Development Manager	<ul style="list-style-type: none"> <li>• Implementation of social policies, procedures, and management plans, notably the Stakeholder Engagement Plan, the social components of the ESMP and the SDP.</li> <li>• Planning of and carrying out social and stakeholder engagement training programs for employees and contractors.</li> <li>• Developing and maintaining relationships with local community stakeholders, and in particular coordinate the Stakeholder and Community Forum in collaboration with stakeholders.</li> <li>• Establishment and overall management of the grievance mechanism in conjunction with the environmental, and health and safety coordinators, and in liaison with the Human Resources Manager.</li> <li>• Assistance with stakeholder engagement and building relationships with local community stakeholders.</li> <li>• Act as the primary points of contact between communities and TERRA.</li> <li>• Implementation of the social management system including social management plans.</li> </ul>
<b>Contractors/ Suppliers</b>		
All contractors	Directly: Project Managers : Plant and Farm Indirectly: Environmental and Sustainability Manager, Site administrator	<ul style="list-style-type: none"> <li>• Implement the ESMP and ensure adherence to the DRC legal requirements, and international standards (Equator Principles, IFC Performance Standards, EHS Guidelines)</li> <li>• Ensure staff members are regularly trained and awareness is built relating to environmental and social management</li> </ul>

### 8.3 Structure of the ESMP

As part of the Framework ESIA, SRK has developed an ESMP which is includes by a series of conceptual environmental and social management thematic plans. These currently focus primarily on the construction and operations phases and will need to be expanded in the Comprehensive ESIA and ESMP. The list of thematic plans developed to date is as follows:

- Preliminary Environmental Awareness Plan (to be developed further by TERRA);
- Construction and Site Clearing Control Plan;
- Community Health and Safety Plan (CHSP);
- Emergency Preparedness and Response Plan (EPRP);
- Cultural Heritage Management Plan and Chance Find Procedure;
- Influx Management Plan;
- Contractor Management Plan;
- Employment and Capacity Plan;
- Water Management Programme.

**Stand-alone plans that have been developed include the following:**

Stakeholder Engagement Plan (SEP), incorporating the stakeholder grievance mechanism. During the update of the ESMP, additional plans will be integrated within the farm area, if necessary, covering air quality, resource efficiency, biodiversity, labour and human resources, as well as occupational health and safety.

### 8.4 Impact Mitigation and Management

Table 8-2 and Table-8-3 below summarise the proposed mitigation and management measures for the impacts identified in the ESIA through the specialist work undertaken to date. Cumulative impacts are identified in Section 7 and will need to be expanded on in the Comprehensive ESIA and ESMP

The tables are organised by project phase for the project covering construction and operation and are clustered according to environmental/social aspect and impacts. These tables represent the recommendations arising from the specialist studies undertaken to date

**Table 8-2: Construction Phase: TERRA Management Measures (Duration – Mid 2014 – Mid 2015)**

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
<b>Activity: Construction</b>					
Environmental and social awareness and training	EA1: Non-compliance with the ESMP and project site standards.	To ensure compliance with and implementation of the ESMP	<ul style="list-style-type: none"> <li>Appointment of a suitably qualified individual to oversee implementation of the ESMP during all phases of the project.</li> <li>Appointment of a suitably qualified Health, Safety and Environment (HSE) office bearer to undertake audits on a regular basis.</li> </ul>	Audit / incident reports.	TERRA
		To ensure that all staff, contractors and sub-contractors are aware of and understand the requirements of the ESMP and environmental issues in relation to their individual areas of work	<ul style="list-style-type: none"> <li>An induction and training program as per the existing TERRA induction programme covering the ESMP, environmental awareness, dealing with environmental incidents and waste management.</li> <li>All staff commissioned during pre-construction and construction, including sub-contractors, will be advised of ESMP requirements through the induction program as well as on notice boards at the contractors camps during construction and notice boards during operation. These notice boards should cover the ESMP, environmental and social awareness, dealing with emergencies and waste management.</li> <li>Specific training in safety for those individuals working in high risk environments.</li> </ul>	Staff are able to respond correctly onsite to environmental and social aspects of their work.	TERRA
		To be able to manage all environmental incidents and emergencies relating to all activities in accordance with the ESMP and to identify root causes of incidents and to implement prevention plans	<ul style="list-style-type: none"> <li>Existing Environmental Emergency preparedness procedure and the non-conformance and corrective action procedure will be updated for the current projects for implementation in emergency situations such as Oil or fuel leaks and spills, fires, sewage spillage, and damage to community property</li> <li>The Emergency preparedness procedure includes requirements to contact the Environmental Coordinator following an emergency or incident.</li> </ul>	A coherent, immediate response to all emergencies	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
<b>Biophysical</b>					
Soils, land capability and land use	SL1: Placement of project infrastructure, resulting in a temporary loss of soil resource, and change in soil characteristics, land capability and land use	Limit the impact on the soils to the immediate footprint of the project activities and limit the duration to the life of the project.  Rehabilitate and conserve soil and land where possible.	<ul style="list-style-type: none"> <li>• Minimize the disturbed footprint as far as practically possible.</li> <li>• Implement compensation measures in areas where livelihood are impacted by the loss of agricultural lands.</li> <li>• The proposed TERRA project focuses on the construction and operational phases only. Therefore the site clearing and earthwork activities will also be carried out phase by phase in order to reduce soil erosion.</li> <li>• Leguminous cover crops also assist soil conservation and moisture retention by: <ul style="list-style-type: none"> <li>○ Intercepting of rainfall (absorbing the energy of the raindrops, thus reducing runoff)</li> <li>○ Retarding erosion by decreasing surface velocity</li> <li>○ Restraining soil movement</li> <li>○ Improvement of soil porosity</li> <li>○ Increasing biological activity in the soil</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	SL2: Site clearance resulting in a permanent loss resource, and potential in soil characteristics, land capability and land use as a result of increased erosion	Manage the project activities to limit the extent of erosion on the surrounding landscape	<ul style="list-style-type: none"> <li>• Minimize the disturbed footprint as far as practically possible.</li> <li>• Minimize the area of disturbance.</li> <li>• Implement storm water control measures to reduce water velocity should mitigate erosion. These controls could include: <ul style="list-style-type: none"> <li>• Berms, bunds, sediment control structures and diversions around the farming land facility and roads.</li> <li>• Where non-contact water diversions discharge to the environment, energy dissipaters such as gabions, established vegetation etc. should be included in the design;</li> <li>• Where needed, minimize exposed soil; and</li> <li>• Erosion can also be limited by ensuring that mobile vehicles and human movement is limited to dedicated</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>access ways, with off road travel authorized when required for critical farming operations.</p> <ul style="list-style-type: none"> <li>Implement livelihood restoration and compensation measures in areas where livelihood are impacted by the loss of agricultural lands.</li> <li>Implement appropriate topsoil stockpile management.</li> </ul>		
	<p>SL3: Spillage of agrochemicals, hydrocarbons and seepage from waste resulting in permanent loss of soil resource, and change in soil characteristics, land capability and land use</p>	<p>The minimisation of the accidental release or spill of contamination onto soils</p>	<ul style="list-style-type: none"> <li>Establishment of facilities for the safe storage of agrochemicals and hydrocarbons</li> <li>The preparation of procedures to ensure that spillage during mobile equipment maintenance is minimized.</li> <li>The provision of appropriate secondary containment in areas where hydrocarbons, solvents and other potentially hazardous materials are stored.</li> <li>Implement emergency preparedness and response measures plan</li> </ul>	<p>Compliance with GIIP standards and guidelines as appropriate</p>	<p>TERRA</p>
<p>Biodiversity</p>	<p>B1: Loss of habitats of diverse species of flora and fauna due to site clearing and earthmoving activities</p>	<p>To rehabilitate disturbed areas</p>	<ul style="list-style-type: none"> <li>Site clearing to be conducted sequentially, not all at once</li> <li>All cleared or degraded areas of miombo that do not form part of TERRA's operations must be rehabilitated to a stable ecological state.</li> <li>A Biodiversity Action Plan to be developed to inform TERRA protection and management of biodiversity in the entire concession, taking cognisance of ecosystem services currently utilised by the local communities.</li> <li>Ensure through assessment that its concession contains no environmental and social values, such as unique biodiversity, watershed protection, soil stabilization or archaeological site. This will provide rational basis for use and protection of biodiversity.</li> <li>The development of this area is phased out over 8 years (for 10,000ha). TERRA should plan its development every year over a large period of time. By clearing smaller blocks, it will minimize the impact on the fauna as they</li> </ul>	<p>Compliance with GIIP standards and guidelines as appropriate Performance Standards (PS6), as well as industry-specific guidelines</p>	<p>TERRA</p>



Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>will have time to more. The phasing out of the farming development will also help identify and control impacts such as a low biomass to manage.</p> <ul style="list-style-type: none"> <li>• There is loss of villagers farms, the compensation have done.</li> <li>• Loss of Non-Timber Forrest Product (NTPs) (masuku, fingo, and many other species) can be resolved by leaving some bush area. This bush can act as a buffer zone and can be used as a shelter for the animals that are going to be used for pest control.</li> </ul>		
	<p>B2: Loss of aquatic habitat due site clearing, earthmoving and agrochemicals usage activities</p>	<p>To minimise impacts on aquatic habitats</p>	<ul style="list-style-type: none"> <li>• No spoiling of material to take place to the west of the existing (most western) road to the proposed spoil site, to avoid impacts to the extensive swamp and Swamp forest system west of the road;</li> <li>• A stormwater management plan must be developed for both the construction and operational phases of the project, with particular attention paid to minimising increased sedimentation of the rivers and lake;</li> <li>• A Biodiversity Action Plan to be developed to inform TERRA's protection and management of biodiversity in the entire concession, taking cognisance of ecosystem services currently utilised by the local communities.</li> </ul>	<p>Compliance with GIIP standards and guidelines as appropriate Performance Standards (PS 6), as well as industry-specific guidelines</p>	<p>TERRA</p>
	<p>B3: Fragmentation of habitats and ecological processes due to positioning of project infrastructure</p>	<p>To rehabilitated fragmented habitats</p>	<ul style="list-style-type: none"> <li>• A BAP should be developed to inform TERRA's protection and management of biodiversity in the entire concession, taking cognisance of ecosystem functioning and to avoid or minimise the fragmentation of habitats.</li> </ul>	<p>Compliance with GIIP standards and guidelines as appropriate Performance Standards (PS 6), as well as industry-specific guidelines</p>	<p>TERRA</p>

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	B4: Degradation of aquatic habitats due to altered hydrological regimes and surface or groundwater quality	To minimise degradation of aquatic habitats	<ul style="list-style-type: none"> <li>A stormwater management plan to be developed for all project components to address stormwater run-off volumes, velocity, water quality to minimise impacts on natural areas;</li> <li>Leak and spill management systems to be in place at all potential major sources of pollution such as fuel, lubricant and hazardous product storage facilities, vehicle servicing areas, and workshops;</li> <li>All plant components and vehicles to be serviced within the designated workshop areas;</li> <li>A Biodiversity Action Plan to be developed to inform TERRA's protection and management of biodiversity in the entire concession.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate Performance Standards (PS 6), as well as industry-specific guidelines	TERRA
	B5: Introduction of alien invasive plants due to site clearing and disturbance of vegetation	To minimise spread of alien invasive vegetation	<ul style="list-style-type: none"> <li>Minimise cleared or disturbed areas;</li> <li>The specification for plant (machinery) contractors must include the washing of plant prior to it being dispatched to the study area;</li> <li>A Biodiversity Action Plan to be developed to inform TERRA's protection and management of biodiversity in the entire concession;</li> <li>Promote the systematic eradication of invasive plant species infestations, especially in areas disturbed by development. Revegetation must use plants that are indigenous to the immediate area.</li> <li>Ensure that only trained people handle and make use of herbicides.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate Performance Standards (PS6), as well as industry-specific guidelines	TERRA
	B6: Loss or disturbance of species of special concern due to site clearing and farming activities	To minimise impacts on protected flora and fauna.	<ul style="list-style-type: none"> <li>Site clearing to be conducted sequentially and from one corner of the site to the other, to enable highly mobile species to leave the farming area;</li> <li>No fauna are to be hunted or destroyed by any project personnel;</li> <li>An environmental education training programme to be developed and implemented, including regular refresher</li> </ul>	Compliance with GIIP standards and guidelines as appropriate Performance Standards (PS	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>sessions;</p> <ul style="list-style-type: none"> <li>Effective penalties (e.g. fines) must be imposed for the hunting or harm to fauna by any staff;</li> <li>A Biodiversity Action Plan to be developed to inform TERRA's protection and management of biodiversity in the entire concession.</li> </ul>	6), as well as industry-specific guidelines	
Air Quality	AQ1: PM <sub>10</sub> emissions during construction activities pose a risk to human health and affect vegetation.	To avoid and minimize PM <sub>10</sub> emissions	<ul style="list-style-type: none"> <li>Locate stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction;</li> <li>Cover vehicles carrying dusty materials to prevent materials being blown from the vehicles;</li> <li>Set speed limits to minimise the creation of fugitive dust within the project boundary;</li> <li>Development of routine air quality monitoring program within the farm.</li> </ul>	Monitoring of PM <sub>10</sub> during the construction phase of the project and to also undertake audits to determine efficiency of management measures. Dust fallout monitoring will need to be undertaken at the villages surrounding the project area. Data should be compared to in-country requirements and IFC PS 3.	TERRA
Visual	V1: Loss of sense of place affecting local communities due to site clearing and construction	Reduce visual impact on communities	<ul style="list-style-type: none"> <li>Minimize the disturbed footprint as far as practically possible.</li> <li>Undertake stripping, stockpiling and stockpile management as per the Soil Management Plan.</li> <li>Clear vegetation in phases so that only those areas required for immediate development are cleared.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	activities		<ul style="list-style-type: none"> <li>Good practice measures include the following: <ul style="list-style-type: none"> <li>Paint buildings and structures or use materials with colours that reflect and complement the natural colour and textures of the surrounding landscape.</li> <li>Use directional lighting in areas operating at night, if communities are affected by lighting.</li> </ul> </li> <li>Develop and implement the waste management plan for the project.</li> </ul>		
Waste	Wa1: Impact associated with handling, storage and disposal of waste	Handling, storage and disposal of waste	<ul style="list-style-type: none"> <li>Domestic waste should be properly disposed of to avoid an invasion of scavengers such as rodents.</li> <li>A register of hazardous waste should be maintained</li> <li>Ensure that the WMF complies with GIIP requirements for waste management</li> <li>Develop and implement waste management plan</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
<b>Socio-economic</b>					
Traffic and Transportation	T1: impact of farming activities related to traffic and transportation	To minimise road safety risks to users	<ul style="list-style-type: none"> <li>TERRA to provide driver training awareness for staff operating vehicles</li> <li>TERRA to include driver training awareness in the contractual agreement with contractors</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
Land Take	LT1: Loss of access to productive land and livelihood activities (economic displacement) through the Project's acquisition of land	Reduce loss of economic and physical displacement	<ul style="list-style-type: none"> <li>It will be important for TERRA to implement various management measures in order to mitigate the potential impacts resulting from the loss of access to ecosystem services. These should include the following: <ul style="list-style-type: none"> <li>Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services;</li> <li>Provide safe access to Lubanda Lake;</li> </ul> </li> <li>Limit Project footprint to minimize land acquisition and displacement of productive lands.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	LT2: Loss of access to	Reduce loss of ecosystem services to nearby	<ul style="list-style-type: none"> <li>It will be important for TERRA to implement various management measures in order to mitigate the potential</li> </ul>	Compliance with GIIP	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	ecosystem services	communities	<p>impacts resulting from the loss of access to ecosystem services. These should include the following:</p> <ul style="list-style-type: none"> <li>○ Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services;</li> <li>○ Provide safe access to Lubanda Lake;</li> </ul>	standards and guidelines as appropriate	
Expectations of Economic Opportunities and Improved Living Conditions	EO1: Influx and spontaneous settlement due to perceived employment opportunities and infrastructure development	Reduce influx of people due to employment opportunities	<ul style="list-style-type: none"> <li>• Influx is typically a difficult impact to manage and/or mitigate; therefore, it is only possible to mitigate the impacts caused by influx. TERRA will attempt to manage influx through the Influx Management Plan. Furthermore, it will be possible to develop a strategy as a component of the SDP to address issues related to and potentially enhanced by Project-induced influx. This strategy will be developed in order to clearly define how TERRA, in conjunction with local government and relevant stakeholders, intend to manage the impacts caused by influx where possible. More detail is included in Impacts EO2 – EO5.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	EO2: Increase of social pathologies due to influx and the presence of construction workers	Decrease social pathologies	<ul style="list-style-type: none"> <li>• Although TERRA will not be directly involved in the treatment of social pathologies, it is important that the Contractor Management Plan, which defines the proper behavior of employees (including contractors), is strictly enforced. In addition, employees should be prohibited from abusing alcohol and drugs, and stringent measures should be put in place to address offenders.</li> <li>• Implement and enforce the Contractor Management Plan</li> <li>• Implement the CHSP initiatives, such as education and awareness programs that address social pathologies in neighboring communities.</li> <li>• Monitor employee and contractor compliance with company policy regarding alcohol and substance abuse.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	EO3: Increased pressure on	Decrease pressure on natural resources	<ul style="list-style-type: none"> <li>• TERRA will develop an SDP and attempt to identify opportunities to enhance the availability and access to</li> </ul>	Compliance with GIIP	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	natural resources resulting from project-related influx		<p>various natural resources such as water. Furthermore, where possible, TERRA will provide training and employment in an attempt to diversify the local economy and reduce the reliance on natural resources.</p> <ul style="list-style-type: none"> <li>Implement the management measures detailed in the Influx Management Plan in the ESMP.</li> </ul>	standards and guidelines as appropriate	
	EO4: Increased pressure on social services and infrastructure due to influx and opportunistic settlement	Decrease pressure on social services	<ul style="list-style-type: none"> <li>Implement Influx Management Plan detailed in ESMP.</li> <li>TERRA should provide support and capacity building to service providers (i.e., public schools and clinics) through the SDP.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	EO5: Increased prevalence and spread of communicable diseases due to Project related influx and the presence of construction workers	Reduce the spreads of diseases	<ul style="list-style-type: none"> <li>Implement Influx Management Plan detailed in ESMP.</li> <li>Implement Community Health and Safety Plan detailed in ESMP.</li> <li>Implement and enforce the Contractor Management Plan.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
Employment and Associated Benefits	EB1: Generation of employment	Increase in employment opportunities	<ul style="list-style-type: none"> <li>The following mitigation measures, in line with the Employment and Capacity Plan, can further enhance the benefits of local employment generation, especially at a direct and indirect level: <ul style="list-style-type: none"> <li>Employ local workers if qualified applicants with the appropriate skills are available. Formalize this policy in company HR guidelines and contractors' agreements.</li> <li>Purchase goods and services at a local level, if available at a fair price. Formalize this policy in company purchasing guidelines and contractors' agreements.</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<ul style="list-style-type: none"> <li>○ Work closely with the community before and during the Project to identify and communicate required skills and resources that the local community could provide. This will take place in meetings with focus groups and/or representatives within the communities, and will commence before construction of the Project is initiated.</li> <li>○ Implement the measures detailed in the Employment and Capacity Plan prioritizing local employment and training</li> <li>○ Formalize this policy in company HR guidelines and contractors' agreements.</li> </ul>		
Social Investment Opportunities	SI1: Improved infrastructure in the study area due to social investment activities	Improve infrastructure	<ul style="list-style-type: none"> <li>• TERRA will develop a SDP that outlines service delivery and infrastructure development support initiatives. These initiatives should be developed in consultation with local government, local communities, NGOs and CBOs so as not to create paternalistic dependence on TERRA.</li> <li>• Where possible, TERRA should look to partner with local government and improve the quality and sustainability of existing services and infrastructure.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
<b>Operational Activities</b>					
	OA1: Potential disturbance of cultural heritage sites and graves	Do not disturb cultural hertaige and grave sites	<p>TERRA will implement the measures detailed in the Cultural Heritage Management Plan and Chance Find Procedure. Some of the key points include the following:</p> <p>The project infrastructure shall be aligned to avoid any known grave sites and sites which otherwise has cultural significance.</p> <p>All Contractors shall take note of the cultural heritage sites determined and take measures to ensure that these areas are not disturbed by the construction or site clearing teams.</p> <p>Contractors shall make provision for accidental discovery of archaeological sites and graves within the construction area.</p> <p>TERRA will avoid the removal of cultural heritage sites and graves where possible.</p> <p>The chance find procedure will be adopted should unidnetified</p>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			graves or cultural heritage sites be discovered.		
	OA2: Pollution of surface and groundwater due to operational activities	Reduction in pollution	TERRA will develop and initiate management and mitigation measures as detailed in the Water Management Programme (WMP). This includes proper transport, handling, use and storage of potentially hazardous materials such as fertilizers and pesticides as well as measures to prevent erosion and run off into existing surface water.  TERRA will also be required to implement a water monitoring and reporting regime as detailed in the WMP.	Compliance with GIIP standards and guidelines as appropriate	TERRA
	OA3: Increased road safety risks due to increased traffic	Reduce road safety risks	TERRA will implement the management measures of Traffic Safety section of the CHSP.	Compliance with GIIP standards and guidelines as appropriate	TERRA
	MR1: Increased direct revenue to national government	Increase in revenue	Government income is determined by tax regimes and world market prices for commodities. As such, no mitigation measures are recommended for this impact.	Compliance with GIIP standards and guidelines as appropriate	TERRA



**Table-8-3: Operations Phase**

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
<b>Activity: Operations</b>					
<b>Biophysical</b>					
Soils, land capability and land use	SL1: Placement of project infrastructure, resulting in a temporary loss of soil resource, and change in soil characteristics, land capability and land use	Limit the impact on the soils to the immediate footprint of the project activities and limit the duration to the life of the project.  Rehabilitate and conserve soil and land where possible.	<ul style="list-style-type: none"> <li>Minimize the disturbed footprint as far as practically possible.</li> <li>Implement compensation measures in areas where livelihood are impacted by the loss of agricultural lands.</li> <li>The proposed TERRA project focuses on the construction and operational phases. Therefore the site clearing and earthwork activities will also be carried out phase by phase in order to reduce soil erosion.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	SL2: Site clearance resulting in a permanent loss resource, and potential in soil characteristics, land capability and land use as a result of increased erosion	Manage the project activities to limit the extent of erosion on the surrounding landscape	<ul style="list-style-type: none"> <li>Minimize the disturbed footprint as far as practically possible.</li> <li>Minimize the area of disturbance.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	SL3: Spillage of agrochemicals, hydrocarbons and seepage from waste resulting in permanent loss of soil resource, and change in soil characteristics,	The minimisation of the accidental release or spill of contamination onto soils	<ul style="list-style-type: none"> <li>Establishment of facilities for the safe storage of agrochemicals and hydrocarbons.</li> <li>The preparation of procedures to ensure that spillage during mobile equipment maintenance is minimized.</li> <li>The provision of appropriate secondary containment in areas where hydrocarbons, solvents and other potentially hazardous materials are stored.</li> <li>Implement emergency preparedness and response</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	land capability and land use		measures plan		
Surface water resources	W1: Potential increase of runoff due to change in vegetation covers, from natural ecosystem to maize crops	To minimize surface water runoff	<ul style="list-style-type: none"> <li>Technologies for reducing the energy of run-off water will be implemented so that run-off does not carry significant sediments from the cultivated land.</li> <li>Cultivation will be perpendicular to the slope to minimize run-off.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	W2: Potential increase of soil erosion on cultivated land and sedimentation in the water ways	To minimize soil erosion and sedimentation	<ul style="list-style-type: none"> <li>Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes.</li> <li>Technologies for reducing the energy of run-off water will be implemented so that run-off does not carry significant sediments from the cultivated land</li> <li>Cultivation will be perpendicular to the slope to minimize iron and run-off</li> <li>The impact of the hydrological and drainage system due to the site clearing can be attenuated by a good management of available fresh water to minimize soil erosion and nutrient losses.</li> <li>Legumes cover can be used to help minimizes soil erosion by reducing the depressive power of raindrops and acts as an impediment to surface runoff.</li> <li>Detailed hydrological studies should be carried out for each phase of the proposed farm development to help determine the flood area and help design the sizes of the drains and culverts.</li> <li>The status of surface and ground water should also be monitored. TERRA should develop a water management plan.</li> <li>Leave a riparian reserve of about 20 meters around the river and lake for the purpose of minimizing the amount of</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			sediments entering the river system and erosion of riverbanks.		
	W3: Potential increase in groundwater recharge due to the change in land cover, from forest ecosystem to cultivated land		<ul style="list-style-type: none"> <li>None</li> </ul>		
	W4: Potential leaching of nutrients from the soil due to the application of fertilizers in the cultivated land	Minimise nutrient leaching and soil erosion	<ul style="list-style-type: none"> <li>Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes, silt traps and prompt re-vegetation, where possible.</li> <li>Technologies for reducing the energy force of run-off water such as installation of diversion channels, sedimentation ponds, rock filter or plastic dams will be implemented so that run-off does not carry significant sediments from the cultivated land.</li> <li>Cultivation will be perpendicular to the slope to minimize iron and run-off.</li> <li>Control the use of fertilizers.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	W5: Potential contamination of water resources due to application of pesticides and phosphates associated with sediments	To minimize pesticide contamination	<ul style="list-style-type: none"> <li>Construction of settlements ponds.</li> <li>Use of biodegradable pesticides.</li> <li>Reduce the pesticides dosage.</li> <li>The use of agrochemicals is very expensive thus the application of the fertilizer should be based on the crop requirements. Mulch from the decomposed biomass can be used. The use of organic fertilizer will minimize the impacts of the chemicals in the soil, waterways, and lighten the fertilizers budget.</li> <li>For pest control, TERRA can use chemical, cultural, biological and physical practices to control the infestations.</li> <li>The agrochemicals should be well stored and handled to</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>avoid spills.</p> <ul style="list-style-type: none"> <li>• Workers should be warned of the danger of these products and trained on the way to handle them, use them, and dispose of their used containers.</li> <li>• The application of pesticides and fertilizers should be in strict accordance with the manufacturers' instructions and generally established safety procedures. Every chemical product must have their Material Safety Data Sheet (MSDS).</li> <li>• TERRA should have these procedures and instructions available as a form of "company Instruction for application of Pesticides and Fertilizers".</li> <li>• TERRA should consider the preparation of such instructions which would incorporate all elements including of safe handling of some of the chemicals and integrate in these instructions the guide for "Pesticide handling and application".</li> <li>• All petrochemicals should be stored, handled and disposed of to avoid spoilage, and thus avoid soil and waterways pollution. TERRA will have to put in place an oil/water separator next to the workshop drainage system. TERRA has to put in place a Spill Response Plan".</li> <li>• TERRA should not make use of POP or Persistent Organic Pollutants banned under Stockholm convention which came into force.</li> </ul>		
	W6: Potential water contamination due leakages from storage areas and accidental spills of fuel and chemicals	To minimize water contamination from fuel and chemicals	<ul style="list-style-type: none"> <li>• Establishment of facilities for the safe storage of agrochemicals and hydrocarbons.</li> <li>• Fuel and chemicals will be stored in a secured area.</li> <li>• Fuel will be stored in a steel tank, preferably supplied and maintained by the fuel supplier and above the ground.</li> <li>• Leakage of fuel and other chemicals will be avoided.</li> <li>• All storages for fertilizers, pesticides and fuel will be located in an adequately banded areas capable of preventing</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>contamination of surface and groundwater resource.</p> <ul style="list-style-type: none"> <li>• Refuelling and maintenance of vehicles will be undertaken within the specific depots.</li> <li>• All repairs done on machinery using hydrocarbons as fuel will have a drip tray placed strategically to avoid incidentally spills.</li> <li>• Spill clean-up procedure will be implemented.</li> <li>• Where contaminants are transported, emergency contaminant and mitigation measures must be developed to minimize impacts should accidental spillages occur along the transport routes.</li> <li>• Equip all trucks and equipment carrying fuels or oil with spill response materials and train personnel in the use of such materials.</li> <li>• Store all potential sources of contamination in secure facilities with appropriate Storm Water management systems in place to ensure that contaminants are not released to the water resource through Storm Water runoff.</li> </ul>		
Groundwater resources	W7: Contamination of groundwater resulting from seepage from farm land, sewage and other waste	To avoid and minimize impacts on water quality from effluent discharge	<ul style="list-style-type: none"> <li>• Manage waste in accordance with the Waste Management Plan.</li> <li>• Prioritize construction of a properly lined and designed waste landfill site and sewage treatment system as early as possible during construction.</li> <li>• Proper sanitation to be provided to all staff as human gastrointestinal parasites and pathogens can be spread to wildlife via water.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
Air Quality	AQ2: Increase in PM10 emissions resulting from land clearing, earthworks, burning of biomass and vehicular	To reduce impact of PM10 emissions during operations activities	<ul style="list-style-type: none"> <li>• Cover vehicles carrying dusty materials to prevent materials being blown from the vehicles.</li> <li>• Set speed limits to minimize the creation of fugitive dust within the project boundary.</li> <li>• Development of routine air quality monitoring program within the farm.</li> </ul>	Monitoring of PM <sub>10</sub> during the operations phase of the project and to also undertake audits to	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	movement			determine efficiency of management measures. Data should be compared to in-country requirements and IFC PS 3.	
	AQ3: Increase in gas (SO <sub>2</sub> , NO <sub>x</sub> , CO and VOCs) emissions resulting from vehicle exhaust emission and biomass burning	To reduce impact of gas emissions during operations activities	<ul style="list-style-type: none"> <li>Limit vehicle idling and keep vehicles well maintained to minimize particulate and gaseous emissions.</li> <li>Where possible, biomass burning should be considered and a schedule should be maintained to allow for pollutants to disperse into the atmosphere in a short amount of time.</li> <li>Biomass burning should be conducted during the day and during the summer months; and</li> <li>Development of routine air quality monitoring program.</li> </ul>	Monitoring of gas emissions at the villages during the operations phase of the project and to also undertake audits to determine efficiency of management. Check vehicle service records TERRA	
Noise	N1: Continuous noise impact on Mwenga, Lubanda, Minga and Katofio villages resulting from farming activities	Avoid and minimise noise impacts	<ul style="list-style-type: none"> <li>Restrict construction activities to daytime hours 07:00 am to 07:00 pm.</li> <li>Monitor noise in surrounding villages. Conduct one survey of 24-hour duration per month. Determine night-time impact.</li> <li>Increase in ambient level due to project noise should not be allowed to exceed 5 dB.</li> <li>Any complaints about noise received from communities must be logged in a Complaints Register.</li> <li>Feedback on new entries and on actions in response to complaints must be a fixed item on weekly or monthly management meeting agendas.</li> <li>Carry out additional attenuation measures as required and as appropriate.</li> </ul>	Maintain complaints register and verify actions taken. Compliance with GIIP standards and guidelines as appropriate	TERRA
Visual	V2: Loss of sense		<ul style="list-style-type: none"> <li>Minimize the disturbed footprint as far as practically</li> </ul>		

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	of place for local communities from project infrastructure and illumination		<p>possible.</p> <ul style="list-style-type: none"> <li>Undertake stripping, stockpiling and stockpile management as per the Soil Management Plan.</li> <li>Develop and implement a waste management plan for the project.</li> <li>Use directional lighting in areas operating at night, if communities are affected by lighting.</li> </ul>		
Waste Management			<ul style="list-style-type: none"> <li>Domestic waste should be properly disposed of to avoid an invasion of scavengers such as rodents.</li> <li>A register of hazardous waste should be maintained</li> <li>Ensure that the WMF complies with GIIP requirements for waste management.</li> <li>Develop and implement waste management plan.</li> </ul>		
<b>Socio-economic</b>					
Land Take	LT1: Loss of access to productive land and livelihood activities (economic displacement) through the Project's acquisition of land	Reduce loss of economic and physical displacement	<ul style="list-style-type: none"> <li>It will be important for TERRA to implement various management measures in order to mitigate the potential impacts resulting from the loss of access to ecosystem services. These should include the following: <ul style="list-style-type: none"> <li>Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services;</li> <li>Provide safe access to Lubanda Lake;</li> <li>Limit Project footprint to minimize land acquisition and displacement of productive lands.</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	LT2: Loss of access to ecosystem services	Reduce loss of ecosystem services to nearby communities	<ul style="list-style-type: none"> <li>It will be important for TERRA to implement various management measures in order to mitigate the potential impacts resulting from the loss of access to ecosystem services. These should include the following: <ul style="list-style-type: none"> <li>Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services;</li> <li>Provide safe access to Lubanda Lake;</li> <li>Where loss of income is incurred TERRA should compensate households and develop livelihood</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>restoration initiatives detailed in the LACPF.</p> <ul style="list-style-type: none"> <li>Where possible, allow households access to portions of the concession area in order to take advantage of the various ecosystem services.</li> </ul>		
Expectations of Economic Opportunities and Improved Living Conditions	EO1: Influx and spontaneous settlement due to perceived employment opportunities and infrastructure development	Reduce influx of people due to employments opportunities	<ul style="list-style-type: none"> <li>Influx is typically a difficult impact to manage and/or mitigate; therefore, it is only possible to mitigate the impacts caused by influx. TERRA will attempt to manage influx through the Influx Management Plan. Furthermore, it will be possible to develop a strategy as a component of the SDP to address issues related to and potentially enhanced by Project-induced influx. This strategy will be developed in order to clearly define how TERRA, in conjunction with local government and relevant stakeholders, intend to manage the impacts caused by influx where possible. More detail is included in Impacts EO2 – EO5.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	EO2: Increase of social pathologies due to influx and the presence of construction workers		<ul style="list-style-type: none"> <li>Although TERRA will not be directly involved in the treatment of social pathologies, it is important that the Contractor Management Plan, which defines the proper behavior of employees (including contractors), is strictly enforced. In addition, employees should be prohibited from abusing alcohol and drugs, and stringent measures should be put in place to address offenders.</li> <li>Implement and enforce the Contractor Management Plan</li> <li>Implement the CHSP initiatives, such as education and awareness programs that address social pathologies in neighboring communities.</li> <li>Monitor employee and contractor compliance with company policy regarding alcohol and substance abuse.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	EO3: Increased pressure on natural resources resulting from project-related influx		<ul style="list-style-type: none"> <li>TERRA will develop an SDP and attempt to identify opportunities to enhance the availability and access to various natural resources such as water. Furthermore, where possible, TERRA will provide training and employment in an attempt to diversify the local economy and reduce the reliance on natural resources.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA



Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<ul style="list-style-type: none"> <li>Implement the management measures detailed in the Influx Management Plan in the ESMP.</li> </ul>		
	EO4: Increased pressure on social services and infrastructure due to influx and opportunistic settlement	Decrease pressure on social services	<ul style="list-style-type: none"> <li>Implement Influx Management Plan detailed in ESMP.</li> <li>TERRA should provide support and capacity building to service providers (i.e., public schools and clinics) through the SDP.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	EO5: Increased prevalence and spread of communicable diseases due to Project related influx and the presence of construction workers	Reduce the spreads of diseases	<ul style="list-style-type: none"> <li>Implement Influx Management Plan detailed in ESMP.</li> <li>Implement Community Health and Safety Plan detailed in ESMP.</li> <li>Implement and enforce the Contractor Management Plan.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
Employment and Associated Benefits	EB1: Generation of employment	Increase in employment opportunities	<ul style="list-style-type: none"> <li>The following mitigation measures, in line with the Employment and Capacity Plan, can further enhance the benefits of local employment generation, especially at a direct and indirect level: <ul style="list-style-type: none"> <li>Employ local workers if qualified applicants with the appropriate skills are available. Formalize this policy in company HR guidelines and contractors' agreements.</li> <li>Purchase goods and services at a local level, if available at a fair price. Formalize this policy in company purchasing guidelines and contractors' agreements.</li> <li>Work closely with the community before and during the Project to identify and communicate required skills and resources that the local community could provide. This will take place in meetings with focus groups</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
			<p>and/or representatives within the communities, and will commence before construction of the Project is initiated.</p> <ul style="list-style-type: none"> <li>○ Implement the measures detailed in the Employment and Capacity Plan prioritizing local employment and training</li> <li>○ Formalize this policy in company HR guidelines and contractors' agreements.</li> </ul>		
Social Investment Opportunities	SI1: Improved infrastructure in the study area due to social investment activities	Improve infrastructure	<ul style="list-style-type: none"> <li>• TERRA will develop a SDP that outlines service delivery and infrastructure development support initiatives. These initiatives should be developed in consultation with local government, local communities, NGOs and CBOs so as not to create paternalistic dependence on TERRA.</li> <li>• Where possible, TERRA should look to partner with local government and improve the quality and sustainability of existing services and infrastructure.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
<b>Operational Activities</b>					
	OA1: Potential disturbance of cultural heritage sites and graves	Do not disturb cultural heritage and grave sites	<ul style="list-style-type: none"> <li>• TERRA will implement the measures detailed in the Cultural Heritage Management Plan and Chance Find Procedure. Some of the key points include the following: <ul style="list-style-type: none"> <li>○ The project infrastructure shall be aligned to avoid any known grave sites and sites which otherwise has cultural significance.</li> <li>○ All Contractors shall take note of the cultural heritage sites determined and take measures to ensure that these areas are not disturbed by the construction or site clearing teams.</li> <li>○ Contractors shall make provision for accidental discovery of archaeological sites and graves within the construction area.</li> <li>○ TERRA will avoid the removal of cultural heritage sites and graves where possible.</li> <li>○ The chance find procedure will be adopted should unidentified graves or cultural heritage sites be discovered.</li> </ul> </li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

Aspect	Impact	Management Objective	Mitigation Measures	Performance criteria	Responsible party
	OA2: Pollution of surface and groundwater due to operational activities	Reduction in pollution	<ul style="list-style-type: none"> <li>TERRA will develop and initiate management and mitigation measures as detailed in the Water Management Programme (WMP). This includes proper transport, handling, use and storage of potentially hazardous materials such as fertilizers and pesticides as well as measures to prevent erosion and run off into existing surface water.</li> <li>TERRA will also be required to implement a water monitoring and reporting regime as detailed in the WMP.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	OA3: Increased road safety risks due to increased traffic	Reduce road safety risks	<ul style="list-style-type: none"> <li>TERRA will implement the management measures of Traffic Safety section of the CHSP.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA
	MR1: Increased direct revenue to national government	Increase in revenue	<ul style="list-style-type: none"> <li>Government income is determined by tax regimes and world market prices for commodities. As such, no mitigation measures are recommended for this impact.</li> </ul>	Compliance with GIIP standards and guidelines as appropriate	TERRA

## 8.5 Environmental Awareness Plan

This preliminary environmental awareness plan describes the manner in which TERRA intends informing its employees of any environmental risks which may result from their work and the manner in which the risk must be dealt with to avoid pollution or degradation of the environment. TERRA recognises that this needs to be finalised, approved and broadened to capture social requirements. Environmental conditions should be included in any operational contracts, thereby making Contractors aware of the potential environmental risks associated with the project and the necessity to prevent accidental spillages by the implementation of good housekeeping practices.

The following principles will apply to the Environmental Awareness Plan (safety, health and environmental (SHE) training):

- All personnel will as a minimum, undergo general SHE induction and awareness training.
- An ESMS coordinator will be appointed.
- The ESMS coordinator will identify the SHE training requirements for all TERRA personnel and Contractors. The training requirements should be recorded in a training needs matrix indicating particular training that must be undertaken by identified personnel and Contractors.
- Development of Training Programme and General Awareness Training should be conducted as follows:
  - All employees, current, new and Contractors will undergo induction, to incorporate environmental awareness training. At the end of this training, personnel will be required to complete the awareness test.
  - All personnel performing tasks which can cause significant or major environmental impacts shall be competent on the basis of training, education and/or experience.
  - Awareness training must include the potential consequences of departure from specified operating procedures as well as significant environmental impacts, actual or potential, of their work activities.
  - Training will be appropriate to the activity of individual employees.
  - Monthly environmental topics will be generated to raise awareness of employees on environmental issues.
  - Evaluation of awareness and competency training will be carried out through questionnaires or post-training tests conducted during training sessions and are also done through questioning of employees during audits.

Environmental topics (together with the safety and health) will be published on the notice boards each month.

## 8.6 Construction and Land Clearing Control Plan

The Construction Control Plan is relevant to all contractors, including TERRA (in terms of implementation). The Plan to be implemented by the Contractor shall include as a minimum the key measures set out immediately below.

### 8.6.1 Control of access to the site

- The safety of the site shall not be lowered by construction work, construction-related activities or land clearing activities and the Contractor shall remedy immediately any non-compliance and the effects thereof.

- The Contractor shall restrict the number of entry and exit points for security reasons.
- The Contractor shall erect a physical barrier (e.g. a removable fence) to ensure that there is no unauthorized access outside of the construction and land clearing area.

### 8.6.2 Control of construction activities in sensitive areas including wetlands

Any contractors used by TERRA shall be solely responsible for any action necessary to ensure the prevention of harm to species during construction. Management measures will include the following:

- Prior to the commencement of construction and land clearing activities, contractors shall (together with the designated HSE office bearer) survey the limits of construction, land clearing and additional workspace areas required. Contractors shall mark the limits using 1.5 m long stakes at 200 m maximum intervals for the duration of the contract. If sensitive habitat is affected, the stake interval shall be reduced to 50 m spacing and the stakes shall be painted a conspicuous colour.
- Staff including machine operators shall be instructed about the sensitivity of the areas and vegetation clearance shall be restricted to the absolute minimum necessary.
- In steeper sections of the site a method statement shall include details of areas of cut and fill required to ensure the management of erosion, stabilise and rehabilitate the completed works.
- Any construction or clearing in wetland areas (cenotes) should be avoided. TERRA and all contractors shall prevent permanent damage occurring as a result of construction of the works to all wetlands within the project site.
- TERRA and all contractors shall take note that the definition of 'wetlands' in this ESMP is broader than the layperson's understanding of the term 'wetland' or 'marsh', and includes all areas where hydromorphic soils occur in the project area. A 100m buffer area around wetlands should be maintained.
- As far as is reasonably practical, the contractors should schedule construction activities to take place during winter when surface and subsurface water flows are lowest, plants are dormant and inundation is limited.
- Contractors shall not remove any vegetation within the wetland, other than that which is absolutely necessary in the construction right-of-way for linear infrastructure forming part of the project, such as water pipelines and road infrastructure. Where crossing of a wetland is necessary, this shall occur at a 90° angle to the dominant natural flow of water in the wetland.
- As far as is possible, the Contractors shall backfill the trench in the wetland with the material originally removed. This shall be done in accordance with the natural soil profile in the wetland. The method chosen as being most appropriate for a particular site (including the use of clay barriers at intervals along the pipeline) shall not affect the natural surface or sub-surface (lateral and longitudinal groundwater movement) flow within the wetland and shall contain/prevent channelling of water along the pipeline and/or in the backfill.
- The Contractors shall test each wetland before construction and identify any clay lenses within the depth of excavation. The Contractors shall re-seal any impermeable layer that is breached by construction within a wetland, either by using clay removed from the trench, or alternatively with bentonite or any other appropriate material or method approved by Terra.
- The Contractors shall manage all temporary construction roads in or adjacent to wetlands so as to disperse runoff and avoid concentrating water flows. Temporary construction roads in

proximity to wetlands shall be completely removed and rehabilitated after construction, in accordance with the re-grassing specification.

- Limiting access and construction disturbance in wetlands is considered essential. The Contractors shall take particular note of the first provisions in this construction control plan above in this regard.
- The Contractors shall carefully monitor the use of heavy machinery within wetlands. Machine operators shall be fully informed about the sensitivity of these areas.
- The Contractors shall reinstate the original wetland geometry and topography in both cross-sectional and longitudinal profile after construction.
- The Contractors shall remove from the wetland immediately after construction is completed all coffer dams, causeway and construction materials, discard material, berms and other foreign items used in the construction of the pipeline. Ripping and disking of the wetland surface shall be done in all compacted areas after construction.
- The Contractors shall re-vegetate the area encompassing the construction activities based on advice from the designated HSE officer. Appropriate plant species, seeding methods and replanting, as indicated in the specification and approved byTERRA, shall be used to achieve this.

### **8.6.3 Control of vegetation clearing**

- The Contractors shall not clear any vegetation outside of the areas defined by the stake markers referred to in the section immediately above. Cleared vegetation shall be windrowed along the perimeter of the construction area.
- Any large indigenous trees which have been individually marked in the field shall not be damaged by the Contractors. The trees shall be plotted on the survey drawings.
- Forested areas shall be avoided where possible.
- Where the Contractor has to dispose of vegetation cleared from the construction site, options for use by local communities should be explored.
- The burning of vegetation should be avoided as far as possible. A method statement shall be prepared for each controlled burn, and submitted to TERRA.

### **8.6.4 Control of topsoil and subsoil**

- Due to land clearing activities the entire project area will be highly susceptible to erosion and needs to be managed as such.
- Any topsoil (defined as the soil above 150 mm) excavated from the site shall be stored separate from wind rows or stockpiles of any other excavated materials to minimise loss from erosion or mixing with other materials.
- Topsoil shall not be contaminated with anything that might impair its plant-support capacity.
- After the completion of the backfilling, re-contouring and erosion control works, the Contractors shall spread the topsoil and waste soil evenly around the construction site to maintain or improve land capability and improve land capability.

### 8.6.5 Control of construction at watercourses

- For linear infrastructure (including powerlines, access roads and irrigation pipelines) the Contractors shall prepare for each river crossing a method statement for review by TERRA to include:
  - Means of control of suspended sediment and turbidity, damage to riparian vegetation, spillage of fertilizers and pesticides, cement and other foreign materials and a monitoring programme to provide rapid feedback on the effectiveness of controls.
  - Identified and surveyed trees in the riparian fringe scheduled for protection within the construction right-of-way, shall not be damaged during construction.
  - Measures that will be used to stabilize river embankments after construction and to return the channel to its pre-construction profile or to a more stable profile.
- During construction and site clearing, the Contractors shall make provision to maintain the natural flow of any drainage line affected.
- The following measures, among others, may be considered by the Contractors in order to minimize the risk of increased suspended sediment in the water column downstream:
  - Elimination of surface flow through the cleared area;
  - In cases where the entire flow of water of a water body is diverted around the water crossing site, it must be returned to the water body immediately downstream of the crossing site;
  - The use of silt fences or hay bales to isolate the construction area from the water body in situations where the flow velocities and volumes are low;
  - The removal and temporary storage of any material excavated from the bed or banks of the water body to a location out of the water body until the materials are permanently removed from the location or backfilled into the water body. Where sufficient space exists, and where the storage will not cause any environmental damage, this may be within the macro-channel banks of the river; and
  - The treatment of any water removed from the isolation area, prior to discharge back into the downstream river course, to remove suspended sediment.
- TERRA shall undertake periodic independent audits of sediment generation caused by the construction works and land clearing in the rivers in order to verify the results of the sediment monitoring maintained by the Contractors.
- The Contractors shall apply measures to reduce impact on spawning fish.
- Where rehabilitating river works, the Contractors shall comply with the following: (a) the river channel embankments shall be returned to the pre-existing (or a more stable) profile than that which existed prior to construction. The Contractors may make use of the fixed point photography taken by TERRA in order to ensure compliance with this requirement; (b) river embankments shall be stabilised, using any necessary protection measures, including re-vegetation, rip rap, reno mattresses and other measures, to ensure that the banks are protected against erosion; (c) measures using indigenous grasses to permanently stabilise disturbed areas shall be fully effective by the end of one growing season; and (d) debris disposal and clean up shall be carried out to return the river course to its pre-existing condition prior to the works.
- In rehabilitating the river crossings, the Contractors shall, in addition to the requirements specified in the re-vegetation specification, include the re-planting of indigenous trees in the riparian fringe.

### **8.6.6 Control of impact of construction and site clearing activities on groundwater**

- The Contractors shall take careful note of the findings of the SRK groundwater specialist team as these become available for the Comprehensive ESIA and ESMP.
- Where possible, the development will be designed to avoid damage to groundwater resources.

### **8.6.7 Control of noise levels**

Noise generated by construction, operation activities and site clearing is to be kept to a minimum and should adhere to relevant noise standards. Noise management should include the following:

- The Contractors shall ensure that noisy construction and site clearing activities are limited to working hours (i.e. between 06h00 and 19h00 daily) from Monday to Saturday, or as required in terms of legislation and/or negotiated with local communities;
- Noise generating equipment should be designed to control and dampen noise emissions to ensure that the increase in ambient noise level will comply with relevant norms and standards;
- The Contractors' employees shall not make recreational use of all-terrain vehicles or motorcycles in the project area;
- Community members shall be able to register their complaint / concern about noise through a complaints register. Complaints should be responded to as a matter of urgency and measures must be taken to minimize the noise; and
- TERRA and its employees shall adhere to the Code of Conduct as set out below in the Contractor Management Plan.

### **8.6.8 Control of dust levels**

- The Contractors shall control dust in the project area, including along haul roads, and along the N5 road (Route Kasenga) to minimize detrimental effects to communities.
- Control measures to be considered include the use of water bowsers to wet down surfaces that have been denuded, as well as dust roads and which have the potential to generate dust.
- Areas denuded as a result of the project will be kept to a minimum, and measures set out above for control of vegetation clearing, topsoil and subsoil, as well as erosion control shall be implemented.

### **8.6.9 Rehabilitation during and following construction**

- The Contractors shall remove all temporary works in the construction area which are not to be utilised during the operational phase of the project.
- The Contractors shall prevent concentrated run-off along, or next to, constructed or maintained roadways, pipelines and powerline route by shaping the land, establishing vegetation, and taking other appropriate measures to absorb and disperse runoff.
- In places where erosion control is required such as backfilled trenches along the top of bank of all gullies, watercourses, large depressions and steep slopes, the Contractors shall construct diversion banks to divert the flow of water away from the erosion-vulnerable features and into the natural drainage courses.
- The Contractors shall cover any backfilled pipeline trench evenly with topsoil to a minimum depth of 150 mm.



- On arable land the Contractors shall ensure that stone and rock within the soil profile and at the surface do not constrain use any more than was the case prior to construction.
- Where the land is naturally armoured with surface rock or stone, the Contractors shall, after construction, replace the armouring such as alongside roads and over the pipeline construction right-of-way to protect against erosion.
- On slopes steeper than 5%, the Contractors shall use special protection methods to arrest soil erosion during the vulnerable period before vegetation re-establishment occurs.
- Where brush and tree limbs cannot be chipped or used by local communities, and if there is any remaining following completion of construction, this vegetation shall be spread evenly over the rehabilitation site to preserve and assist the regeneration of natural vegetation, erosion control and providing animal habitation.
- The Contractors shall establish vegetation cover (using species appropriate to the local area) in all areas disturbed by the works in the first growing season after construction, and shall maintain this cover for the duration of the maintenance period. The Contractors shall notify TERRA in writing, prior to re-vegetation, of the method of preparation (scarifying / ripping / discing), soil amelioration (addition of lime or gypsum), fertilizing, and seeding (source, mixture and quantity) to be used in rehabilitating each area of the works and the post-establishment maintenance regime to be implemented.
- Revegetation shall be done on all areas requiring rehabilitation as noted above.
- Once the grass has been established, the maintenance period shall commence. This period shall extend for a minimum period of one calendar year.

## 8.7 Community Health and Safety Plan

It is a DRC requirement that occupational health care is extended to the immediate families of national and expatriate employees. With the provision of healthcare services, the Project will significantly contribute to improving and sustaining the health of national employees, households and communities in the Project Impacted Area.

The Community Health and Safety Plan (CHSP) will focus on the following main areas:

- Access to health care facilities;
- Awareness, education and monitoring programmes around malaria management and vector control;
- Training and awareness programmes around STDs, health and hygiene issues; and
- Road Safety and Traffic education and control.

### 8.7.1 Risk Assessment and planning

- TERRA will develop a health and safety profile of affected local communities via the integrated ESIA process.

In the context of a broader risk assessment, TERRA will identify and categorise risks to community health and safety (arising during both construction and operations). Among other themes, the risk assessment should address at least the following:

- Infrastructure and equipment safety;
- Traffic and transport safety;

- Transport and management of hazardous materials (particularly outside the primary secured areas);
- Health circumstances requiring medical facilities and equipment, and the adequacy of existing and planned arrangements in this context;
- Community-based risks to occupational health and vice versa;
- Risks associated with communicable diseases – including risks to communities during the construction phase;
- Risks associated with malaria, water-borne diseases and other illnesses linked to the environment;
- Risks to the natural environment used by communities, and to livelihoods and health in this context; AND
- Community risks associated with security activities.

### **8.7.2 Establishment and implementation of CHSP management systems**

- TERRA will discuss, develop and implement a management and organisational structure for Community Health and Safety (CHS). CHS is a cross-cutting responsibility which will be shared among several managers.
- Identify links with other management programmes e.g. (SEP, LACPF, EPRP) and clarify roles and responsibilities;
- Conduct an internal capacity review against the background of the proposed CHS organisation. Determine gaps and recruit as required;
- Plan and conduct in-house training of relevant managers and staff on the responsibilities associated with the CHSP, and related to specific interventions in this context. Training around monitoring and reporting is a particular priority;
- Evaluate existing CHS-relevant partnerships (and potential new partnerships) with service providers, non-government organisations, community structures and government organisations, and develop a strategy for sustainable CHS in this context. Implement the strategy in consultation with partners;
- Establish and implement CHSP performance monitoring and measurement procedures (with clear indicators and targets). These should address the effectiveness and sustainability of internal and cooperative actions and programmes. Establish and implement appropriate community involvement in CHSP monitoring, through liaison structures (see SEP) and the Grievance Mechanism;
- Determine appropriate incident and accident reporting protocols and procedures for the CHSP, and integrate with the overall occupational health and safety system and database. The system should support incident / accident tracking and trending, and the implementation of relevant proactive and reactive measures. A clear link with the EPRP will be established; and
- Establish and implement internal and external CHS audits<sup>10</sup> to monitor the compliance of management and systems with the CHSP and other applicable plans. The CHS audits should

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<sup>10</sup> Audits are seen to be structured and formal assessments, against strict criteria. External audits will be undertaken by independent evaluators. Monitoring is ongoing and routine, providing operational inputs to management

be coordinated with OHS auditing timetables and programmes. Community input to audits will be secured, through structures and mechanisms outlined above.

### 8.7.3 Operational Control: Construction phase

As an output of the integrated risk assessment, TERRA will identify and categorise CHS risks linked to construction phase activities. This focussed assessment should include a review of CHS performance during completed and ongoing construction activities. Where necessary, a specific set of management and control measures should be developed as an outcome of this task.

- Discuss and agree CHS management structures and accountability during construction, including TERRA arrangements, contractor arrangements, and the links between TERRA and contractors;
- Plan and implement operational control measures for contractors and contract activities. These should address all relevant CHS risks, and should include CHS management requirements and performance indicators and targets. A Code of Practice governing relationships between contractors and communities should be established and agreed with contractors. CHS requirements will be secured contractually;
- Include relevant CHS elements in the OHS screening, training and counselling of contractors. This should include HIV/AIDS awareness and management, and the requirements of the Community Relations Code of Practice (discussed above);
- Plan and implement priority community preparedness measures, including discussion of risks and management measures with community leaders. The effective mobilisation of the Grievance Mechanism will be undertaken through the SEP. Access to and use of the Grievance Mechanism should be highlighted in community interactions; and
- Ensure effective construction phase implementation of accident reporting protocols and health and safety performance monitoring.

### 8.7.4 Community Health

- TERRA should identify the synergies between occupational health management and programmes and CHS and implement management and operational arrangements to realise and extend these synergies;
- TERRA should review existing programmes for the augmentation of health infrastructure and capacity, including potential opportunities to upgrade health infrastructure in the Project area. The review should include an assessment of the benefits for communities and recommendations to sustain these. Implement further activities based on the review;
- TERRA should review, consolidate and where necessary expand environmental health initiatives, including:
  - Water system upgrades;
  - Regular water monitoring;
  - Education on water purification and safe water use;
  - Sanitation, drainage; and
  - Refuse removal.

### 8.7.5 Community Safety

- In order to ensure community safety TERRA should identify CHS risks related to infrastructure and equipment.
- Review designs, construction and management arrangements for structural elements that are potentially hazardous.
- Ensure that all necessary safety and security arrangements are in place and effective. Develop and implement procedures for the operation of equipment;
- Develop and implement a Transport / Traffic Safety Plan, including engineered safety measures on roads, employee and contractor training, and community awareness;
- Plan and implement controls for the management of hazardous materials (fertilizer and pesticides). These controls include the minimisation of releases to air, soils and water; measures to minimise or manage exposure to hazardous materials, controlled transportation and disposal of hazardous materials; and securing hazardous sites. The EPRP will set out emergency response procedures.

### 8.7.6 Natural resources management and protection

TERRA will implement measures to ensure that environmental risks are not increased and that community use of natural resources is not compromised. Measures include:

- Design and engineering inputs ensuring that communities are not more vulnerable to natural hazards such as landslides and floods as a result of land clearing; and
- Planning to ensure that community access to water and land resources is not compromised, and that alternatives / compensation are made available where this is the case.

### 8.7.7 Transport and Traffic Safety Management

A transport safety plan will be developed and implemented pro-actively to sensitise the surrounding communities of any potential increased safety risks. TERRA will take the following into account:

- The traffic routes with high volumes of traffic during the construction phase;
- Identification of schools in close proximity of the main traffic routes;
- Education at the identified schools about safe practices for pedestrians in particular;
- Project newsletters containing safety messages will not only be distributed to project employees but also to communities at community centres, clinics, post offices and schools.
- Investigation into the provision of pedestrian bridges or managed crossing points in high traffic areas.
- Education and awareness sessions at schools will focus on:
  - Pedestrian safety such as wearing high visibility clothing when walking at night, not walking in roads, walking on the on-coming side of the traffic etc.
  - Basic awareness of road and traffic rules through the set-up of a simulated road with road signs and the use of bicycles;
- Appropriate signage will be erected at busy crossings, and under passes will be located where necessary;
- Hazardous materials loading, conveyance and offloading will be undertaken in line with DRC requirements and international best practice; and

- TERRA impacts will be subject to special driving training, and will be carefully managed to limit fatigue. All impactrs in the employ of TERRA will undergo a impactr competency test.

Minimum vehicle safety requirements will also be followed and all vehicles will as a minimum meet the in-country legislative requirements and in addition only vehicles meeting international good practices will be allowed on site.

## 8.8 Emergency Preparedness and Response Plan

Management of emergency preparedness and response is closely related to occupational health and safety (OHS) as well as community health and safety. The close proximity of the project to the surrounding communities and sensitive environments dictate the Emergency Preparedness and Response Plan (EPRP) should extend beyond OHS to include community health and safety relative to emergencies as well as measures to be taken in the event of accidents and emergencies that affect the biophysical environment.

### 8.8.1 Potential sources of risk

Examples of risks which might be generated by TERRA's internal activities include:

- **All Phases:** Non-compliance with measures resulting in incidents from actions including failure to comply with safe behaviour, safety labelling, as well as not wearing personal protective equipment; work equipment failure; manual load handling.
- **Construction:** Traffic associated with construction vehicles, either due to collisions or accidental leaks, spills and incidents from fertilizers and/or pesticides resulting in soil and water pollution; and construction activities such as falls from a height and electrocution, spillages and contamination of soil and water resources. There could also be accidents from community members accessing the construction site or damage caused to community assets by TERRA or Contractor staff or vehicles.
- **Operations:**
  - Handling, transport, storage and use of harmful substances such as fertilizers and pesticides
  - Harvest loading and transport to and from site and on-site
  - Hazards linked to exposure to heat, injury from moving parts, dust, noise, vehicles, and electrical hazards.
- **Major natural occurrences:** could include major rain events at site or upstream, downstream flooding and fire risk particularly during the dry season.

Risks to TERRA are increased through limitations of local capacity to manage and respond to emergencies, as well as the remoteness of the project from a major city. There could be expectations of TERRA response to external emergencies.

### 8.8.2 TERRA response to security emergencies

Contractors and consultants will require that there is capacity to respond to emergencies from a security perspective. This will require components including:

- Sufficient security staff with appropriate training, regular security status updates, and the need for a security action plan to be developed by TERRA;

- An effective information network between TERRA and external stakeholders who might include the United Nations, Consulates, the National Police, National Intelligence, Provincial Government, private security firms, surrounding projects and communities;
- Means of communication including possible evacuations through satellite phones, cellular phones and the use of the Skype network;
- Standard Operating Procedures (SOPs) for security emergencies; and
- A comprehensive training and induction programme relating to security, including a component on human rights.

### 8.8.3 TERRA response to occupational health and safety emergencies

- TERRA will provide health services to their employees and dependents serviced with appropriately trained personnel reporting to appropriately designated individual.
- There will be sufficient paramedic/medical capacity to treat minor injuries and stabilize patients prior to transfer to the nearest hospital.
- A dedicated helicopter landing site will be developed if applicable, and emergency evacuation to Kinshasa via helicopter will be undertaken when/if required.
- OHS risk assessment will need to be carried out to identify emergency scenarios and medical requirements and appropriate action plans developed by TERRA.
- Consideration will need to be taken of off-site incidences and emergencies, and measures that will need to be in place for affected surrounding communities.

### 8.8.4 TERRA response to environmental and community emergencies

A key component of implementing strong environmental practice will be the development of an ESMS. Sufficient staff will be in place to deal with fire safety and life safety, environmental emergencies and community liaison officers. Further, induction and job specific training to prevent and deal with environmental emergencies will form a key part of the culture of environmental and social awareness, accountability, responsibility and prevention for personnel at all levels.

Risks facing communities could cover:

- **Health risks:** Disease vectors, communicable diseases, non-communicable diseases, as well as psychosocial disorders, use of contaminated recycled goods such as containers for fertilizers and pesticides;
- **Transportation-induced risks:** Differential speeds between heavy vehicles, light vehicles, pedestrians and cyclists could result in traffic accidents associated with injuries and fatalities, collisions could result in hazmat leaks/ spills and incidents from noise and dust;
- **Social risks:** Reduced well-being through factors including change of sense of place, changes in population composition through processes such as in-migration, pressure on natural resources and increasing local population vulnerability such as from reduced access to land and ecosystem services;
- **Security risks:** Risks to community safety from interventions that do not comply with rules of conduct/ the principles of proportionality/ applicable law; public trespass into project operational areas resulting incidents such from electrical hazards/ accidental falls and injuries from machinery;

- **Handling, storage, use and disposal of fertilizers and pesticides:** Inappropriate management of hazardous materials leading to fires and/or explosions affecting health and safety of employees and communities; pollution of surface and groundwater from leaks/ spills resulting in soil and water pollution and nuisance/odour and visual impacts from poorly managed landfills; and
- **Water availability:** reduced access to potable water for communities.

### 8.8.5 Development of the operational EPRP

- The basis for EPR will be comprehensive risk analysis at relevant stages covering both construction and operation. Risk analysis will need to extend beyond the immediate footprint area of risk, so as to include on-site, off-site and downstream environmental receptors.
- Planning for EPR on site will include ensuring adequate capacity, resources, competencies, risks and requirements in terms of EPRP for effective response emergencies.
- Planning will be undertaken to deal with external/ community emergencies arising from TERRA activities.
- External stakeholders will be informed of potential hazards, and measures taken to reduce risks associated with living in close proximity to a large agricultural operation.
- TERRA will work with authorities and communities in developing, testing and implementing the plans.
- Steps to be taken in the development of the internal plan include:
  - Identification of an EPR Champion;
  - Identification of internal and external stakeholders roles and responsibilities;
  - Identification of capacity and resources within TERRA for EPR;
  - Internal workshops with TERRA operational and service department directors to internalise EPR requirements;
  - Risk assessment for all operational areas (internal risks) and all third party activities that could result in risks to TERRA (external risks);
  - Preparation of procedures and registers for management of hazardous materials such as fertilizers and pesticides; and
  - Procedures for monitoring and evaluation.

## 8.9 Cultural Heritage Management Plan and Chance Find Procedure

- TERRA will develop and implement a cultural heritage management plan indicating the following measures:
  - The project infrastructure shall be aligned to avoid any known grave sites and sites which otherwise has cultural significance.
  - All Contractors shall take note of the cultural heritage sites determined and take measures to ensure that these areas are not disturbed by the construction or site clearing teams.
  - The designated HSE office bearer or their appointee must be trained in basic cultural heritage and archaeological site identification in order to immediately inform TERRA of any chance discovery including graves. The Contractors shall make provision for accidental discovery of archaeological sites and graves within the construction area. In the event of a

chance find they will immediately notify TERRA who must ensure that a chance find procedure in line with IFC PS8 pertaining to cultural heritage is implemented.

- In accordance with Section 11 and 12 of the IFC PS 8 Guidelines, removal of cultural heritage will be avoided unless:
  - There are no technically or financially feasible alternatives to removal;
  - The overall benefits of the project outweigh the anticipated cultural heritage loss from removal; and
  - Any removal of cultural heritage is conducted by the best available technique.
- The chance find procedure should include the following requirements:
  - Employees and Contractors should be notified that archaeological sites and/or graves/cemeteries may be exposed during the construction and land clearing activities;
  - Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, should cease immediately and the designated HSE office bearer or their appointee should be notified as soon as possible;
  - All discoveries should be reported immediately to the relevant authorities, so that an investigation and evaluation of the finds can be made;
  - Artefacts should not be removed, destroyed or interfered with by anyone on site;
  - For sites that may be found to occur within infrastructure footprints and cannot unavoidably be damaged through construction activities, the following should be undertaken:
    - In collaboration with affected stakeholders, develop relocation program for all graves and other objects that can be relocated or reconstructed. Relocation will include 1) identification and development of new locations to accommodate the displaced objects and 2) culturally-appropriate ceremonies for the removal and transfer of graves, sacred sites and other objects; and
    - Appropriate time and resources should be provided to allow for salvaging and studying of findings.

## 8.10 Influx Management Plan

A common impact of infrastructural projects in underdeveloped areas is the influx of opportunity seekers. The influx may be motivated by expectations around the development itself, or it might be the result of a more general perception of an opportunity. Project induced influx most commonly occurs in response to direct and indirect employment and economic opportunities. Project development and operation offers an array of legitimate and illegitimate economic opportunities, including:

- Employment with the project;
- Benefits offered by the project's compensation procedures (for land and crops) and community development activities;
- Opportunities to provide support services to the project;
- Opportunities to supply goods and services that capture the substantial increases in disposable cash incomes in the area once employment begins; and
- New business opportunities catalysed by the development and operation of the project (e.g., hotels, guest-houses, restaurants, bars, brothels).



This plan sets out TERRA's contribution to the mitigation of the negative impacts associated with uncontrolled influx. It recognised that a company has limited influence to stem or manage the effects of influx but it is believed that the measures proposed will make a contribution. This influx management plan aims to meet GIIP.

### 8.10.1 Types of influx

- **General regional migration to Kasenga:** this form of influx will require a broad response by parties in and around the Project area. TERRA proposes cooperating with other companies and local government in this context.
- **TERRA focused influx:** management of this form of influx and its effects can be undertaken largely by TERRA. A variety of measures is proposed, ranging from information dissemination to access control on the TERRA concession.
- **Compensation based influx:** influx of opportunists looking to benefit from the compensation and livelihood restoration process. The risk of opportunistic land invasion and/or un-entitled access to compensation and livelihood restoration will have to be managed by TERRA.

### 8.10.2 Proposed initiatives to address regional influx

TERRA will work with other companies and local government to convey regular and accurate information in appropriate media about development activities in the broader vicinity, and especially about job and procurement availability and procedures.

Where possible, TERRA will implement social development initiatives that will aid in mitigating the negative impacts caused by influx such as increased pressure on social services and social pathologies.

### 8.10.3 Proposed initiatives to address TERRA-focused influx

TERRA will manage influx precipitated by expectations and opportunism related to its presence and operations in the following ways:

- **Management of expectations:** this will be done via regular briefings on labour, recruitment and procurement to the TERRA community liaison structures. The representatives will receive training in communication, and TERRA communication will be disseminated through relevant community liaison structures.
- **Recruitment and supply chain transparency:** TERRA is committed to using local labour wherever possible and will establish a central point of registration for possible recruitment at an appropriate local venue.
- **Concession management and security arrangements:** concession access roads will have boom gates and access control, and major facilities (e.g. mill) will be fenced. Households and individuals with legitimate business in the concession area will be allowed access. All security arrangements will be in line with international good practice.
- **Community management of influx and influx impacts:** the communities in the project-impacted area will be informed of the risks of opportunistic influx, and will be provided with tools to address problems if they arise. The tools will include: training in local census-taking and in community record keeping; information on entitlements and management measures under the LACPF; information on TERRA's concession access control and conditions for access, and; information on the use of TERRA's grievance management mechanism.
- **Strategic Planning:** In order to help reduce the inevitable impacts of influx, TERRA will work with local government through a strategic planning process to develop plans and initiatives to

help mitigate the impacts. It is imperative that local government takes ownership of these plans, while TERRA will assist where possible. Some of the strategic plans that should be considered and proactively developed include:

- **Town Planning:** Local government, in conjunction with TERRA, should monitor and anticipate the future growth of communities in the area and plan accordingly. This should include future land requirements as well as provision of services such as water, electricity, schools, clinics and transportation networks.

Proactive strategic planning can be the cornerstone of an effective influx management strategy. As TERRA will create a certain amount of project induced influx, coupled with the capacity limitations of local government, it will be important for TERRA to take the lead on this process.

#### 8.10.4 Proposed initiatives to address compensation based influx

The economic displacement within the TERRA concession could potentially create an influx of opportunists looking to benefit from the compensation and livelihood restoration process. TERRA will have to manage influx related to the compensation and livelihood restoration process in the following manner:

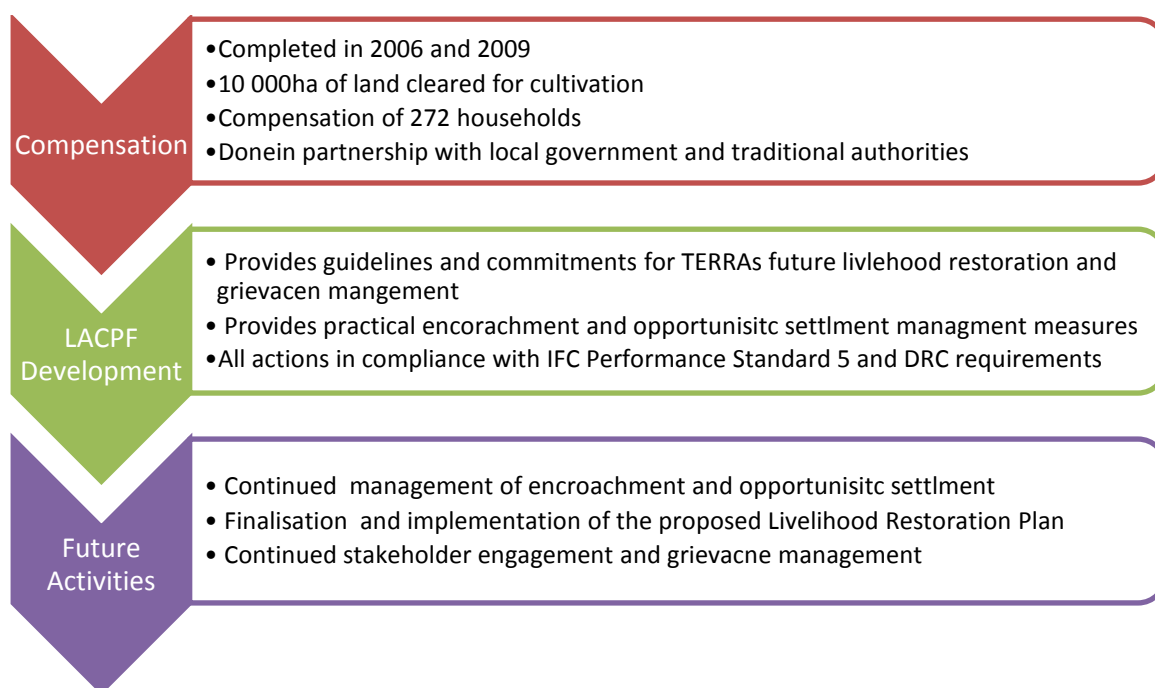
- **Compensation management:** TERRA has prepared a Land Acquisition and Compensation Policy Framework (LACPF) which has clear rules for entitlements and compensation. Where possible, economic displacement will be avoided for the project. This will be used as a tool to manage the opportunistic invasion of land;
- **Workforce management:** Providing a plan for workforce management, recruitment and housing, since economic displacement often will precede the official start of construction;
- **Land Tenure:** Structuring land tenure documents to safeguard against sale and/or exploitation
- **Protection of Vulnerable People:** Designing programs to safeguard vulnerable populations against exploitation; and
- **Community Engagement:** Engaging affected communities to build awareness about and management of influx and developing collaborative management strategies involving government, the project and affected communities.

### 8.11 Land Acquisition and Compensation Policy Framework

#### 8.11.1 Scope and Objectives of the LACPF

As only economic displacement has resulted from the Project, a full Resettlement Action Plan (RAP) is not required. The objectives of this document, the Land Acquisition and Compensation Policy Framework (LACPF) are to guide the livelihood restoration process with the goal of restoring or improving livelihoods where possible and managing future encroachment and opportunistic settlement.

The figure below provides an overview of the past, current and future phases.



**Figure 8.11: TERRA LACPF activities**

### 8.11.2 Compensation Process to date

TERRA have already compensated 272 households in order to clear the 10 000 ha area for cultivation. All affected households in the concession have been compensated according to DRC legislation and no further compensation is anticipated. The table below provides an overview of the economic displacement that has already occurred.

**Table 8.3: Extent of past economic displacement activities**

Date	Number of Economically Displaced Households	Extent of Landtake
2006	190	224 ha
2009	82	165 ha

TERRA has followed the following procedure in all of their compensation activities to date:

- The Ministry of Agriculture, Fishing and Animal Husbandry identified the individuals who were farming in the would be concession area;
- The Ministry then documented all the individuals, along with the size of land each of the individuals occupied
- The gazetted Ministry compensation rates per hectare were instituted;
- The affected farmers were compensated based on the size of their plots and rate per h.a.;
- According to DRC guidelines, individuals should be given at least 6 months to resettle; TERRA gave each individual 2 years to find alternative cropping area

Following the compensation process, TERRA followed the following process in order to secure replacement agricultural land:

1. Approval for land from the Village chief;
2. Approval from Village Chief's Group Members
3. Approval from Territory and District
4. NOC from District court;

5. Demand for Land in Land Department;
6. Measurement and GPS coordinates of Land from Technical Land department;
7. Land document for short period and clearance form Conservator;
8. Approval for Construction;
9. Approval from Environment Minister;
10. Land Title; and
11. Authorization from Minister

All the relevant certificates and approvals related to this process are included in Appendix A.

### **8.11.3 Future compensation and livelihood activities**

As TERRA have compensated all households within their 10 000 ha concession area, no further compensation is anticipated. However, there is a chance that encroachment and opportunistic settlement may occur which will have to be managed as per Section 1.1.4 of the LACPF.

Any further compensation will be conducted by TERRA in line with Good International Industry Practice (GIIP) and DRC requirements. This will include relocating the affected fields and compensating the relevant owners for loss of crops and income. Furthermore, TERRA will develop a Livelihood Restoration Plan (LRP) in order to restore, or improve, household's sources of livelihoods.

### **8.11.4 Management of Encroachment and Opportunistic Settlement**

As TERRA have already compensated all households who were active on their 10 000 ha concession area, it will be important to implement various management measures to control and mitigate encroachment back in to the area and opportunistic settlement of people seeking compensation or benefits. TERRA will implement the following management measures:

- Enforce the cut-off date for households eligible for compensation. As compensation process is complete, it will be important to clearly disseminate this date and make it clear that any households encroaching or settling in the area after the date will not be eligible for compensation;
- Clearly demarcate the concession area with the use of signs and boundary markings;
- Where fencing is constructed, TERRA must ensure that alternative access points are provided to community members where necessary; and
- Actively engage with local communities and traditional authorities to ensure their awareness of the concession area and their cooperation with monitoring and enforcement of encroachment and opportunistic settlement.

### **8.11.5 Grievance Management**

A transparent, accessible and accountable mechanism through which affected people can express grievances is an important mechanism for sustaining good relations between TERRA and its stakeholders. It is accepted good practice to afford affected parties the opportunity to air concerns and grievances related to sensitive issues such as compensation. Against this background a grievance management provision is a requirement of a comprehensive LACPF.

#### **Objectives**

The objectives of the complaints and grievance procedure are:

- To create a transparent and legitimate process between TERRA and the affected households that enhances the relationship, improves communication and builds trust ;

- To link the process to the overall stakeholder engagement strategy to allow the two processes to be mutually reinforcing;
- To create a 'mouthpiece' for the affected community to voice their concerns;
- To address compensation and livelihood restoration related concerns and grievances effectively and promptly in a manner that is mutually beneficial to both TERRA and the affected households;
- To deal with issues quickly and effectively therefore reducing reputational risks that can be associated with the compensation and livelihood restoration process.

## Communication

The availability of the complaints and grievance redress mechanisms will be communicated during all consultations with the affected community ensuring that stakeholders, including all affected households, are aware of the procedure and have easy access to strategic points through which grievances and complaints can be submitted, recorded, and resolved at no cost or retribution.

### 8.11.6 Likely Types of Grievances and Disputes

In practice, grievances and disputes that are most likely following the compensation and during livelihood restoration process are:

- Disputes over plot limits, either between the affected person and the Project, or between neighbours;
- Disputes over the ownership of a given asset (two or more individuals claim to be the owners of such an asset);
- Disagreement over the valuation of an asset;
- Family disputes resulting in conflict amongst family members over ownership or shares of a given asset; and
- Disagreement over livelihood restoration measures.

It should also be noted that any query or comment should also be acknowledged and addressed before it becomes an issue or grievance.

### 8.11.7 Livelihood Restoration Plan

#### Purpose

IFC Guidance notes that *"simple restoration of livelihood may be insufficient to protect affected populations from adverse project impacts, especially induced effects such as competition for resources and employment, inflation, and the breakdown of social support networks. For this reason, IFC seeks to promote the improvement of the living standards of people affected by the project"*

The social-economic baseline shows that a majority of the households in the Project area are poor and sustain their livelihoods through multiple livelihood activities. Agriculture is prominent among these activities, providing food for household consumption, and in some cases, surplus produce is sold to generate income. Other sources of livelihood include charcoal production and animal husbandry.

The LRP describes TERRA's strategy to ensure that livelihoods disrupted by land acquisition and clearing are speedily restored, sustained and where possible improved. Inputs proposed via the LRP will be implemented as part of a broader development programme. Participation of affected households and local authorities is central to the success of this broader development programme.

## **Links with TERRA's CSR Initiatives**

Where possible, TERRA will link the proposed livelihood restoration initiatives detailed below with their current and future Corporate Social Responsibility (CSR) activities. This will enable TERRA to replace and possibly improve the livelihoods of both the affected households and the broader community.

TERRA currently has a Community Development Plan (CDP) that focuses on improved agricultural output and social infrastructure development.

## **Livelihoods Restoration Programme**

All households affected by economic displacement will be eligible to participate in the livelihood restoration programme. Some of the options that will be considered by TERRA for the LRP include the following:

- Money management awareness;
- Agriculture enhancement through the Farmer Training Programme;
- Out grower scheme; and
- Training in non-farming income generating activities and related business support.

## **Money management awareness**

Experience with cash compensation in other African countries suggests that people awarded cash compensation are vulnerable to misuse and mismanagement of the cash, which in many cases is often used for short term expenses. To prevent households experiencing increased vulnerability as a result of receiving cash compensation, TERRA should assist households with improving their awareness on money management.

All households receiving cash compensation could be encouraged to attend a course on money management, which would aim to:

- Assist households with securing cash;
- Provide tips on avoiding misuse and mismanagement of funds; and
- Help households with skills to improve savings and expenditure.

These training services would need to be provided by an organisation experienced in facilitating money management awareness courses. If these are not available in the area then an experienced resettlement consultant could provide this service.

## **Agricultural enhancement**

TERRA plan to improve agricultural output through their Farmer Training Program. This initiative aims to assist households with improving their agricultural output and farming techniques. This would include the following:

- Practical skills training courses on improved agriculture techniques, including fertilization, small scale irrigation, related equipment and post-harvest grain conservation;
- Provision of fertilizer and seeds; and
- Extension services and related monitoring.

Training and extension services should be provided by TERRA as they are experienced in agricultural development in the area.

## **TERRA Out-Grower Scheme**

TERRA will develop an out-grower scheme to assist affected households, and the broader community, in increasing maize production, as well as securing supply for its milling facilities. This initiative will also assist affected households as they will be guaranteed off-take.

Currently, TERRA's agronomists frequently visit the surrounding farmers and educate them about good farming practices. Down the line, TERRA is considering providing inputs to local farmers by setting a buy back agreement, which would help improve yields.

Over all, this will improve the standard of living of the affected households as well as the broader community as every farmer would have a guaranteed off-take, substantially reducing the risk of any post-harvest losses.

## **Training and business support**

Currently affected households are characterised by high levels of unemployment, dependence and reliance on subsistence farming. Training and business support will aim to assist households with improving their livelihoods by diversifying their income sources. This programme could potentially include the following activities:

- Assist households with identifying feasible non-farm income generating activities;
- Provide skills training and support for generating alternative livelihood strategies; and
- Related monitoring and support for a period of five years.

## **Managing the LRP**

As a cooperative and multi-faceted programme the LRP will require coordination and management. This role will be undertaken by TERRA, or by a resettlement consultant hired by TERRA to oversee the management and implementation of this Plan. The contributions of the resettlement consultant will be outlined in a Memorandum of Understanding.

## **Ensuring Sustainability**

All LRP programmes will need to be designed to ensure sustainability. Through an analytical and consultative process adequate projects will need to be identified that seek to address potential social opportunities to enhance and improve the livelihoods of those affected by displacement. In addition, these programmes will need to be implemented with a broader development strategy that aims to mitigate social impacts and risks.

## **8.11.8 Monitoring and Evaluation**

### **General Objectives of Monitoring and Evaluation**

International standards require monitoring and evaluation on the effectiveness of economic displacement and rehabilitation activities, the disbursement of compensation, the effectiveness of public consultation and participation activities and the sustainability of income restoration and development efforts among affected communities.

The primary objective of the LACPF monitoring and evaluation programme is to ensure that the Plan is fully implemented, and that affected households derive maximum benefit from the agreed compensation and associated development support. Further objectives include the following:

- a) To guide further interactions with affected persons and communities;
- b) To learn lessons that might be fed back into future LACPF activities;
- c) To build a base of goodwill and trust between TERRA and affected persons/communities;

- d) To secure early warning of problems and potential conflicts; and
- e) To establish a base for feedback with affected households, local government, and other stakeholders.

### Internal and External Monitoring

The monitoring and evaluation programme aims to ensure the LACPF meet its objectives and complies with international standards. Internal and external monitoring is an integral component of the LACPF process and has the following general objectives:

- a) To assess progress with LACPF activities;
- b) To monitor implementation of the livelihood restoration processes;
- c) To determine the impact of livelihood restoration and compensation on affected households;
- d) To prevent potential impacts adversely affecting impacted households; and
- e) To determine the nature and causes of LACPF implementation problems and identify solutions.

### Performance Indicators

Key performance indicators assist with monitoring and managing LACPF implementation and economic displacement impacts. These indicators are classified under three broad categories listed below:

- i) **Process indicators:** Indicating project inputs, expenditures, staff deployment etc. These indicators will largely address TERRA's internal arrangements;
- ii) **Output indicators:** Indicating LACPF implementation results in terms of numbers of affected people compensated, livelihood restoration training, etc. These indicators will largely assess the LACPF's internal implementation processes and results; and
- iii) **Impact indicators:** Measuring the longer-term effects on people affected by economic displacement. Impacts can be determined using the established social baseline and the grievance mechanism. These indicators will largely determine the external impacts of the LACPF implementation process.

Table 8.4 outlines a set of key indicators for each of the categories.

**Table 8.4: Key performance indicators**

Indicator	Description	Measure
<b>Process indicators</b>		
Staff deployment	<ul style="list-style-type: none"> <li>• If required, recruit additional staff members or external consultants to assist with LACPF implementation, management and monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Number of staff</li> <li>• Terms of reference for external consultants and resettlement specialists</li> <li>• Staff training</li> </ul>
Internal staff meetings	<ul style="list-style-type: none"> <li>• Weekly meetings held with staff responsible for compensation and livelihood restoration</li> <li>• Monthly management meetings with key project personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Minutes from management meetings</li> </ul>
Meetings with key stakeholders	<ul style="list-style-type: none"> <li>• Monthly meetings with community authorities (i.e. Traditional Authorities)</li> </ul>	<ul style="list-style-type: none"> <li>• Minutes from meetings</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• Monthly progress reports</li> <li>• Annual reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Reports</li> </ul>
Expenditure	<ul style="list-style-type: none"> <li>• Expenditure on compensation</li> </ul>	<ul style="list-style-type: none"> <li>• LACPF budget</li> </ul>



Indicator	Description	Measure
	and livelihood restoration programmes	
<b>Output indicators</b>		
Project affected people	<ul style="list-style-type: none"> <li>Details of people affected by economic displacement</li> </ul>	<ul style="list-style-type: none"> <li>Number of people affected by economic displacement</li> </ul>
Compensation	<ul style="list-style-type: none"> <li>Descriptions of compensation payments</li> </ul>	<ul style="list-style-type: none"> <li>Compensation payment amounts</li> <li>Signed compensation forms</li> </ul>
Livelihood restoration training	<ul style="list-style-type: none"> <li>Review livelihood</li> </ul>	<ul style="list-style-type: none"> <li>Number of programme participants</li> </ul>
Grievances	<ul style="list-style-type: none"> <li>Review the effectiveness of the grievance mechanism</li> </ul>	<ul style="list-style-type: none"> <li>Number of grievances received</li> <li>Number of hearings</li> <li>Percentage of grievances resolved</li> <li>Percentage of grievances still outstanding</li> </ul>
<b>Impact indicators</b>		
Collect socio-economic data on affected households	<ul style="list-style-type: none"> <li>Undertake a household survey with project affected people</li> </ul>	<ul style="list-style-type: none"> <li>Updated socio-economic baseline</li> <li>Determine differences between pre- and post compensation and LRP income</li> <li>Percentage of households with improved income</li> </ul>
Livelihood restoration	<ul style="list-style-type: none"> <li>Review the effectiveness of the livelihoods restoration plan</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of households who have continued farming</li> <li>Percentage of households pleased with the livelihood restoration process</li> </ul>
Perceptions of project affected people	<ul style="list-style-type: none"> <li>Document changes in households perceptions and evaluate households satisfaction with the livelihood restoration and compensation process</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of households pleased with the compensation process</li> <li>Percentage of households with positive sentiments towards TERRA</li> <li>Percentage of households with improved quality of life</li> </ul>
Vulnerable households	<ul style="list-style-type: none"> <li>Undertake a household survey with vulnerable households</li> <li>Monitor and do bi-annual visits to vulnerable households</li> </ul>	<ul style="list-style-type: none"> <li>Updated socio-economic baseline on vulnerable households</li> <li>Determine differences between pre- and post LRP income</li> <li>Percentage of households with improved income</li> </ul>

## Monitoring Plan

The Plan identifies the various LACPF management domains, some of the key performance areas, broad performance indicators, monitoring responsibilities, timing and frequency of monitoring, reporting, and the overall duration of specific monitoring initiatives. Apart from ongoing monitoring, key monitoring intervals will be the following:

- a) On completion of the LACPF implementation TERRA will commission a Completion Audit to determine whether livelihood restoration and compensation complied with the procedures and policies outlined in this LACPF, and more generally with the IFC's Performance Standards and DRC legislation;

- b) Six months after implementation. This will be largely internally managed, and will provide an opportunity to correct deviations from the principles and objectives of the LACPF. An evaluation session involving the main stakeholders will be considered. The session will identify key lessons.
- c) One year after implementation. Internal and external evaluations will take place on this occasion. The internal evaluation will focus on livelihoods restoration activities, and the external on sustainability.
- d) Two years after implementation. A second external review will take place on this occasion, again focussed on issues of sustainability.

## 8.12 Contractor Management Plan

The IFC PS2 principles guiding contractor management pertain to labour and working conditions.

### 8.12.1 Screening and induction

- TERRA should conduct a proper screening and background checks will be undertaken before Contractors are appointed to check previous social offences such as rapes, child abuse and any other social violence related offences. Anyone with a record of such offences should not be hired.
- Contractor inductions will be undertaken before commencing with construction and land clearing in relation to:
  - **Community health and safety:** To address social pathologies in neighbouring communities through promoting education and awareness programs for Contractors. Similarly, communities should also receive training relating to these aspects. These training programs should be developed in consultation with local government health departments, education Departments, NGOs and CBOs, and should be targeted more to the vulnerable groups of society, i.e. children, women and the elderly; and
  - **Cultural sensitivity issues:** To address Contractor behaviour in relation to community resources and assets and prevent utilization of such by the contractors.

### 8.12.2 Accommodation

- TERRA will ensure that accommodation meets requirements as per the IFC's guidance note on Workers' Accommodation.
- Contractors should be accommodated in dedicated fenced off construction camps, with all facilities and amenities far away from the communities.
- Proper access control measures should be implemented to prevent unauthorised people entering the construction camp and to monitor movement of Contractors into and out of the construction camp. Contractors should not be allowed visitors at the construction camp.

### 8.12.3 Code of Conduct

- There needs to be a Code of Conduct for Contractors to adhere at all times. This should cover the following issues:
  - Relationships with the surrounding communities- violence towards communities, unauthorised use of community assets and resources etc.;
  - Sexual misconduct; and
  - Drug and alcohol abuse.

- Stringent measures should be put in place to address offenders and this should form part of the employment contract and should be agreed upon before the employment contract can be signed.
- Measures should be based on the national or international labour principles. The IFC PS 2: Labour and Working Conditions, paragraph 19) asserts that “the client should ensure that all workers receive notice of dismissal and severance payments mandated by law and collective agreements in a timely manner. All outstanding back pay and social security benefits and pension contributions and benefits will be paid (i) on or before termination of the working relationship to the workers, (ii) where appropriate, for the benefit of the workers, or (iii) payment will be made in accordance with a timeline agreed through a collective agreement.”
- An ongoing community education programme, to include the grievance process and community members’ rights, should be implemented.

#### 8.12.4 Grievance procedure

The SEP contains the grievance procedure that should be distributed to communities. It needs to be ensured that this is aligned with the grievance procedures for both community members to report offences by Contractors, and for Contractors to report offences by communities.

The dedicated community grievance procedure should take the following into consideration:

- Appropriate location for lodging of grievances. Children should report the incident at school if that is the location of the incident. If the incident happens at home, this should be reported through the central grievance office;
- Cut-off time for grievances to be lodged, e.g. within 24 hours of the incident happening;
- Turn-around time for the grievances to be addressed, and identification of designated person to provide feedback;
- Availability of a full-time translator to translate for local communities; and
- Assessment of legitimacy of the grievance, with the need for witnesses to be defined.

The dedicated grievance procedure for Contractors to report offences by community members should take the following into consideration:

- Appropriate location for lodging of grievances;
- Cut-off time for grievances to be lodged e.g. within 24 hours of the incident happening;
- Turn-around time for the grievances to be addressed, and identification of designated person to provide feedback; and
- Assessment of legitimacy of the grievance, with the need for witnesses to be defined.

### 8.13 Employment and Capacity Plan

IFC PS 2, Principles 15, 18, 19 and 20 are relevant to employment and capacity issues. TERRA should engage and co-ordinate with the relevant authority in the district relating to local employment to determine the following:

- Availability of a database of unemployed people;
- Assistance provided to registered people to assess job opportunities.

### 8.13.1 Local recruitment strategy

TERRA must develop a local recruitment strategy to address access to job opportunities by local communities. This should address the following issues:

- Avoidance of discrimination in recruitment, including ensuring that men and women have equal opportunity;
- Confirmation with the communities and local *chefs* regarding which villages to be prioritised for employment. Ensure that an equitable number of individuals are employed from each village within the determined zone of influence;
- Maximize employment benefit to as many people within the Projects area of influence as feasible;
- Avoidance of raised expectations, including through clear communication and transparency regarding the actual number of job opportunities available for the local communities;
- Avoidance of on-site recruitment, close to the gate, or at the Contractors camp, including for ad-hoc or temporary positions;
- Development of very clear recruitment guidelines in terms of the following:
  - Where jobs are advertised and what medium is used for advertising jobs;
  - How applicants should respond to the job adverts, such as where applications should be sent and by which date;
  - Duration of the jobs and payment levels are to be agreed upon before any contract can be signed;
  - Local community members should not be responsible for recruitment as there are possibilities for favouritism;
  - Specific skills needs and general minimum recruitment requirements must be obtained from potential employees;
- Verification of submissions must be enforced through submission slips to be provided to the applicants. Applicants should further be provided with contact details for follow-ups regarding their applications;
- Turnaround time by which to inform applicants of the results;
- Equitable distribution of casual employment among local villagers; and
- Where there are labour offences punishable by dismissal, these should be discussed with the potential employee and should form part of the employment contract and agreed with the potential employee before resuming employment.

### 8.13.2 Recruitment management

TERRA's Recruitment will be in line with its policy and the Local Department of Labour.

TERRA should appoint a dedicated resource to address recruitment and capacity issues at an offsite office. The approach by TERRA must include:

- Regular monitoring of the and gathering of feedback on recruitment issues;
- Proper management and adherence to TERRA's recruitment strategies where Contractors need to recruit employees separately; and

- Use the developed Grievance Mechanism to address some of the recruitment related issues and develop measures to deal with unsuccessful jobseekers.

### **8.13.3 Community training and skills**

- Assess the need for a skills survey within the project's primary zone of influence to identify available skills within the area. Jobseekers should be given an opportunity to register on the relevant database, providing evidence of any qualifications and work experience that they have;
- Where there are no skills readily available provide agricultural and general industry related training and development to the local community members ahead of the operational phase to ensure they are ready to access job opportunities when they arise;
- Develop a bursary scheme for children in high school (who excel in their studies) to enable them to further their studies in relation to large scale agricultural operations;
- Upgrade the SDP to meet GIIP to cater for people who might not qualify for employment at the farm. Actions should include the following:
  - Develop alternative livelihoods strategies to enable other people not employed by TERRA still benefit from the operation.

### **8.13.4 Confidentiality**

Manage employees to ensure they do not divulge employment related information to the local communities. Actions should include the following:

- All employees should sign confidentiality agreements to prevent them from divulging recruitment information and thus raising expectations that could not necessarily be met.
- Employees found to be in violation of this requirement should be dealt with accordingly.

### **8.13.5 Dismissals or retrenchments**

Should there be a need to dismiss or retrench employed people before their employment contract comes to an end, the following measures should be put in place:

- Communicate the reasons for the retrenchments with the affected people and their representatives;
- Pay all amounts owing to the employee before the actual dismissal takes place;
- If the dismissal is related to an offence by the employee, depending on the type of offence, the employee can be suspended with or without pay while investigations are under way.

### **8.13.6 Employment grievance mechanism**

A grievance mechanism must be in place for employment related queries and unrest. Where prospective employees demonstrate dissatisfaction in the manner in which their applications were handled, there needs to be a process of communicating this dissatisfaction through the established grievance mechanism.

### **8.13.7 Dissemination of the Employment and Capacity Plan**

Information relating to this strategy should be disseminated to the local communities through the available community engagement platforms.

## 8.14 Water Management Plan

The Water Management Plan of the Project (WMPP) outlines the management commitments that TERRA will implement to mitigate and monitor negative impacts to the surface and groundwater resources, and enhance positive impacts identified in Section 7. The overall objective of all the management commitments is to ensure compliance with the relevant in-country legislation, as well as take into consideration relevant TERRA policies.

The WMPP is a living document that will be periodically reviewed and updated by TERA in response to changes to the project description, changes in the organisational structure and changes in the legislation in the DRC as well as other guidelines and practices that the company subscribes to.

As part of on-going implementation, this WMP will also be publicly disclosed.

Mitigation of the potential impacts is taken to represent all facets of actions taken to avoid or reduce negative effects and enhance positive effects, including the following hierarchy:

- Avoidance;
- Minimization;
- Rehabilitation; and
- Compensation.

### 8.14.1 Objectives

The water management action plan for the expansion and operation phases of the project includes various design features, mitigation measures and best management practices to achieve the following environmental management objectives:

- Undertake expansion and operation activities in a manner that will minimize the adverse effects of the on human and ecological beneficiaries of the current water regime;
- Changes in the water regime should be reversible to such an extent that there will not be any significant lasting adverse effects on the human and ecological beneficiaries; and
- Undertake activities to allow for long-term sustainable use of the water resources.

### 8.14.2 Mitigation

#### **Measures to mitigate potential water degradation or deterioration and water contamination or pollution hazards**

The surface and groundwater action plans for the expansion and operation phases of the TERRA agricultural project will include various design features, mitigation measures, and best management practices to achieve the environmental management objectives. Environmental management objectives pertaining to surface water will include using rain water for irrigation to minimize the pressure on surface water resources, minimizing the project's impact on surface water quality by releasing (non-contact water) storm water runoff to the environment or diverting it around the project area, recycling or containing contact water and minimizing the project's impact on surface water flows.

Environmental management objectives pertaining to groundwater include undertaking expansion and operation activities in a manner that will minimize the adverse effects of the project on human and ecological beneficiaries of the current groundwater regime, planning that after operations changes in the groundwater regime are reversible and will not cause significant lasting adverse effects on the

human and ecological beneficiaries, and undertaking activities to allow for long-term sustainable use of groundwater.

Mitigation measures for addressing potential pollution and water quality deterioration, pertaining to surface and groundwater, may include water management, chemical storage and handling, and cultivated land site layout designs. Each is discussed below.

- Staff and contractors will be trained regarding the surface water management measures outlined in this action plan to ensure that their daily activities and actions do not compromise the action plan. The plant site “first flush” runoff will be captured in a containment facility sized to contain the first ten minutes of a precipitation event. The runoff from the chemical and hydrocarbons storage sites will be captured in storm water ponds. The storm water captured in the stormwater ponds may be used for dust suppression after adequate treatment. The storm water dams will be designed to spill no more than once every ten years, on average.
- Proper storage facilities, with secondary containment, will be established for the storage of oils, grease, fuels, chemicals and other hazardous materials to be used during all phases of the project as appropriate. Fuel storage areas established to date are in a secure area in a steel tank above surface. New fuel storage areas will be designed with steel tanks and appropriate secondary containment systems. Furthermore, all storage tanks in the expansion area will be located in adequately bunded areas capable of containing 100 percent of the volume of the largest tank. The area inside the containment shall be built to prevent contamination of surface and groundwater and the installation of underground storage tanks will be avoided.
- Refuelling and maintenance of vehicles will occur primarily within specified depots. Working areas and fuel transfer areas within these depots will be underlain by an impermeable surface and will have grease traps or oil/water separators to ensure that no spill of lubricants, oils or fuels reaches local water. Repairs done on machinery using hydrocarbons as fuels or lubricants will have a drip tray placed strategically to avoid incidental spills. Furthermore, the location of workshops, maintenance and refuelling sites and materials storage areas will be located away from watercourses.
- Where possible, the volumes of pesticides, herbicides and fungicides will be reduced. Bio-degradable pesticides will be used to minimize pollution of surface and groundwater resources by the applied chemicals.

### **Measures to mitigate potential runoff and soil erosion from the cultivated land**

It is recommended that the agricultural practices are aimed at minimising potential runoff and soil erosion of the cultivated land so as to minimise off-site discharge of runoff and sediments. Generally erosion rates should be kept lower than the soil regeneration rate, estimated at 10t/ha/annum. In-field practices should include:

- Contour ploughing;
- Minimising exposed areas during the rainfall period;
- Establishing cropping systems with maximum cover;
- Agricultural practices that promote the ploughing of non-harvested plant matter back into the upper soil horizons;
- Establishing contour drainage channels and terraces to reduce downslope runoff velocities to a recommended minimum and
- Soil water management to promote infiltration of rain and irrigated water.

**Off field measures should include:**

- Two cut off drains to discharge to holding ponds for re-use;
- Establishment of wetland areas or flow diversions at concentrated off-field discharge points to minimise velocities and sediment entrainment and

Establishment of erosion protection structures where flow velocities are excessive.

## 8.15 Certification

TERRA should obtain certification in line with the requirements of PS6, which necessitate that *“primary production practices are codified in globally, regionally, or nationally recognised standards”*. The ESMS that includes the ESMP should demonstrate credible standards for agribusiness projects that will undergo independent verification for certification purposes.

## 8.16 Checking and corrective action

Checking and, if necessary implementing corrective action, a key component of the ESMP management cycle. They ensure that the:

- Required ESMP management activities are being implemented; and
- Desired outcomes are being achieved.

### 8.16.1 Inspections: construction phase

An ongoing, but pragmatic inspection regime will be developed that allows for potential EHS transgressions to be identified proactively so that mitigation can be quickly and effectively implemented.

### 8.16.2 Internal and external audits

- Where the monitoring data and the inspection reports highlight problems, an internal audit will be used by TERRA to ascertain the source of the problem and to define action to prevent its recurrence. The three key areas for audit are facilities (are they operating properly?), project procedures (are they properly designed and implemented?) and finally, and perhaps most importantly Contractor's EHS performance.
- TERRA auditing regime will address the requirements of international lending institutions and commercial banks for external, independent monitoring verification, as well as regular audits of the ESMP implementation.

### 8.16.3 Corrective action

There are several mechanisms for implementing corrective action, both during the construction and operational phases. Mechanisms to address transgressions include:

- Verbal instruction (in the event of minor transgressions from established procedure, usually following a site inspection);
- Written instruction (identifying source/s of problems, usually following an audit); and
- Contract notice (following possible breach of contract).

### 8.16.4 Reporting

The findings of all of the above will be structured into instructive reporting that provides information to all required parties on EHS performance, together with clearly defined corrective action where this is seen to be required. Both the monitoring and inspections are reported on continuously. Within the



reporting structure it is necessary to create a review function that continuously assesses the reporting and prescribes any necessary corrective action. Reporting will include the provision of information on the EHS performance to external stakeholders and surrounding communities.

### **8.16.5 Management review**

TERRA will undertake a formal management review of the ESMP at defined intervals, both during the construction and operational phases. The purpose of the management review is for senior project management to review the environmental management performance during the preceding period and to propose measures for improving that performance in the spirit of continuous improvement.

### **8.16.6 Liaison**

Throughout the project, ongoing liaison will be maintained with authorities and communities alike to ensure the following:

- Timeous advance warning of any project activities that may have some adverse impact on surrounding communities, e.g. clearing of additional land; and
- Ongoing feedback on the EHS performance of the project.

## **8.17 Environmental and Social Monitoring**

Provisional environmental and social variables that are to be monitored during the various project phases are set out in the table below. These should be expanded upon and refined in the Comprehensive ESIA and ESMP as more information and improved understanding of the project environment becomes available. Monitoring results must be structured and presented for review on an ongoing basis so that if objectives and targets are not met, corrective action can be taken.

The full monitoring plan and chosen indicators will need to fulfil requirements including the following:

- Information gathered needs to be specific for meaningful interpretation covering the material potential impacts;
- Indicators need to be measurable and auditable, so that results can be verified;
- Monitoring needs to be relevant to specific receptors potentially impacted within the project area of influence; and
- Monitoring programmes further need to be time-bound with a clear schedule of monitoring activities.

Some environmental aspects will require continuous monitoring. A pragmatic approach needs to be taken to ensure that monitoring of relevant aspects is undertaken at the appropriate level.

**Table 8-4: Environmental and social monitoring**

Phase	Monitoring parameters	Reference location/ monitoring point	Monitoring frequency	Implementing Body
<b>Climate and air quality</b>				
Construction	Monitoring of PM10 during the construction phase of the project and to also undertake audits to determine efficiency of management measures. Dust fallout monitoring will need to be undertaken at nearby villages as dust emissions are expected to be high during land clearing activities. Data should be compared to local and international standards (IFC PS3, as well as EHS guidelines for the agricultural industry)	It is proposed that monitoring points to be determined during Final ESIA and ESMP site visit	Quarterly monitoring, review and reporting of air quality parameters and conditions according to the requirements of the site Air Quality Monitoring Plan	TERRA
Operation	Monitoring of PM10 during the operational phase of the project and to also undertake quarterly audits to determine efficiency of management measures. Dust fallout monitoring will need to continue at nearby villages, as dust emissions are expected to be high. Data should be compared to local and international standards (IFC PS3, as well as EHS guidelines for the agricultural industry).	It is proposed that monitoring points to be determined during Final ESIA and ESMP site visit	Quarterly monitoring, review and reporting of air quality parameters and conditions according to the requirements of the site Air Quality Monitoring Plan	TERRA
<b>Biodiversity</b>				
Construction Operation	Inspections of operations to ensure minimization of project footprint and control of dust through measures contained in the Construction and Land Clearing Management Plan.	Site wide	Monthly (during construction and land clearing)	TERRA
Construction Operation	Report on new disturbances, conservation actions and rehabilitation measures through measures contained in the Construction and Land Clearing Management Plan	Site wide	Annually	TERRA
Construction Operation	Monitoring, review and reporting on quality, quantity and impacts of contact water discharged into environment according to the Water Quality Monitoring Plan	Site wide	Quarterly	TERRA

<b>Phase</b>	<b>Monitoring parameters</b>	<b>Reference location/ monitoring point</b>	<b>Monitoring frequency</b>	<b>Implementing Body</b>
Construction Operation	Review of the effectiveness of the Water Quality Monitoring Plan	Site wide	Annually	TERRA
<b>Ecosystem services and economics</b>				
Construction Operation	Monitor increased pressure on natural resources resulting from project-related influx through measures contained in the SEP and Influx Management Plan	Site wide	Annually	TERRA
Construction Operation	Monitoring for generation of employment through review of employment figures and vocational training numbers, as well as the Employment and Capacity Plan	Site wide and regional	Monthly	TERRA
Construction Operation	Monitor skills levels, skills development, enterprise development, as well as capacity building in the broader project area through measures contained in the SEP and the Employment and Capacity Plan	Site wide and regional	Annually	TERRA
Construction Operation	Monitoring of improvement in infrastructure in the project area through social investment activities	Site wide	Annually	TERRA
Construction Operations	Monitoring of increased direct revenue to national government via report payments to government (taxes, royalties etc) via the Extractive Industries Transparency Initiative (EITI).	Site wide	Annually	TERRA
<b>Groundwater resources</b>				
Construction Operation	The groundwater quality monitoring program will include continuing with the existing baseline groundwater quality monitoring network, and removing obsolete or adding new sites to the network to accommodate the expansion of the cultivated land. Monitoring sites to the north of the current cultivated land will be established. Locations will be added and modified as	<ul style="list-style-type: none"> <li>• TBH1: Water supply borehole;</li> <li>• TBH2: Water supply borehole;</li> <li>• HDW1: Community Well.</li> </ul>	Quarterly	TERRA

Phase	Monitoring parameters	Reference location/ monitoring point	Monitoring frequency	Implementing Body
	<p>appropriate to address the full extent of effects due to the expansion.</p> <p>There is no surface and groundwater monitoring programme outside the project area.</p> <p>Conventional parameters include total alkalinity, total dissolved solids, total suspended solids, total organic carbon, dissolved organic carbon, chemical oxygen demand, biochemical oxygen demand, Hardness, Color.</p>			
<b>Surfacewater resources</b>				
Construction Operations	<p>The surface water quality monitoring program will include a continuation of monitoring at the identified baseline monitoring points. Additional monitoring sites or changes to prior monitoring sites will be considered to the network when the cultivated land expands.</p> <p>The surface water flow monitoring program will include monitoring at all the baseline surface water quality sites. Additional monitoring sites or changes to prior monitoring sites may be considered to the network as the cultivated land expands. Surface water flows will be monitored monthly, except where automatic monitors are installed to provide continuous data.</p> <p>Conventional parameters include total alkalinity, total dissolved solids, total suspended solids, total organic carbon, dissolved organic carbon, chemical oxygen demand, biochemical oxygen demand, Hardness, Color.</p>	<ul style="list-style-type: none"> <li>• SW1: Upstream monitoring point at Besa River</li> <li>• SW2: Downstream monitoring point in a channel</li> <li>• SW3: Monitoring point at Kafira River</li> <li>• SW4: Downstream monitoring point in a channel</li> <li>• Lake Lubanda</li> </ul>	Monthly	
<b>Soils, land capability and landuse</b>				
Construction	Monitoring of soils, land capability and landuse to be through measures contained in the Construction and Land Clearing Management Plan	It is proposed that this is determined by a Closure specialist during the Final ESIA and ESMP	Monthly: <ul style="list-style-type: none"> <li>• Inspect activities for the implementation of mitigation measures including soil salvage/management,</li> </ul>	TERRA

Phase	Monitoring parameters	Reference location/ monitoring point	Monitoring frequency	Implementing Body
			storm water controls, etc. Keep record of inspections and areas visited; and <ul style="list-style-type: none"> <li>• Inspect fertilizer and pesticide storage area containment areas.</li> </ul> Annually: <ul style="list-style-type: none"> <li>• Record total and new areas disturbed, volume of soil salvaged, and areas where reclamation is complete;</li> <li>• Site wide evaluation on the effectiveness of erosion control efforts including erosion control structures and measures implemented;</li> <li>• Evaluation on the effectiveness of the spill response plan, including a review of significant spill incidents and mitigation measures; and</li> </ul>	
<b>Noise</b>				
Construction	Continuous noise to be monitored through measures contained in the Construction and Land Clearing Management Plan, through variables including: <ul style="list-style-type: none"> <li>• <math>L_{Aeq}</math> (A-weighted equivalent continuous sound pressure level)</li> <li>• Monitor daytime and night-time levels, focusing on worst-case levels expected at night</li> <li>• Log noise in 10-minute averaging intervals</li> <li>• (<math>L_{Aeq, 10 \text{ min}}</math>)</li> </ul> Monitored through measure	Monitor continuous noise in nearby villages. It is proposed that exact monitoring points to be determined during Final ESIA and ESMP site visit	With construction in progress, conduct at least one noise monitoring survey per month. Each survey to cover at least one 24-hour period	TERRA

Phase	Monitoring parameters	Reference location/ monitoring point	Monitoring frequency	Implementing Body
Operation	<p>Continuous noise to be monitored through measures contained in the Construction Management Plan through variables including:</p> <ul style="list-style-type: none"> <li>• <math>L_{Aeq}</math> (A-weighted equivalent continuous sound pressure level)</li> <li>• Monitor daytime and night-time levels, focusing on worst-case levels expected at night</li> <li>• Log noise in 10-minute averaging intervals</li> <li>• (<math>L_{Aeq, 10 \text{ min}}</math>)</li> </ul>	Monitor continuous noise in nearby villages. It is proposed that exact monitoring points to be determined during Final ESIA and ESMP site visit	<p>With ploughing, harvesting, milling etc. taking place and with the mill in operation, conduct at least one noise monitoring survey per month. Each survey to cover at least one 24-hour period.</p> <p>Carry out additional 24-hour surveys during mill maintenance shut-downs to verify background levels in the absence of mill noise and to determine the increase in ambient levels when operations resume.</p>	TERRA
<b>Traffic and transportation</b>				
Construction Operation	Monitoring to be undertaken through review of project traffic volumes on all roads, intersections, road conditions, traffic incidents/accidents and consider potential corrective measures contained in the CHSP	Site wide	Annually	TERRA
Operation	Monitoring of implement of safety rules and procedures to be undertaken as outlined in the CHSP and the EPRP	Site wide	Annually	TERRA
<b>Social</b>				
Construction Operation	Monitoring improvement of infrastructure in the study area due to social investment activities through measures outlined in the, the Employment and Capacity Plan as well as the SEP including the grievance mechanism	Site wide	Annually	TERRA
Construction Operation	Monitor increased prevalence and spread of communicable diseases due to project-related influx of workers through the measures contained in the Influx Management Plan, the Employment and Capacity Plan, as well as the SEP	Site wide	Annually	TERRA

<b>Phase</b>	<b>Monitoring parameters</b>	<b>Reference location/ monitoring point</b>	<b>Monitoring frequency</b>	<b>Implementing Body</b>
Construction Operation	Monitoring increased pressure on social services and infrastructure due to influx and opportunistic settlement workers through the measures contained in the Influx Management Plan, Employment and Capacity Plan, as well as the SEP	Site wide	Annually	TERRA
Construction Operation	Monitoring of influx of jobseekers tracked through measures contained in the Influx Management Plan; Contractor Management Plan, Employment and Capacity Plan, as well as the SEP	Site wide	Annually	TERRA
<b>Cultural heritage</b>				
Construction Operation	Monitoring of disturbance of archaeological resources within the project area through the Cultural Heritage Management Plan and Chance Find Procedure	Site wide	Annually	TERRA
Construction Operation	Monitoring of community issues regarding disturbance of cultural practices and resources through measures contained in the Cultural Heritage Management Plan and Chance Find Procedure; the LACPF, as well as the SEP	Site wide	Annually	TERRA

# 9 Environmental and Social Action Plan

## 9.1 Information Gaps

An overview of key information needed to address gaps in knowledge in the ESIA and ESMP is provided below. This information is required for completion of the comprehensive ESIA and ESMP to:

- Improve the confidence and quality of impact assessment predictions in line with GIIP; and
- Ensure that the nature and scale of management commitments are appropriate to the impacts identified.

As mentioned in Section 3, SRK has undertaken the ESIA (this report) which will be submitted to the IFC for disclosure (60 days). Thereafter the report will be updated based on feedback from the IFC, TERRA and its agents. TERRA is recommended to compile a comprehensive ESIA which complies with GIIP, including with the IFCPS and World Bank EHS standards.

## 9.2 Development of the ESIA and ESMP going forward

### 9.2.1 Project work completed and pending

Table 9-1 below provides an overview of the project work which has been completed in the ESIA and ESMP, and research and drafting required for development of the Comprehensive ESIA and ESMP.

**Table 9-1: Project work completed, and that still to be undertaken for the project during the final ESIA and ESMP process**

Completed in ESIA and ESMP	To be undertaken in comprehensive ESIA and ESMP
<b>Climate and Air Quality</b>	
<ul style="list-style-type: none"> <li>• High level baseline data collected using the Koppen Climate Classification System and historical data from the internet.</li> <li>• A high level impact assessment was undertaken based on the data collected by the in-country consultants (GAC).</li> <li>• Mitigation measures proposed for potential air quality impacts identified.</li> <li>• Provision of recommendations for the comprehensive ESIA and ESMP.</li> </ul>	<ul style="list-style-type: none"> <li>• Ambient air quality monitoring should be undertaken.</li> <li>• Installation of a weather monitor within the project area to monitor wind speed, wind direction, temperature and rainfall at a minimum.</li> <li>• A dispersion modelling study needs to be undertaken to more accurately determine the zone of influence of operational activities.</li> <li>• Revision of the climate and air quality baseline as the social survey progresses and monitoring data becomes available. Thereafter update the impact assessment and management measures accordingly for the comprehensive ESIA and ESMP.</li> </ul>
<b>Biodiversity</b>	
<ul style="list-style-type: none"> <li>• A desktop study based on the limited information available for the broader study area.</li> <li>• A brief site survey undertaken.</li> <li>• Classification of species undertaken.</li> <li>• Development of provisional species lists for common plants and fish (notably limited time was spent in forested patches; no information</li> </ul>	<ul style="list-style-type: none"> <li>• Accurately delineate aquatic and terrestrial habitat given the complex mosaic of habitats present in the study area (including high levels of disturbance and burnt patches obscuring habitat signatures).</li> <li>• Undertake sensitivity mapping.</li> <li>• Review and update the biodiversity baseline, impact assessments and management measures based on additional baseline findings and incorporate into the</li> </ul>



<b>Completed in ESIA and ESMP</b>	<b>To be undertaken in comprehensive ESIA and ESMP</b>
<p>was collected on terrestrial vertebrates, aquatic invertebrates, or subterranean fauna, and insufficient time was available to confirm the presence of endangered, vulnerable or rare species).</p> <ul style="list-style-type: none"> <li>• General distribution of habitats documented.</li> <li>• Mitigation measures were proposed for the potential biodiversity impacts identified.</li> </ul>	<p>comprehensive ESIA and ESMP.</p> <ul style="list-style-type: none"> <li>• Intiate a cerfication process for the TERRA project.</li> </ul>
<b>Surface and ground water resources</b>	
<ul style="list-style-type: none"> <li>• Surface and groundwater study was undertaken including:                             <ul style="list-style-type: none"> <li>○ A summary of the relevant regulatory framework (national standards and IFC Guidelines) for surface and groundwater control</li> <li>○ A review of the EIA conducted by GAC in 2009</li> <li>○ A site visit was undertaken in December 2013 to assess the current status of the water resources in the area</li> <li>○ A review of existing information from the nearby areas</li> <li>○ Compiling a monitoring programme and propose monitoring points</li> <li>○ Identification and rating of expected impacts.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Commence detailed baseline surface and groundwater monitoring based on the monitoring program and protocol proposed in the preliminary surface and groundwater study.</li> <li>• Using collected data review and update the surface and groundwater baseline, impact assessments and management measures in the comprehensive ESIA and ESMP.</li> <li>• Undertake floodline determination and develop comprehensive measures for effective management of stormwater and effluent.</li> <li>• Prepare water management measures that take account of the following:                             <ul style="list-style-type: none"> <li>○ Storm water diversion will need to be planned after a detailed hydrological assessment</li> <li>○ Excessive water during the wet season</li> <li>○ Water quality at all the sampling locations is considered fit for most categories of use</li> <li>○ Samples have a signature dominated by precipitation with no significant effect of evaporation</li> <li>○ 1:50 and 1:100 year flood line.</li> </ul> </li> </ul>
<b>Soils , Land Capability and Land Use</b>	
<ul style="list-style-type: none"> <li>• A desktop study was conducted which included:                             <ul style="list-style-type: none"> <li>○ Review of available project information and data for the area, including legal requirements for the protection of soils and lands of high capability as well as permits that may be required by the DRC legislation</li> <li>○ Compilation of information needs list.</li> <li>○ Review of soil fertility parameters required to assess agricultural potential</li> <li>○ Review of soil characteristics and land capability in terms of the Food and Agriculture Organisation (FAO) Guidelines for Soil Description, 2006, which includes physical and</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Verify preliminary findings/predictions developed in the ESIA and ESMP by undertaking appropriate soil samples to determine soil fertility parameters and characteristics, as well as land capability.</li> <li>• Using collected data review and update the soils, land capability and land use baseline, impact assessments and management measures in the comprehensive ESIA and ESMP.</li> </ul>

<b>Completed in ESIA and ESMP</b>	<b>To be undertaken in comprehensive ESIA and ESMP</b>
<p>morphological characteristics as well as information used to derive land capability.</p> <ul style="list-style-type: none"> <li>○ Liaison with other specialists as necessary such as the social, water and biodiversity teams.</li> <li>○ Generic impact prediction was undertaken which will need to be modified as more detailed information become available.</li> <li>○ Proposed mitigation measures for the potential soil, land capability and land use impacts identified.</li> </ul>	
<b>Noise</b>	
<ul style="list-style-type: none"> <li>• A desktop study was undertaken and included: <ul style="list-style-type: none"> <li>○ A review of available project information and data for the area, including legal requirements</li> <li>○ Preparation of an information needs list</li> <li>○ Analysis of aerial photo/ satellite imagery to identify potentially sensitive receptors in relation to proposed infrastructure</li> <li>○ Review of the locations and characteristics of receptors and noise sources</li> <li>○ Identification of mitigation measures for the potential noise impacts identified</li> <li>○ Recommendations for the future monitoring of significant impacts, in the context of existing sources and receptors</li> </ul> </li> </ul>	<p>Revision of the noise baseline as the social survey progresses, review the impact assessment in the light of any new information including design details, and update management measures in the comprehensive ESIA and ESMP.</p>
<b>Traffic and Transportation</b>	
<ul style="list-style-type: none"> <li>• Traffic and transportation study included: <ul style="list-style-type: none"> <li>○ Transport survey and data collection including current transport and pedestrian flows on the surrounding road network, public transport and road safety</li> <li>○ Identification of existing major sources of traffic and the sensitive receptors</li> <li>○ Potential indirect, direct and cumulative risks/impacts to the receptors/resources for each project alternative</li> <li>○ Management measures for identified significant impacts and to enhance positive impacts of the project</li> <li>○ Monitoring requirements for implementing the suggested</li> </ul> </li> </ul>	<p>Revision of the traffic baseline and review of the impact assessment in the light of any new project information including socio-economic data. Update management measures in the comprehensive final ESIA and ESMP</p>

<b>Completed in ESIA and ESMP</b>	<b>To be undertaken in comprehensive ESIA and ESMP</b>
<p>management measures</p> <ul style="list-style-type: none"> <li>○ List of further studies that might be necessary as part of the Comprehensive ESIA.</li> </ul>	
<b>Social</b>	
<ul style="list-style-type: none"> <li>• Social baseline included:                             <ul style="list-style-type: none"> <li>○ Gathering initial information on social baseline, water use and availability, heritage and livelihoods</li> <li>○ Social household survey of affected communities</li> <li>○ Assessment of potential impact arising from the proposed project</li> <li>○ Management measures for identified significant negative impacts and the enhancement of benefits arising from the project.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Refine the social management plans covering areas including land acquisition, livelihood restoration and compensation, measures related to management if impacts related to population influx, traffic, contractors, employment and capacity, cultural heritage/ chance find procedures as information becomes available from additional investigations, e.g. cultural heritage, water and biodiversity.</li> <li>• Update the SEP to record any additional stakeholder engagement.</li> <li>• Develop a detailed sustainable (community) development plan based on sound understanding of local development needs, contextual conditions and client requirements.</li> </ul>
<b>Cultural heritage</b>	
<ul style="list-style-type: none"> <li>• Initial findings on cultural heritage in the project area were collected during the social surveys.</li> <li>• High-level archaeological and heritage and management measures are included in the ESIA, including a chance find procedure.</li> </ul>	<ul style="list-style-type: none"> <li>• The cultural heritage survey should be conducted of the project area to obtain information from communities to determine where sacred sites are, and other sites of cultural significance.</li> <li>• Using collected data review and update the cultural heritage baseline, impact assessments and management measures in the comprehensive ESIA and ESMP.</li> </ul>
<b>Stakeholder Engagement</b>	
<ul style="list-style-type: none"> <li>• Stakeholder engagement undertaken to:                             <ul style="list-style-type: none"> <li>○ Identify stakeholders directly and indirectly impacted by the project</li> <li>○ Hold introductory and follow-up meetings with the key stakeholders</li> <li>○ Distribute BIDs (in French and Lingala) to key stakeholders.</li> </ul> </li> <li>• Preparation of an Issues and Responses Report (IRR).</li> <li>• SEP and associated stakeholder documentation including a grievance mechanism.</li> </ul>	<ul style="list-style-type: none"> <li>• Set up a formal grievance mechanism in the project area.</li> <li>• Disclose the Non-Technical Summary of the ESIA to key stakeholders.</li> <li>• Based on feedback from stakeholders, including comments received through the grievance mechanism, update the IRR and update the SEP.</li> </ul>
<b>Planning and management of environmental, health and safety (EHS) issues</b>	
<ul style="list-style-type: none"> <li>• Generic EHS structure and roles and responsibilities presented.</li> <li>• General requirements for monitoring,</li> </ul>	<ul style="list-style-type: none"> <li>• Confirm the EHS structure and roles and responsibilities within the TERRA organizational structure.</li> <li>• Integrate and implement the ESMP in the context of a</li> </ul>

Completed in ESIA and ESMP	To be undertaken in comprehensive ESIA and ESMP
reporting and auditing set out in the ESMP.	wider environmental and social management system (ESMS). <ul style="list-style-type: none"> <li>• Ensure alignment of policies with ESMS objectives and relevant certification requirements.</li> <li>• Review and update the relevant sections of the ESMP in the comprehensive ESIA.</li> </ul>

**9.2.2 Plans developed and pending**

Key plans containing specific management and mitigation measures provided by specialists and the SRK project team are included in the main body of the ESMP. The Stakeholder Engagement Plan (SEP), incorporating the stakeholder grievance mechanism is the only ‘stand-alone’ plan. The list of plans to date is as follows:

- Environmental Awareness Plan;
- Construction and Land Clearing Control Plan;
- Community Health and Safety Plan (CHSP);
- Emergency Preparedness and Response Plan (EPRP);
- Cultural Heritage Management Plan and Chance Find Procedure;
- Influx Management Plan;
- Contractor Management Plan;
- Employment and Capacity Plan;
- Water Management Programme.

**Stand-alone plans that have been developed include the following:**

- SEP, incorporating the stakeholder grievance mechanism

**Additional plans that should be included in the comprehensive ESIA and ESMP include:**

- Water quality and quantity
- Air quality management plan
- Biodiversity management plan
- Waste management plan
- Occupational health and safety plan (OHSP).

## 10 Conclusions

SRK has undertaken the ESIA (this report) which will be submitted to the IFC for disclosure (60 days). Thereafter the report will be updated based on feedback from the IFC, TERRA and its agents. TERRA is recommended to compile a comprehensive ESIA which complies with GIIP, including with the IFCPS and World Bank EHS standards.

This ESIA and ESMP is the first and only of SRK's key deliverables towards the development of a Comprehensive ESIA and ESMP during 2014. It should be noted that owing to the limited baseline information and data available at this stage, the impact assessment has taken the precautionary approach with negative impacts potentially rated higher than they might. The ESIA incorporates the following components:

- An outline of the baseline environment and description of the proposed activity;
- A description of the ESIA and ESMP process, as well as stakeholder documentation including the key issues and concerns raised by stakeholders during the project process to date;
- Overview of findings of the specialist studies undertaken to date; and
- Environmental and social impact assessment and management measures for the construction and operational phases.

The project site is located approximately 90 km east of Lubumbashi and 80 km south of Kundelungu National Park in the vicinity of the N5 road (Route Kasenga) to the south in the surrounding area of the Lubanda Village, Kasenga territory, Haut-Katanga District in Katanga Province of DRC. The vegetation dominating the immediate vicinity of the TERRA farms is savannah with grasses such as *Hyperhenia*, *Panicum* and *Imperata* species. The forest trees in the area are of the Zambezi type (Miombo), *Brachystegia* and *Pterocarpus* species. The diversity of mammals in the project area is low and that of bird's moderate, while insects showed higher diversity. A number of Red List species occur in the area, most of them being specific to forest habitat. Local communities are reliant on subsistence agriculture to meet their basic livelihood needs. Potable water for domestic and animal consumption is mainly sourced from boreholes in the villages highlighting the importance of groundwater resources.

The ESIA has involved one round of stakeholder engagement with government, community and non-governmental role players, with more engagement proposed to follow in the process of developing the final ESIA and ESMP. Stakeholder documentation has included a BID for the ESIA and ESMP. The report proposes measures in the Stakeholder Engagement Plan (SEP) (including grievance mechanism process) to address stakeholder issues during all project phases. Concerns about the project are explained the Issues and Responses Report (IRR) (Appendix B of the main report). The project is widely welcomed by stakeholders, with development expectations including employment and services.

As part of the ESIA by GAC, a site survey for baseline data collection, and environmental monitoring for data collection was carried out by the experts of GAC in 2010.

The subsequent ESIA by SRK included an additional site survey undertaken from December 2013 to March 2014 by key specialists from SRK's project team to fill critical gaps and update the baseline information where possible. The four month project timeframe did not however allow for detailed primary data collection and analysis, and where relevant, limitations in this regard are noted. The following specialist studies were undertaken by SRK: surface and groundwater; socioeconomic; and biodiversity, and updated the baseline information presented in the 2010 ESIA. The project is anticipated to bring regional and local economic benefit including through job creation. Key potential

negative impacts requiring careful management during construction include impacts from construction activities (e.g. loss of flora and biodiversity, noise and dust), social disruption from influx of workers, traffic and road safety, as well as soil erosion. During operation, key potential negative impacts could include groundwater drawdown leading to lowering of the water table, which in turn could impact communities' water availability. Air pollution from dust of construction and tractors and ongoing social disruption from traffic and risk of disease are potential impacts for communities in the immediate vicinity of the development.

Findings from specialist input to the ESIA include the need for review of community development issues which should proceed as a priority during the Comprehensive ESIA and ESMP phase. These issues will form the focus of in-depth social baseline investigations, analysis and recommendations. The Comprehensive ESIA and ESMP should contain detailed recommendations and plans for management, monitoring, audit and review for the lifetime of the project, covering aspects including social impacts, air pollution, water quality and quantity, cultural heritage as well as biodiversity.

It is anticipated that it will be possible to successfully mitigate impacts associated with the development, with no fatal flaws having been identified to date. The ESMP should be integrated into TERRA's ESMS which should be aligned with the requirement for certification.

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

# Appendices

## **Appendix A: Lists of signatures by 'Inspection of I 'Agriculture, Fisheries and Livestock**

REPUBLIQUE DEMOCRATIQUE DU CONGO  
 PROVINCE DU KATANGA  
 DISTRICT DU HAUT KATANGA  
 TERRITOIRE DE KASENGA

LISTE D'INDEMNISATION DES PLANTEURS VICTIMES D'EXPROPRIATION  
 DES LEURS CHAMPS PAR LA SOCIETE TERREA SPRL

INSPECTION DE L'AGRICULTURE, PECHE ET ELEVAGE

N°	NOMS ET POSTNOMS	CULTURE	AGES	SUPERFICIE	TOT/TIER	TOT. GEN. MONTANT \$	TOT GEN. MONTANT FC	SIGNATURE
1	KALUNGA MUSONDA	MANIOC	2 ANS	72 ARES	43	43 \$	215000FC	<i>Kalunga</i>
2	PETRONIE MUKINDA	MANIOC	2 ANS	35 ARES	21	21 \$	105000FC	<i>MUSANSHE</i>
3	MABWALE CHARLES	MANIOC	2 ANS	58 ARES	35	35 \$	175000FC	<i>Mabwale</i>
4	KISULO KINKANGA	MANIOC	2 ANS	420 ARES	252	252 \$	1260000FC	
5	MVEMA KATSHETSHE	MANIOC	2 ANS	315 ARES	189	189 \$	945000FC	<i>Mvema</i>
6	KIBWE KITONGE	MANIOC	1 AN	495 ARES	294	294 \$	1470000FC	
7	BLANDINE -MWANSA	MANIOC	2 ANS	74 ARES	44	44 \$	220000FC	
8	MITWELE ADALBERT	MANIOC	2 ANS	22 ARES	134	134 \$	670000FC	<i>Mitwele</i>
9	KALULU KIBASO	MANIOC	2 ANS	45 ARES	27	27 \$	135000FC	
10	KINGEBE KUNDA	MANIOC	2 ANS	67 ARES	40	40 \$	200000FC	
11	KASONGO MUSUYI	MANIOC	2 ANS	200 ARES	120	120 \$	600000FC	<i>Kasongo</i>
12	MADAME MUSONDA							

13	KUNDA KAFITA	MANIC	2 ANS	170 ARES	.02	.02 \$	51 000 FC	<del>AKC</del>
14	MPUNDU KONDE	MANIOC	2 ANS	70 ARES	42	42 \$	21 000 FC	
15	MINGA - BUPE	MANIOC	2 ANS	104 ARES	62	62 \$	31 000 FC	
16	KABULE KINGERE	MANIOC	2 ANS	112 ARES	67	67 \$	33 500 FC	
17	MUNDA JOSEPH	MANIOC	2 ANS	24 ARES	14	14 \$	7 000 FC	MUNDA
18	DIEUDONNE	MANIOC	2 ANS	225 ARES	135	135 \$	67 500 FC	DLS + 4000
19	KISALA DIEUDONNE	MANIOC	2 ANS	62 ARES	37	37 \$	18 500 FC	<del>QJOL</del>
20	MWAPE DIEUDONNEE	MANIOC	2 ANS	105 ARES	63	63 \$	31 500 FC	<del>Sup</del>
21	KASHIYA FRANCOIS	MANIOC	2 ANS	12 ARES	7	7 \$	3 500 FC	Resolution
22	KALIMBE JEAN	MANIOC	1 AN	84 ARES	50	37 \$	18 500 FC	KALIMBE
23	MUSANSHA FLORIBERT	MANIOC	1 AN	60 ARES	36	36 \$	18 000 FC	MUSANSHA - FLORIBERT
24	KASANDA FAUSTIN	MANIOC	1 AN	20 ARES	12	12 \$	6 000 FC	<del>AKC</del>
25	KILUFIA BENI	MANIOC	1 AN	63 ARES	38	38 \$	19 000 FC	<del>AKC</del>
26	KABELU MATANDA	MANIOC	2 ANS	131 ARES	72	72 \$	36 000 FC	
27	MWANGA POLEPOLE	MANIOC	2 ANS	108 ARES	65	65 \$	32 500 FC	<del>AKC</del>
28	KAULU KISOKWA	MANIOC	2 ANS	53 ARES	32	32 \$	16 000 FC	KAULU
29	KANUNGWE GILBERT	MAIS		967 ARES	580			
		3 MANGIERS	En rap,	4x3x3=	36	628 \$	31 400 FC	
		1 A .UME	En rap,	4x1x3=	12			

30	KASONGO MODESTE	MANIOC	2 ANS	118 ARES		7 S	35500FC	<del>Handwritten signature</del>
31	ERNEST	MANIOC	2 ANS	19 ARES	11	1 S	5500FC	<del>Handwritten signature</del>
32	JEAN MUKOLUNDA	MANIOC	1 AN	39 ARES	23	293 S	146500FC	<del>Handwritten signature</del>
		10 touffes des bananier	En rap.	3x10x3=	90			
		15 MANGIERS	En rap.	4x15x3=	180			
33	NA NGANDWE MATHILDE	MANIOC	1 AN	32 ARES	19	19 S	9500FC	<del>Handwritten signature</del>
34	KUNYUNGU POWEL	MAIS		240 ARES	144	144 S	72000	<del>Handwritten signature</del>
35	MUFWAYA	MANIOC	1 AN	45 ARES	27	27 S	13500FC	<del>Handwritten signature</del>
36	PATRICE	MANIOC	2 ANS	39 ARES	23	23 S	11500FC	<del>Handwritten signature</del>
37	KIZONDE	MANIOC	2 ANS	466 ARES	280	518 S	259000FC	<del>Handwritten signature</del>
		3 MANGIERS	En rap.	4x3x3=	36			
		16 AGRUMES	10 rap.	4x10x3=	120			
		1 AVOCATIER	En rap.	10x1x3=	6			
		1 GOYAVIER	En rap.	2x1x3=	30			
		1 PORCHERIE	En activité	40 ARES	40			
38	MUSOKAI (MUSOKA) K.M.	MANIOC	2 ANS	35 ARES	21	21 S	10500FC	<del>Handwritten signature</del>
39	MOFATI KANGWE	MANIOC	1 AN	49 ARES	29	29 S	14500FC	<del>Handwritten signature</del>
40	LWANDO <i>Alphonse</i>	MANIOC	2 ANS	18 ARES	11	11 S	5500FC	<del>Handwritten signature</del>
41	MPONDE -	MANIOC	2 ANS	20 ARES	24	24 S	12000FC	<del>Handwritten signature</del>
42	KALUBA LOUISE	MANIOC	2 ANS	18 ARES	11	11 S	5500FC	<del>Handwritten signature</del>
43	MUMBA LWANDO	MANIOC	2 ANS	13 ARES	8	8 S	4000FC	<del>Handwritten signature</del>
44	MWENA MODESTE	MAN. :	2 ANS	15 ARES	9	9 S	4500FC	<del>Handwritten signature</del>

*Handwritten note:*  
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of use


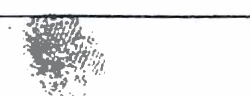
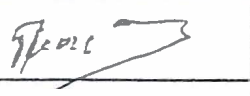

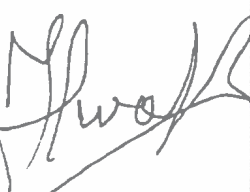
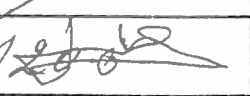
45	KUNDA ROSE	MANIOC	2 ANS	15 ARES	5	5 \$	25000F	
46	SIMON MWAPE KATELE	MANIOC	2 ANS	8 ARES	41	41 \$	20500F	
47	KUNDA MWEMA ROSE	ARACHIDES		68 ARES	5	5 \$	25000F	
48	MBWAMBWE	MAIS		8 ARES	38	38 \$	19000F	
49	YOBO	MANIOC	2 ANS	64 ARES	65	65 \$	32500F	
50	TSHEWE EMMANUEL	MANIOC	1 AN	108 ARES	56	56 \$	28000F	
51	NGOSA MWANSA	MANIOC	1 AN	93 ARES	54	78 \$	39000F	
		2 MANGIERS	En rap,	90 ARES	24			
52	ISAAC MWEPU	MANIOC	2 ANS	4x2x3=	28	28 \$	14000F	
53	MU. KILUMBA KABI	MANIOC	2 ANS	47 ARES	20	20 \$	10000F	
54	KAMWANA ESTA	MANIOC	2 ANS	33 ARES	10	10 \$	5000F	
55	MUSHIBWE KAPENDA	MANIOC	2 ANS	52 ARES	31	43 \$	21500F	
		1 MANGIER	En rap,	4x1x3=	12			
56	KASANDA BESTA	MANIOC	2 ANS	45 ARES	27			
		1 MANGIER	En rap,	4x1x3=	12	45 \$	22500F	Kasanda
		1 PAPAYER	En rap,	4x1x3=	6			
57	CHALWE CHOLA	MANIOC	2 ANS	27 ARES	16	16 \$	8000F	
58	KIPILI MBOBOLA	MANIOC	2 ANS	54 ARES	32			
		3 MANGIERS	En rap,	4x3x3=	36			
		2 MANGIERS	En rap,	4x2x3=	24	136 \$	68000F	K Mb
		4 PAPAYERS	En rap,	2x4x3=	24			
		1 PORCHERIE	En activité		20			
59	BUPE	MANIOC	2 ANS	19 ARES	5	5 \$	2500F	

61	KASABA ROGER	MANIOC	2 ANS	27 ARES	3	16 \$	8000FC	
62	KASONGO DORIS	MANIOC	2 ANS	14 ARES	8	32 \$	16000FC	
		3 MANGUIERS	Non en rap.	1x3=	3			
		3 AGRUMES	Non en rap.	1x3=	3			
63	AUGUSTIN KALUNGWANA	3 PAPAYERS	En rap,	2x2x3=	18	82 \$	41000FC	
		MANIOC	2 ANS	15 ARES	9			
		5 MANGUIERS	En rap,	4x5x3=	60			
64	KALONDA	1 GOYAVIER	Non en rap.	1x1=	1	6 \$	3000FC	
		2 PAPAYERS	En rap,	2x2x3=	12			
65	KAZADI	MANIOC	2 ANS	12 ARES	7	7 \$	3500FC	
66	MOFEYA MUMBA	MAIS		75 ARES	45	45 \$	22500FC	
67	KILEYA NGANDWE	MAIS		306 ARES	184	409 \$	204500FC	
		25 touffes des bananier	En rap,	3x25x3=	225			
68	KAPYA KILEYA	MANIOC	1 AN	128 ARES	77	77 \$	38500FC	
69	KISUMBA DIEUDONNE	MANIOC	1 AN	50 ARES	30	30 \$	15000FC	
70	KISEBWE LAURENT	MAIS		50 ARES	30	30 \$	15000FC	
71	MWEMA KALYEKE	MAIS		48 ARES	29	29 \$	14500FC	
72	FUBE CHOLA	MANIOC	1 AN	35 ARES	21	21 \$	10500FC	
73	NGANDWE POTOLO	MANIOC	2 ANS	7 ARES	4	4 \$	2000FC	
74	KITUPA LUC	MANIOC	2 ANS	180 ARES	108	108 \$	54000FC	
75	MWITWA OSCAR	MAIS		30 ARES	18	18 \$	9000FC	

Refus.



X 76	ISAAC MWEPU	MANIOC	1 AN	37 ARES	2	22 \$	11000F	
77	KYUNGU KALALA	MANIOC	2 ANS	28 ARES	17	17 \$	8500F	<del>Kyungu</del>
78	LUMBWE KAKONE	MANIOC	2 ANS	22 ARES	13	13 \$	6500F	
79	KATIKISHA BENATI	MANIOC	1 AN	26 ARES	16	16 \$	8000F	<del>Benati</del>
80	KALABA GASPARD	MANIOC	2 ANS	101 ARES	61	72 \$	36000F	
		8 AGRUMES	Non en rap.	1x8=	8			
		1 PALMIER	Non en rap.	3x1=	3			
81	CHABALA GASPARD	MANIOC	2 ANS	25 ARES	15	15 \$	7500F	Chabala
82	KYAMFYA MARIE	MANIOC	2 ANS	25 ARES	15	15 \$	7500F	
83	LUBELEKI CHANTAL	MANIOC	2 ANS	15 ARES	9	9 \$	4500F	Chantal
84	MUKALAY KISOMA	MANIOC	2 ANS	12 ARES	7	7 \$	3500F	<del>Mukalay</del>
85	MUMBA NGANDWE	MANIOC	1 AN	31 ARES	19	19 \$	9500F	
86	MUMBA SOMU	MANIOC	1 AN	34 ARES	20	20 \$	10000F	<del>Mumba</del>
87	PANDWE DORCAS	MANIOC	2 ANS	38 ARES	23	23 \$	11500F	Pandwe
88	M. LIKUKU JOSUE	MANIOC	3 ANS	253 ARES	152	152 \$	76000F	
89	CHOLA KASWESHI	MANIOC	1 AN	158 ARES	95	95 \$	47500F	Chola
90	KABOSHA BUNDA	MANIOC	2 ANS	63 ARES	38	38 \$	19000F	Kabosha
91	KAPENDA	MANIOC	2 ANS	21 ARES	13	13 \$	6500F	Chis
		MANIOC	2 ANS	99 ARES	59			
		MANIOC	2 en rap	4x2x3=	24			

92	KALASA ALFRED	4 MAI JUS	2 en non rap.	1x2=		87 S	435000F	
		1 GOYAVIER	Non en rap.	1x1=	1			
		1 AGRUME	Non en rap.	1x1=	1			
93	MUBANGA BEATRICE	MANIOC	2 ANS	129 ARES	77	77 S	385000F	
94	MUMBA MAKENGA	MANIOC	2 ANS	380 ARES	228	228 S	1140000F	Shenke
95	MWANSA MWEWA	MANIOC	1 AN	68 ARES	41	41 S	205000F	Shenke
96	CHOLA NSEKE	MANIOC	2 ANS	115 ARES	69	69 S	345000F	
97	PAPA SHENKE	MANIOC	2 ANS	78 ARES	47	121 S	805000F	Shenke
		3 MANGUIERS	En rap.	4x3x3=	36			
		2 AGRUMES	Non en rap.	1x2=	2			
		2 PAPAYERS	En rap.	2x2x3=	12			
		2 touffes de bananiers	En rap.	3x2x3=	24			
98	KASANDA KAWEME	MANIOC	2 ANS	32 ARES	19	19 S	95000F	
99	<sup>PAT</sup> KANDU MWEWA	MANIOC	2 ANS	12 ARES	7	7 S	35500F	
100	PANDWE KANGULA	MANIOC	2 ANS	580 ARES	348	418 S	2090000F	PA DIANE
		1 PORCHERIE	En activité		50			
		2 PUIITS D'EAU			20			
101	MUNYANGWE KYENYEWWE	MANIOC	2 ANS	20 ARES	12	12 S	60000F	
102	KIBOKO LAURENT	MANIOC	2 ANS	480 ARES	288	401 S	2505000F	
		10 AGRUMES	4 en rap et	4x4x3=	48			
			6 non en rap.	1x6=	6			
		1 PUIITS D'EAU	En activité		50			
		1 touffe de bananier	En rap.	3x1x3=	9			
103	CHOLA SYMPHORIEN	MANIOC	2 ANS	400 ARES	240	240 S	1200000F	

105	NA MPALA KATWEME	MANIOC	2 ANS	168 ARES	101	101 \$	50500K	<i>[Signature]</i>	
106	MWEMA FILIKI	MANIOC	2 ANS	36 ARES	22	22 \$	11000	<i>[Signature]</i>	
107	ESTER MALAMA	MANIOC	2 ANS	25 ARES	15	15 \$	7500K	<i>[Signature]</i>	
108	NGOI BWALYA	MANIOC	2 ANS	20 ARES	12	12 \$	6000K		
109	KYEMBO NA DELPHIN	MANIOC	1 AN	15 ARES	9	9 \$	4500K	<i>[Signature]</i>	
110	LWIMBA EUPHRASIE	MANIOC	1 AN	25 ARES	15	15 \$	7500K	<i>[Signature]</i>	
111	KAPONDA	MANIOC	2 ANS	310 ARES	186	186 \$	93000K	<i>[Signature]</i>	
112	KOMBE FELIX	4 MANGUIERS	2 en rap.	4x2x3=	24	49 \$		<i>[Signature]</i>	
				2 non en rap.	1x2=				2
				En rap,	3x1x3=				9
				2 ANS	24 ARES				14
113	MPINGA	MANIOC	2 ANS	13 ARES	8		4500K		
114	MUYAMBO MUKEYA	MANIOC	2 ANS	8 ARES	5		2500K	<i>[Signature]</i>	
115	MOFYA	MAIS		190 ARES	114		5700K		
116	KILONGO	MANIOC	2 ANS	28 ARES	17		8500K		
117	MWAPE KALENGA	MANIOC	2 ANS	346 ARES	208				
		4 MANGUIERS	En rap,	4x4x3=	48				
		2 AVOCATIERS	En rap,	5x2x3=	30				
		11 GOYAVIERS	Non en rap.	1x11=	11				
		2 AGRUMES	Non en rap.	1x2=	2				
		1 PORCHERIE	En activite		5				
		2 touffes canne	En rap,	2x2=	4				
		2 PAPAYERS	En rap,	2x2x3=	12				
		MAIS							
		7 AGRUMES	En rap						
320 \$							160000K		

118	KIBEKWE KAFUSHA S	2 PAI (F)	En rap.	2x2x3=		130 \$	650000	KIBEKWE
			2 en rap.	2x2x3=	1			
		5 GOYAVIERS	3 non en rap	1x2=	2			
		1 touffe canne	En rap,	2x1=	2			
119	MWAPE - PANANCE	MANIOC	2 ANS	150 ARES	90	90 \$	450000	KUNDA
120	KISEBWE - MUTUPUA	MANIOC	2 ANS	59 ARES	35	35 \$	17500	.
121	JEAN KAPUTULA	MANIOC	1 AN	393 ARES	236	420 \$		JUK
		10 AGRUMES	4 en rap et	4x4x3=	48			
			6 non en rap.	1x6=	6			
		2 PAPAYERS	En rap,	2x2x3=	12			
		1 AVOCATIER	Non en rap.	1x1=				
		10 touffes bananiers	En rap,	3x10x3=	90			
		2 MANGUIERS	En rap,	4x2x3=	24			
1 PORCHERIE	En activité		13					
122	BWALYA KISALA	MANIOC	1 AN	150 ARES	90	90 \$	450000	
123	NGANDWE KIBIMBI	MANIOC	2 ANS	14 ARES	8	8 \$	40000	
124	MUKALAY KANSELE	MANIOC	2 ANS	28 ARES	1	17 \$	85000	
125	MINGA MBAYO	MANIOC	2 ANS	51 ARES	31	31 \$	155000	
126	KYASHA	MANIOC	2 ANS	10 ARES	6	6 \$	30000	.
127	TSHAMA MPONGO G	MAIS		210 ARES	126	126 \$	630000	.
128	KIBUYE - KITUBIBU	MANIOC	2 ANS	174 ARES	104	104 \$	520000	
129	MUJINGA KYAKOTA	MAIS		56 ARES	34	34 \$	170000	.
130	MUMBA THERESE	MANIOC	2 ANS	25 ARES	15	15 \$	75000	.
131	ANNIE KALONDA	MANIOC	1 AN	2 ARES	1	1 \$	55000	

132	VICTORINE KYAMBALA	MANIOC	2 ANS	38 ARES	22	22 \$	11000F	.
133	KYAMBA JEAN PIERRE	MANIOC	1 AN	6 ARES	4	4 \$	2000F	
134	KYULU MUKEBO	OIGNONS		10 ARES	6	46 \$	23	
		ETANG			40			
135	Mme VERONIQUE	ETANG		43 ARES	26	26 \$	13000F	.
136	FRANCOIS KALUBA	ETANG			40	40 \$	20000F	Kaluba
137	MUSOSA KABENGE	ETANG			60	60 \$		
138	GILBERT MUNYUMBWA	MAIS			90	90 \$	45000F	
139	PATRICK TRIWO	ARACHIDES		33 ARES	20	20 \$	10000F	Mwamba
140	ANGELINE TSHANDA	MANIOC		63 ARES	38	38 \$	19000F	shoda
141	KAMONA GENEVIEVE	MANIOC	2 ANS	160 ARES	96	96 \$	48000F	
142	KILUFYA HONORINE	MANIOC	2 ANS	70 ARES	42	42 \$		U
143	KYUNGU BERNADETTE	MANIOC	2 ANS	69 ARES	41	41 \$	20800F	
144	MWILA PROSPERINE	MANIOC	1 AN	45 ARES	27	27 \$	13500F	
145	MUJINGA SAKUTOWA	MANIOC	2 ANS	23 ARES	14	14 \$	7000F	.
146	MULUNDU MWELWA	MAIS		180 ARES	108	108 \$	54000F	58000F
147	MUMBA MUSEMEMBE	MAIS		382 ARES	229	229 \$	114500F	
148	VICTORINE KAPAPA	MANIOC	2 ANS	21 ARES	13	13 \$	6500F	

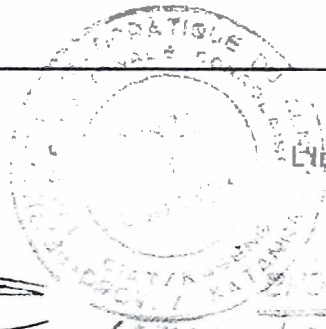
150	KAYOPE MOISE	MANIOC	3 ANS	100 ARES	70	<del>30 000 FC</del>	30 000 FC	
151	KYAMBIKA NSOMPA	MANIOC	1 AN	21 ARES	13	285 \$	142 500 FC	mi
152	MWELWA KILOBA	MANIOC	2 ANS	100 ARES	60	285 \$	142 500 FC	mes & lwa
		1 touffe bananier	En rap,	3x1x3=	9			
		18 MANGUIERS	En rap,	4x18x3=	216			
153	KABAYO LAMEKI	MANIOC	1 AN	65 ARES	39	39 \$	20 500 FC	.
		MANIOC	1 AN	87 ARES	52			
154	KATSHITSHI LONGWA	2 MANGUIERS	En rap,	4x3x3=	24	77 \$	42 500 FC	.
		1 AGRUME	Non en rap.	1x1=	1			
155	KILEPA ETIENNE	MANIOC	3 ANS	22 ARES	13	13 \$	65 000 FC	SEAB
156	ANTO LONGWA	MANIOC	1 AN	9 ARES	5	5 \$	27 500 FC	.
157	ROBERT LONGWA	MANIOC	2 ANS	27 ARES	16	16 \$	80 000 FC	.
158	KILEPA POMPON	MANIOC	1 AN	25 ARES	15	15 \$	75 000 FC	K. i bapa
159	MWITWA LEONARD	MAIS		48 ARES	29	29 \$	145 000 FC	Li on ar
160	MARUERITE KALABA	MAIS		6 ARES	4	4 \$	20 000 FC	
161	LEONTINE MPULAMASANGA	MANIOC	2 ANS	38 ARES	23	23 \$	115 000 FC	
162	MUJINGA LONGWA	MAIS		86 ARES	52	52 \$	260 000 FC	.
163	EVARISTE KASANTULA	MANIOC	2 ANS	70 ARES	42	42 \$	210 000 FC	
164	BUPE KILUBA	MANIOC	1 AN	128 ARES	77	77 \$	385 000 FC	
165	KAYAMBA LUPITO	MAIS		62 ARES	37	37 \$	185 000 FC	

	166	KASANTULA TSHANGWE	MANIOC	2 ANS	191 ARES		115 \$	57 500 Fc	<i>[Signature]</i>
	167	ANTOINETTE MUSHALA	MANIOC 32 MANGUIERS 2 AGRUMES	2 ANS 20 en rap. 12 non en rap. Non en rap.	61-ARES 4x20x3= 1x12= 1x2=	37 240 12 2	29 \$		
	168	GUYLINE MASENGO	MAIS ET ARACHIDES		50 ARES	30	30 \$	15 000 Fc	<i>[Signature]</i>
X	169	MUKUNGWE LEMBA	MANIOC	1 AN	180 ARES	108	108 \$	54 000 Fc	<i>[Signature]</i>
	170	JEANNE KATUTA	MANIOC	3 ANS	400 ARES	240	240 \$	120 000 Fc	<i>[Signature]</i>
	171	<i>BERTHA - KAPASHA</i> BERTHE KAPANSHA	MAIS		400 ARES	240	240 \$	120 000 Fc	<i>[Signature]</i>
	172	MABO LUFUNGULO	MANIOC	3 ANS	60 ARES	36	36 \$	18 000 Fc	<i>[Signature]</i>
	173	MWANZA OLIVIER	MANIOC	2 ANS	110 ARES	66	66 \$	32 500 Fc	<i>[Signature]</i>
	174	BENDA KAFITA	ARACHIDES		100 ARES	60	60 \$	32 500 Fc	<i>[Signature]</i>
	175	KAMFWA KISHALA	MAIS		4 ARES	2	2 \$	1000 Fc	<i>[Signature]</i>
	176	KIBALE SOMBWE	MAIS		100 ARES	60	60 \$	32 500 Fc	<i>[Signature]</i>
	177	ROBERT KANGESHI <sup>le</sup>	MAIS		175 ARES	105	105 \$	52 500 Fc	<i>[Signature]</i>
	178	MWELWA KAMFWA	MANIOC	3 ANS	102 ARES	61	61 \$	30 500 Fc	<i>[Signature]</i>
	179	MWENGE KYABUSHIKU	MANIOC	1 AN	42 ARES	25	25 \$	12 500 Fc	<i>[Signature]</i>
	180	KAPYA DECARIS	MANIOC	3 ANS	200 ARES	120	120 \$	60 000 Fc	<i>[Signature]</i>
	181	KASANDA KABINGANDU	MANIOC		329 ARES	197	197 \$	98 500 Fc	<i>[Signature]</i>
	182	<i>[Illegible]</i>							

182	NGANDWE SEBA	2 PAPA RS	Non en rap.	1x2=	2	219 \$		
		1 AGRUME	Non en rap.	1x1=	1		1095000	
183	MWELE JEAN BAYER	MAIS		721 ARES	48			
		1 MANGIER	En rap,	4x1x3=	12	499 \$	2495000	
		6 touffes bananiers	En rap,	3x6x3=	54			
184	KANDU MUTIPULA	MAIS		80 ARES	48	48 \$	240000	
185	MBUMA ODILON	MAIS		192 ARES	115	115 \$	575000	Bumodgilio
186	AARON MUSHINKWE	MANIOC	1 AN	25 ARES	15	15 \$	125000	Mash
187	Mme KISEMBWE LUC	MAIS		25 ARES	15	15 \$	125000	
188	PAUL KALEKAMUNO	MANIOC	2 ANS	160 ARES	96	96 \$	480000	
189	NGADUBE BESA	MAIS		25 ARES	15	15 \$	125000	
190	MUKUNGWE LEMBA	CONCESSION		3000 ARES	1800	1800 \$	9000000	
16158 \$ plus 10% 1616 \$				224 Ha	16158 \$ plus	16158 \$ plus		
					10% 1616\$	10% 1616\$		
TOTAL					17774 \$	17774 \$		

MUTAJIRI WA AKILI  
 JEAN-MARC  
 ASG TERRA SPRL

*[Signature]*

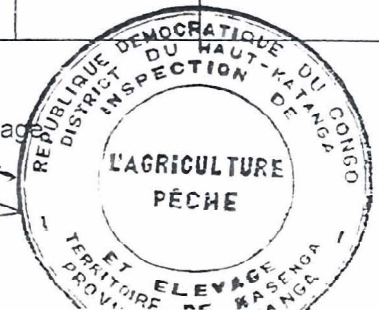


Fait à Lubanda, le 23 novembre 2006

L'Inspecteur de Territoire de l'Agriculture, Pêche et Elevage

SIMBA MAZOYA Fridolin  
 Chef de Bureau

*[Signature]*





Certificat d'enregistrement d'une concession. EMPHYTEOTIQUE

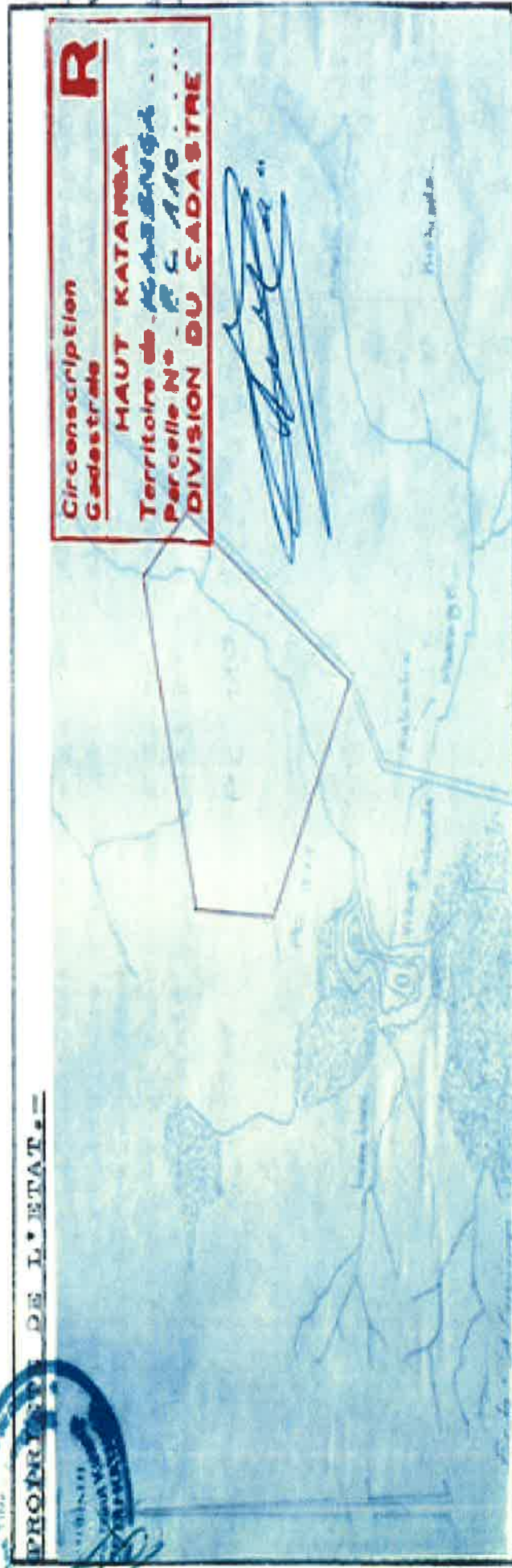
Livre d'enregistrement 90

Commune de K A S H N G A

La TERRA S.P.R.L., spécialisée dans la culture de la tomate, Immatriculée au nouveau registre du commerce n° 1006, ayant son siège social au n° 59, Avenue Colonel MUZIMBA, Commune de Lubumbashi, ici représentée par l'Administrateur délégué, Monsieur RAMIK DHKOLIA. Est enregistré comme étant en vertu d'un contrat d'emphytéose conclu avec la République Démocratique du Congo en date du vingt-sept juin deux mille neuf, reçu ce jour au registre journal sous les numéros d'ordre général 1719 et spécial MK/E 245.

CONCESSIONNAIRE EMPHYTEOTIQUE pour un terme de vingt-cinq ans renouvelables pendant cours le vingt-sept juin deux mille neuf jusqu'au vingt-six juin deux mille trente quatre indiqué ci-après : Une parcelle de terre destinée à usage agricole située à Lubanda, Territoire de Kasenge portant le numéro 110 du plan cadastral d'une superficie de mille deux cent et trois hectares nonant et un ares septante cinq centiares, d'après le procès-verbal de mesure et bornage numéro 572 dressé par le Géomètre du Cadastre en date du huit Octobre deux mille dix

PROPRIETE DE L'ETAT



Les charges qui grèvent cette propriété sont indiquées d'autre part. Délivré à K. I. P. U. S. H. I. le vingt-cinq novembre deux mille dix.

Certificat d'enregistrement d'une concession. EMPHYTEOTIQUE

91

Commune de K... A... B... N... G... A...

Livre d'enregistrement Folio

M. TERESA S. P. K. L., Sociétaire Privée à Responsabilité Limitée, Immatriculée au nouveau registre du commerce n° 1006, ayant son siège social au numéro 59, Avenue Colonel MUSEMBA, Commune de Lubumbashi, représentée par l'Adjoint au Gouverneur, Monsieur KAMBA DIBOLIA,

Est enregistré comme étant en vertu d'un contrat d'emphytéose conclu avec la République Démocratique du Congo en date du vingt-sept juin deux mille neuf, reçu au jour au registre journal sous les numéros d'ordre général 1721 et spécial NK/E 246.

CONCESSIONAIRE EMPHYTEOTIQUE pour un terme de vingt-cinq ans renouvelable en prenant cours le vingt-sept juin deux mille neuf jusqu'au vingt-six Juin deux mille trente quatre du Fonds indiqué ci-après :

Une parcelle de terre destinée à usage Agricole-pastoral située à Lubanda, territoire de Kautanga portant le numéro 111 du plan cadastral d'une superficie de neuf cent septante et un hectares cinquante huit ares trente huit centiares, d'après le procès-verbal de déouage et de bornage numéro 573 dressé par le Géomètre du Cadastre en date du huit Octobre deux mille dix.

PROPRIETE DE L'ETAT



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Echelle : 1/10000

Les charges qui grèvent cette propriété sont indiquées d'autre part.

Delivré à K. I. P. U. S. K. I. le Vingt-cinq Octobre du mois de Novembre

# Certificat d'enregistrement d'une concession. EMPHYTEOTIQUE

Livre d'enregistrement 92  
 Folio

Commune de  
 K A S K N G A

M. TERRA S.P.R.L. Société Privée à responsabilité limitée, Immatriculée au nouveau registre du commerce n° 1006, ayant son siège social au n° 59, Avenue Colonel WUZIMBA, Commune de Lubumbashi, représentée par l'Administrateur Général, Monsieur RAHIM DMKOLIA. Est enregistré comme étant en vertu d'un contrat d'emphytéose conclu avec la République Démocratique du Congo en date du vingt-sept juin deux mille neuf, reçu ce jour au registre journal sous les numéros d'ordre général 1723 et spécial MK/E 249.

CONCESSIONNAIRE EMPHYTEOTIQUE pour un terme de vingt-cinq ans renouvelables pendant cours le vingt-sept juin deux mille neuf jusqu'au vingt-six juin deux mille trente quatre du fonds indiqué ci-après : Une parcelle de terre destinée à usage Agro-pastoral située à Lubanda. Cette parcelle de Kasenga portant le numéro 116 du plan cadastral d'une superficie de mille trente deux hectares, trente huit ares, vingt cinq centiares d'après le procès-verbal de mesurage et de bornage numéro 578 dressé en date du huit octobre deux mille dix par le Géomètre du Cadastre.

PROPRIETE DE L'ETAT.

R

Circonscription  
Cadastrale

HAUT KATANGA

Territoire de KASSENGA

Parcelle N° PC 116

DIVISION DU CADASTRE

Ech: 1/100000

Les charges qui grèvent cette propriété sont indiquées d'autre part.  
 Délivré à K I P U S I le vingt-cinq jour du mois de novembre  
 dix

Certificat d'enregistrement d'une concession. EMPHYTEOTIQUE

93

Commune de IC... A... B... N... G... A...

M. TSHIKA, EP... J. Société privée à responsabilité limitée, Immatriculée au nouveau registre du commerce n° 1006, ayant son siège social au numéro 59, Avenue Colonel WUZIMBA, Commune et Ville de Lubumbashi, Représentée par l'Administrateur Gérant, Monsieur KAMIN DHROLIA... Est enregistré comme étant en vertu d'un contrat d'Emphytéose conclu avec la République Démocratique du Congo en date du vingt-sept Juin deux mille neuf, reçu ce jour au registre Journal sous les numéros d'ordre généraux 1725 et spécial PK/E 250... CONCESSIONNAIRE EMPHYTEOTIQUE pour un terme de vingt-cinq ans renouvelables prenant cours le vingt-sept Juin deux mille neuf jusqu'au vingt-sept Juin deux mille trente quatre du fensis indiqué ci-après : Une parcelle de terre destinée à usage Agro-pastoral située à Lubanda, Territoire de Kasenge portant le numéro 118 du plan cadastral d'une superficie de mille septante cinq hectares septante cinq ares quatre vingt-cinq centiares d'après le procès-verbal de bornage et bornage numéro 580 dressé par le Géomètre du Cadastre en date du huit Octobre deux mille dix...

PROPRIETÉ DE L'ETAT

Echelle: 1/100.000

Circenscription Cadastre  
HAUT KATANGA  
Territoire de KASENGE  
Parcelle No. P.C. 118  
DIVISION DU CADASTRE

Les charges qui grèvent cette propriété sont indiquées d'autre part. Ouvre à K. I. P. U. S. H. I. le Vingt-cinqième Jour du mois de Novembre

Certificat d'enregistrement d'une concession. EMPHYTEOTIQUE

Livre d'enregistrement ..... 5 ..... Folio ..... 94 ..... Commune de K A S E N G A

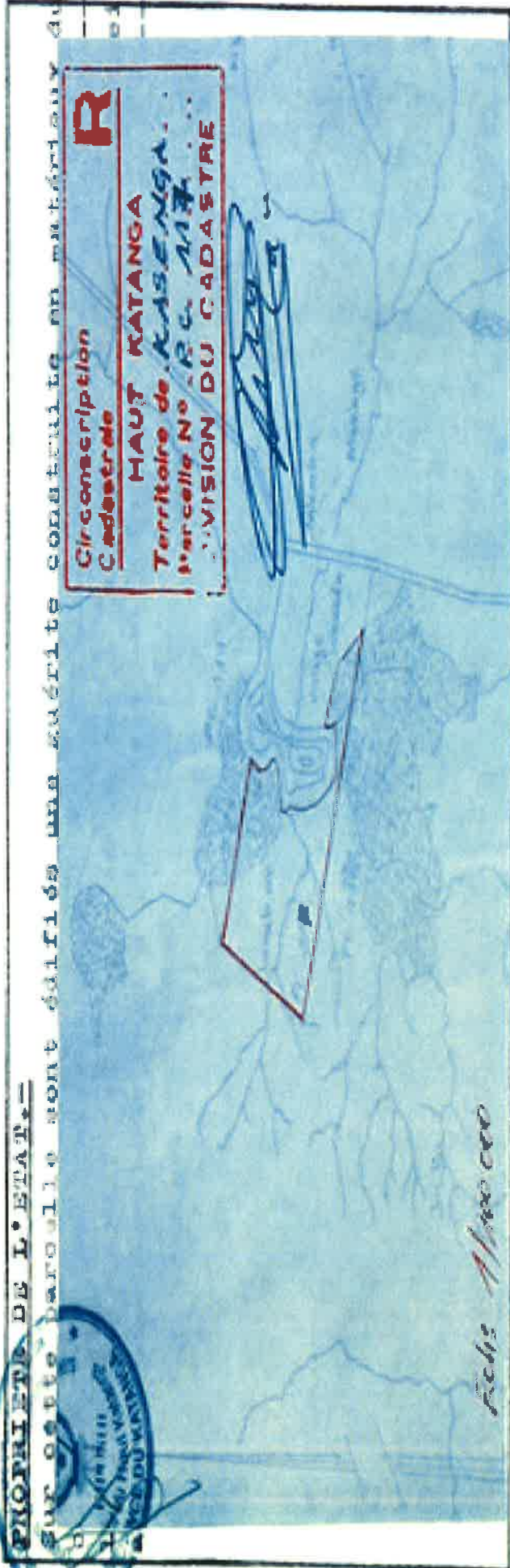
M. TEMA S.P.R.L. Société privée à responsabilité limitée, domiciliée au nouveau registre du commerce numéro 1006, ayant son siège social au numéro 59, Avenue Colonel MUISIBA, commune et Ville de Lubumbashi, représentée par l'Administrateur délégué, Monsieur RAHIM DEROLIA. Est enregistré comme étant en vertu d'un contrat d'emphytéose conclu avec la République Démocratique du Congo en date du vingt-sept juin deux mille neuf, reçu ce jour au registre journal sous les numéros d'ordre général 1727 et spécial NK/E 254.

CONCESSIONNAIRE EMPHYTEOTIQUE pour un terme de vingt-cinq ans renouvelables prenant cours le vingt-sept juin deux mille neuf jusqu'au vingt-six juin deux mille treize quatre du fonds indiqué ci-après : Une parcelle de terre destinée à usage agricole située à Lubanda, territoire de Kamanga portant le numéro 117 du plan cadastral d'une superficie de septcent seize hectares trente cinq ares septante sept centiares d'après le procès-verbal de métrage et de bornage numéro 579 dressé par le géomètre du cadastre en date du huit octobre deux mille dix.

PROPRIETE DE L'ETAT.

Sur cette parcelle sont édifiés une ou plusieurs constructions durables

Circ. conscription  
Cadastre  
HAUT KATANGA  
Territoire de KAMANGA  
Parcelle No. R.C. 117  
DIVISION DU CADASTRE



Arch. / No 000

**ARRÊTÉ 1**

**Article 1er :**

Est approuvée la création d'une parcelle de terre à usage agricole pastoral portant le numéro 110 du plan cadastral du territoire de KASENCA district du Haut-Katanga, Province du Katanga, ayant une superficie de 1.000 ha 00 a 00 en 00ss.

**Article 2 :**

La parcelle ainsi créée est mise sur le marché aux conditions fixées par les Arrêtés Interministériels n° 042/ CAB/ MIN/ APF/ 17/2005 et 068/CAB/MIN/FINANCE/2005 du 26 mai 2005 portant fixation des taux des droits, taxes et redevances à percevoir à l'initiative du Ministère des Affaires foncières.

**Article 3 :**

Le Conservateur des Titres Immobiliers et le Chef de Division du Cadastre de la Circonscription Foncière de Kipushi dans la Province du Katanga sont chargés, chacun en ce qui le concerne, de l'exécution du présent Arrêté qui entre en vigueur à la date de sa signature.

Fait à Kinshasa, le **27 juin 2009**

Maître **KISIMWA**





Le Ministre

Kinahasa, le

ARRETE MINISTERIEL N° <sup>12</sup> / CAB / MIN / AFF.FONC / 2009 DU  
PORTANT CREATION D'UNE PARCELLE DE TERRE  
N°1137 A ~~UN~~ AGRICULTURE AGRICULTURE AGRICULTURE AGRICULTURE  
DE KASENOA DISTRICT DU HAUT-KATANGA, PROVINCE DU KATANGA

**LE MINISTRE DES AFFAIRES FONCIERES,**

- Vu la Constitution, Spécialement l'article 93 ;
- Vu la Loi n° 73/021 du 20 juillet 1973 portant régime général des biens, régime foncier et immobilier et régime des sûretés, telle que modifiée et complétée par la Loi n° 80/008 du 14 juillet 1980 ;
- Vu l'Ordonnance n° 74/148 du 02 juillet 1974 portant mesures d'exécution de la Loi n° 73 - 021 du 20 juillet 1973 portant régime général des biens, régime foncier et immobilier et régime des sûretés telle que modifiée et complétée à ce jour ;
- Vu l'Ordonnance n°08/073 du 24 décembre 2008 portant organisation et fonctionnement du Gouvernement, modalités pratiques de collaboration entre le Président de la République et le Gouvernement ainsi qu'entre les membres du Gouvernement ;
- Vu l'Ordonnance n°08/074 du 24 décembre 2008 fixant les attributions des Ministères, spécialement l'article 1<sup>er</sup>, point B, numéro 26 ;
- Vu l'Ordonnance n°08/07 du 26 octobre 2008 portant nomination des Vice-Prémiers Ministres, Ministres et Vice - Ministres ;
- Vu l'Arrêté Interministériel n°042/CAB/MIN/AFF.F/2005 et 068 / CAB / MIN / FINANCES / 2005 du 26 mai 2005 portant fixation des taux des droits, taxes et redevances à percevoir à l'initiative du Ministère des Affaires Foncières ;
- Vu le dossier constitué au nom de la Société TERRA Spol pour l'acquisition d'une concession à usage agro-pastoral

## **Appendix B: Issues and responses Report**



# **TERRA Industrial Farming Complex: Preliminary Environmental and Social Impact Assessment Issues and Response Report**

Report Prepared for

## **TERRA SPRL**

Report Number 471947/ IRR01



Report Prepared by

 **srk** consulting

March 2014

*SRK Consulting (South Africa) (Pty) Ltd. in association with SRK Consulting Congo S.P.R.L.*

# TERRA Industrial Farming Complex: Preliminary Environmental and Social Impact Assessment

## Issues and Response Report

### TERRA SPRL

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**SRK Project Number: 471947**

**March 2014**

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This Issues and Response Report records the issues of concern, suggestions and other comments raised by stakeholders during the stakeholder engagement process for the Preliminary Environmental and Social Impact Assessment and Gap Analysis for the TERRA Industrial Farming Complex Project. Comments were contributed at pre-meetings held by SRK with local leaders, in December 2013, and again during community and government meetings in February 2014 in Lubanda Village and Lubumbashi, Katanga Province, Democratic Republic of Congo.

Stakeholders also had an opportunity to submit written comments on a comment form distributed with the Background Information Document (BID) at meetings. The BID is appended in Appendix A.

Table 1 provides a list of the meetings held to date, including details of the stakeholder group consulted and the objective of the meeting.

**Table 1: List of meetings held by SRK**

Meeting details	Stakeholder / Group	Objective of meeting
18 February 2014 Lubanda Village	Traditional leaders: Lubanda	To present information about the proposed project to stakeholders, and provide them with an opportunity to raise comments, issues and suggestions about the proposed project.
	Community members, NGOs, and civil society: Lubanda Village	
19 February 2014 Lubumbashi	Provincial Agriculture Cabinet Minister: Lubumbashi	
7 March 2014 Lubumbashi	Provincial Minister of Mines and Environment	

Meeting attendance registers are included in Appendix B, and the comments raised by stakeholders at these meetings are recorded in this Issues and Response Report.

In addition to the above meetings conducted by SRK, members of the IFC convened separate meetings in February 2014, as follows:

**Table 2: List of meetings held by the IFC**

Meeting details	Stakeholder / Group	Objective of meeting
12 February 2014	Chef de Groupment Katete: Lubanda Village	To enable the IFC gain an understanding of the land acquisition process followed by TERRA and to record the Chief's views on the process and potential issues
13 February 2014	Traditional leaders representing the following villages: <ul style="list-style-type: none"> <li>• Mwenge;</li> <li>• Mutipula;</li> <li>• Kalulu;</li> <li>• Filiki;</li> <li>• Kalemba; and</li> </ul> Nkeka	

The comments raised by stakeholders during these IFC arranged meetings are also included in this Issues and Response Report.

This report also includes responses provided by the SRK and TERRA project team. The comments have been categorized as follows.

<b>1</b>	<b>NEED AND DESIRABILITY OF PROPOSED PROJECT</b>	<b>1</b>
<b>2</b>	<b>PROJECT SPECIFIC ISSUES</b>	<b>2</b>
<b>3</b>	<b>SOCIO-ECONOMIC ISSUES</b>	<b>3</b>
3.1	Employment	3

3.2 Grievance procedure.....4

3.3 Community relations .....5

3.4 Chiefs .....5

3.5 Social and other disruptions.....5

3.6 Relocation and compensation.....5

**4 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT..... 6**

4.1 Stakeholder engagement.....8

**5 COMMUNITY DEVELOPMENT PROJECTS..... 8**

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
<b>1 NEED AND DESIRABILITY OF PROPOSED PROJECT</b>					
The project has the potential to bring tangible benefits to the local population. For example, parents employed by TERRA will be able to pay school fees, and schools will have adequate funding to function better.	Bernard Miburo	Lubanda Community	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	Thank you for your comment.
<p>The TERRA Project is the first of its kind in the DRC and has the potential to be the biggest in the country (10 000 hectares). Government is in full support of this project principally because it has the potential to meet the objectives of the State, ie. to diversify the local economy, become self reliant in the production of maize and flour and meet the 70% deficit in the local demand for maize. This objective was published in a Government Ordinance that was promulgated during the financial crisis in 2008. The importance of this strategy is more evident due to the following:</p> <ul style="list-style-type: none"> <li>• South Africa's report on its climate crisis which is likely to affect its maize production; and</li> <li>• Zambia's decision to reduce its quota of maize export.</li> </ul> <p>The DRC is dependent on the maize outputs from these two countries.</p> <p>Some of the difficulties government is currently facing include the inability to monitor subsistence maize production (methods and outputs), to be able to assist maize farmers increase their production and to find suitable development partners. For this reason Government has created a business cooperative, of- which TERRA is member, to</p>	Marc Mutombo	Provincial Agriculture Cabinet Minister	19 Feb 2014	Provincial Government Meeting, Lubumbashi	TERRA appreciates this information by the Ministry, and will continue to keep all parties apprised of progress with the development of the project. The project team looks forward to further engagement with the Minsitry regarding this project.
	Audax Sompwe	Provincial Minister of Mines and Environment	7 March 2017	Provincial Government Meeting, Lubumbashi	

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
discuss and find solutions to identified problems. The next meeting of the cooperative is in November 2014.					
Community leaders share a general sentiment that the TERRA Project has not had negative impacts on the community, and are positive about its expansion.	Kalemba Kayembe	Kalemba Locality Chief	13 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	Thank you for this comment.
What are TERRA's expectations from the community in terms of the project being in this area?	Bernard Miburo	Lubanda Community	18 Feb 2014	NGO and Civil Society Meeting: Lubanda Village	TERRA expects to build a strong relationship with the communities within which it operates. To create an positive constructive environment where all parties work together in a collaborative effort to maximize benefits to all. And at the same time to uphold its responsibilities in compliance with environmental and social legislation and good international industry practice.
<b>2 PROJECT SPECIFIC ISSUES</b>					
TERRA had promised to restitute the area around Lake Lubanda back to the community in order not to restrict fishing. However from the latest information presented, TERRA's concession still engulfs a sizeable area around Lubanda Lake. Has anything changed since the initial committment?	Basile Kashila	Lubanda Community	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	The map shows the old concession boundary which has since been changed. TERRA has restituted the section engulfing Lubanda Lake back to the community and has acquired more land south of the concession from the government. This allows communities to carry on with their fishing activities while keeping TERRA's allotted hecterage the same. The new project footprint will be distributed once all amendments are addressed.
The fact that TERRA uses slash and burn to prepare the land is not a major concern to communities because they also use similar methods.	Kalemba Kayembe	Kalemba Locality Chief	13 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	Thank you for your comment.
What does TERRA plan to do with the land at the end of the life of the project?	Hyppolyte Kaluba Chabala	Encadreur des Communautes	18 Feb 2014	NGO and Civil Society Meeting,	TERRA SPRL – In terms of the Bakajika Land Law of 1973, land belongs to the State, which

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
		Ecclesiales Vivantes		Lubanda Village	means that TERRA leases the land from government. Upon closure, the land will therefore go back to the State and the people of Lubanda.
<b>3 SOCIO-ECONOMIC ISSUES</b>					
<b>3.1 Employment</b>					
TERRA only employs women mainly for cleaning, etc. Will there be other jobs opportunities for women?	Kalenba Kayembe	Kalenba Locality Chief	13 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	TERRA to respond please
Was the community notified of potential job opportunities at the beginning of the project?	Albert Kimbalamuke	Ecole Primaire de Lubanda	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	Farming is a seasonal activity and so most people are informed and subsequently employed only when the need arises (casual workers). At present, mostly unskilled jobs, such as cleaning and bush clearing is required. Previously, before formal procedures and systems were put in place, TERRA approached the chiefs to identify and select potential workers. Now, the services of a local human resources company, Mukap SARL are being used to recruit potential employees. Mukap sends notices to the chiefs and also organises recruiting drives. Those selected have to undergo tests and training.  Recruitment of skilled labour is coordinated via the Ministry of Labour, and notices are displayed in community centers (Lubumbashi and Kasenga).
TERRA should focus on employing young people from the affected communities	Lucien Kabulo	Lubanda Community	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	TERRA has observed that young people are not interested in casual labour. Many of them prefer to work in the nearby stone quarries because they feel that they will earn more or because they are not used to formal
	Albert Kimbalamuke	Ecole Primaire de Lubanda	18 Feb 2014	NGO and Civil Society Meeting,	

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
				Lubanda Village	
Is there a reason why have so many young people have decided not to work at the TERRA project?	Honorine Kilufya	Femmes et Genre	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	employment contracts where employees have to go to work everyday no matter the situation (rain, long travelling distances, etc). As a result, TERRA has had to employ people living outside of Lubanda.
	Anastasie Kibombo	Femmes et Genre, Secretary	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	We urge community organisations to assist TERRA to encourage young people to become involved in this project. TERRA cannot do this alone.
Does TERRA have plans to empower women in the local communities?	Bernard Miburo	Religious Leader	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	There have been discussions around buiding a training school for young women but these are at an early stage. This project is largely dependent on TERRA's financial performance and hence this initiative can be taken further once the project is financially viable.
Students aged between 12 and 15 recently benefited from spending a day working in TERRA's concession. These initiatives should be further encouraged. Young people aged 18 and above also benefit from TERRA's activities, where tasked-based jobs are made available to eligible people	Bernard Miburo	Religious Leader	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	Response from IFC: TERRA is required to work within the guidelines promulgated by the DRC Labour Code, which specifies the legal working age as 18 years.
It is pleasing to note that TERRA has employed local community members since 2008, when I became chief.	Mumba Fernand	Chef the Groupement Katete	12 Feb 2014	Meeting with Chef de Groupement, Chief's residence	Thank you for this comment. TERRA strives to employ as many local people as possible, and will continue doing so through the various phases of development of the project.
<b>3.2 Grievance procedure</b>					
Community leaders usually contact TERRA's Human Ressources Department, to bring to their attention any issues from the community.	Munakasuba Venant	Chef de Terre	13 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	Grievances are usually addressed to TERRA's HR department and resolved with input from community leaders. TERRA is also in the process of compiling a grievance procedure that will be implemented shortly.



COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
<b>3.3 Community relations</b>					
The relationship between TERRA and communities is good. For instance, TERRA helped the community buy the relevant materials for the funeral of the chief who passed away recently.	Lucien Kabulo	Lubanda Community	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	Thank you for this information.
<b>3.4 Chiefs</b>					
Chiefs in the affected villages should benefit from this project in their area and TERRA should for example consider providing the Chiefs with corrugated iron roofing for their houses.	Mwewa Camille	Nkeka Locality Chief	18 Feb 2014	Traditional Leaders' Meeting: Lubanda Village	Thank you for this suggestion. TERRA has several community development projects in the area which benefit the entire community. For instance, TERRA regularly assists the Lubanda Clinic by donating medical supplies. TERRA has also sunk a number of boreholes for the community.
	Nusansa Obedi	Mwenge Locality Chief			
<b>3.5 Social and other disruptions</b>					
TERRA's activities thus far have not prevented the communities from fishing in the Lubanda Lake.	Katopwe Joseph	Katete Locality Chief	13 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	Thank you for this information.
<b>3.6 Relocation and compensation</b>					
The process followed by TERRA SPRL in acquiring land in 2006 adhered to the requirements promulgated by the DRC's Customary Law. There has not been any breach of contract or irregularities, hence my support for the project.	Mumba Fernand	Chef the Groupement Katete	12 Feb 2014	Meeting with Chef de Groupement, Chief's residence	Thank you for this information.
Information about the buffer zone was circulated prior the commencement of the project. Communities have traditionally kept well clear of this area and so I am not aware	Mumba Fernand	Chef the Groupement Katete	12 Feb 2014	Meeting with Chef de Groupement, Chief's residence	Thank you for this information.

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
of any farming activity within TERRA's lease area.					
The resettlement procedure followed by TERRA was comprehensive. An asset inventory was conducted by the Agriculture Inspector from the Kafira Sector (Inspecteur du Service de l'Agriculture du Secteur de Kifira). Fields situated in the concession were identified and measured. Compensation amounts were based on the findings of the assessment and were paid in 2006. Affected parties were given a deadline (2009) within which they had to harvest their crops and move to other suitable areas. There was only one grievance out of 188 affected parties identified in the concession. The complaint was made by the Filiki Locality Chief and was heard by the local tribunal. The tribunal passed the judgement in favour of TERRA.	Mumba Fernand	Chef the Groupement Katete	12 Feb 2014	Meeting with Chef de Groupement, Chief's residence	Thank you for this information.
TERRA has not compensated me for the land that I have lost.	Filiki Kilambe	Filiki Village - Locality Chief	18 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	TERRA is aware of this complaint. The matter was dealt with by the court. The judge ruled in favour of TERRA and the case was closed in the presence of the <i>Chef de Groupement</i> .
Complaints (if any) are usually submitted directly to TERRA. It is when issues cannot be resolved between TERRA and the complainant that the matter is presented to me.	Mumba Fernand;	Chef the Groupement Katete	12 Feb 2014	Meeting with Chef de Groupement, Chief's residence	Thank you for this clarification.
<b>4 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT</b>					
Were environmental studies done to assess the impact of fertilisers on the groundwater resources, once the project starts?	Symphorien Mbay	Paroisse Catholique - Church	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	An initial environmental and social study was conducted by a Congolese consultancy, <i>Groupe des Aménageurs de la République Démocratique du Congo</i> in 2010. TERRA now
	Mutipula	Mutipula	18 Feb	Traditional Leaders'	

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
		Locality Chief	2014	Meeting, Lubanda Village	seeks IFC funding to proceed to Phase 2 of the project to extend its farming activities on the remaining 8 400 hectares of the project area.
Has SRK considered the effects such a big project will have on the biodiversity?	Symphorien Mbay	Paroisse Catholique - Church	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	Terra has appointed SRK to conduct an environmental and social scan to gain an understanding of current environmental and social conditions and potential risks on site. Some specialist studies are being undertaken as part of the study for example, a socio-economic baseline study and a groundwater scan, which was conducted in December 2013. In addition a review of biodiversity data will be done. The study will identify the species likely to be affected and will provide management plans to manage negative impacts and enhance positive impacts.
Briefly describe the management measures TERRA may have identified.	Kalembe Kayembe	Kalembe Locality Chief	18 Feb 2014	Taditional Leaders' Meeting, Lubanda Village	Before identifying management plans, studies such as socio-economic, water and biodiversity have to be undertaken. SRK is not in a position to discuss the plans prior to the completion of baseline investigation and the impact assessment. The plans will be discussed with stakeholders for their information and comment after the environmental and social impact assessment has been completed.
The study should also consider the following: <ul style="list-style-type: none"> <li>The slash and burn and tree-cutting practices used by subsistence farmers;</li> <li>Maize theft that is currently occurring in the communities; and</li> <li>The involvement of local communities in this project.</li> </ul>	Marc Mutombo	Provincial Agriculture Cabinet Minister	19 Feb 2014	Provincial Government Meeting, Lubumbashi	Thank you for your comment. These issues are being considered in the socio-economic and biodiversity studies. The findings and recommended management measures will be made available for stakeholders to comment on once the studies have been completed.
It would like, at the very least, see a copy of	Audax Sompwe	Provincial Minister of	7 March	Provincial	

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
the recommendations SRK will propose		Mines and Environment	2017	Government Meeting, Lubumbashi	
<b>4.1 Stakeholder engagement</b>					
How does TERRA envisage communicating with communities?	Albert Kimbalamuke	Ecole Primaire de Lubanda	18 February 2014	NGO and Civil Society Meeting, Lubanda Village	As part of this study, SRK is developing a stakeholder engagement plan which outlines the key engagement approaches and activities to guide TERRA in its ongoing engagement and communication with its stakeholders throughout that life of the project. The radio station, which TERRA plans to refurbish, will serve to communicate information about the progress of the project, and potential job opportunities to communities and other stakeholders.
<b>5 COMMUNITY DEVELOPMENT PROJECTS</b>					
Examples of community development projects brought to TERRA's attention are the construction of the Lubanda health centre. The centre was built in 2010 with the assistance of International Rescue Committee – an international Non-Government Organisation. The World Bank also financed a portion of the project. The community contributed 10% of the costs and TERRA provided construction equipment.	Kalemba Kayembe	Kalemba Locality Chief	13 Feb 2014	Taditional Leaders' Meeting, Lubanda Village	Thank you for this information.
Communities have high expectations from this project in terms of infrastructure development initiatives such as better schools, hospitals and roads. There is therefore strong community support for the TERRA Project.	Mumba Fernand	Chef the Groupement Katete	12 Feb 2014	Meeting with Chef de Groupement, Chief's residence	TERRA is already undertaking the following community development projects in affected communities in the project area: <ul style="list-style-type: none"> <li>• Intallation of solar lamps – which is already completed;</li> <li>• Installation of water wells to supply drinking water to communities – still in progress</li> </ul>
	Kalemba Kayembe	Kalemba Locality Chief	13 Feb 2014	Taditional Leaders' Meeting, Lubanda Village	
	Bernard Miburo	Lubanda Community	13 Feb 2014	NGO and Civil Society Meeting,	

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
				Lubanda Village	<ul style="list-style-type: none"> <li>Donation of corrugated iron roofs to the Lubanda school.</li> </ul> <p>Other suggestions for projects and needs identified by the community and TERRA will be considered in the Community Development Plan being developed as part of this process. Community projects are focused on benefiting whole communities and not individuals.</p>
	Germaine Ngoy	Lubanda Community	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
	Basile Kashila	Lubanda Community	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
	Maritani	Maritani Locality Chief	18 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	
TERRA's promise to build a training school for girls has not yet materialized.	Filiki Kilambe	Filiki Locality Chief	18 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	
	Maritani	Maritani Locality Chief	18 Feb 2014	Traditional Leaders' Meeting, Lubanda Village	
	Germaine Ngoy	Mamans de Lubanda	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
The women's organization, Mamans Twikatane, which comprises 26 members, assists women to expand the size of their fields and increase production. The organization currently works in a two hectare area and would like to expand its activities but adequate funding is a challenge.	Petronille Masaba Kisanga – President	Mamans Twikatate	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
Local farmers would appreciate technical support from TERRA to enhance their agricultural practice and improve yields.	Hippolyte Kaluba	Saint André Church	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
	Symphorien Mbay	Paroisse Catholique - Church	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
TERRA has supported traditional leaders with	Symphorien Mbay	Paroisse Catholique -	18 Feb	NGO and Civil	

COMMENTS RAISED BY STAKEHOLDER	COMMENTATOR/S	ORGANIZATION/ COMMUNITY	DATE	SOURCE	RESPONSE BY PROJECT TEAM
fertilizers to increase the production of locally grown crops. This support should be extended to benefit other community members as well.		Church	2014	Society Meeting, Lubanda Village	
The community would appreciate a local radio station so that the community could be kept informed about project developments and opportunities?	Hippolyte Kaluba	Saint André Church	13 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	
TERRA should consider assisting to upgrade the Minga–Mitondo road?	Basile Kashila	Lubanda Community	18 Feb 2014	NGO and Civil Society Meeting, Lubanda Village	TERRA recently laid laterite on this road with the view to improve the condition for its vehicles. TERRA is however not able to fully upgrade the road due to lack of equipment and funds.

**Prepared by**

**Peer reviewed by**



**pp Vuyo Matshikiza**

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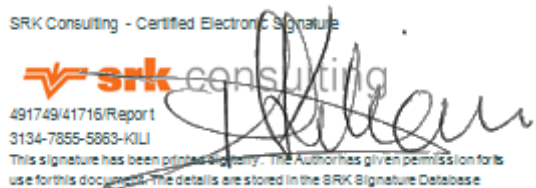
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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

**Appendix A: Background Information Document (English and French)**



## Analyse Environnementale et Sociale pour Terra SPRL, Lubumbashi, Province du Katanga, RDC



### CONTEXTE DU PROJET

Terra SPRL a obtenu un permis auprès du gouvernement de la République Démocratique du Congo (RDC) pour cultiver du maïs blanc sur une zone de 10 000 hectares près du Village Lubanda, à environ 90 kilomètres au sud-est de Lubumbashi. La zone du projet est divisée en deux parties, l'une au Village Lubanda (5 000 hectares) et l'autre près du Village Katofio (5 000 hectares).

En 2007, des travaux préliminaires commencèrent sur 60 hectares près du Village Lubanda. En 2009, les opérations de Terra envoutèrent une zone de 510 hectares. Pendant la même année, une EIES avait été réalisée par le Groupe des aménageurs de la République Démocratique du Congo, conformément à l'exigence de la loi de la RDC sur l'agriculture (Loi Portant Principes Fondamentaux relatifs à l' agriculture , N ° 11 / 022 du 24 Décembre 2011) et plus particulièrement à l'article 66 du Code qui veille à ce que les conséquences environnementales et sociales du projet soient identifiées, évalués et que des plans de gestion appropriés soient mis en place pour minimiser les impacts négatifs et renforcer les effets positifs.

Actuellement, 1 600 hectares du site sont cultivés dans le cadre de la Phase 1 du projet. Terra envisage d'élargir son champ d'action pour inclure la portion de terre située près de Katofio (**Error! Reference source not found.**).



### ANALYSE ENVIRONNEMENTALE ET SOCIALE POUR LA PHASE 2 DU PROJET

Terra sollicite un financement auprès de la SFI pour passer à la Phase 2 du projet (étendre ses activités agricoles sur les 8 400 hectares qui restent). Terra a nommé SRK pour effectuer une analyse environnementale et sociale afin de connaître les conditions environnementales et sociales actuelles et les risques potentiels sur le site.

Certaines études spécialisées sont en cours, par exemple, une étude de base socio- économique et une analyse des eaux souterraines de référence, on été et sont en train d'être faites. L'étude de base socio-économique a commencé à la fin de Janvier 2013 et implique une enquête ménages d'environ 100 ménages situés dans quatre villages, des réunions de groupes d'intérêts avec les hommes, femmes et jeunes dans différentes localités, et des entretiens avec des parties prenantes clés (éducateurs et spécialistes de la santé). Les entretiens avec les parties prenantes clés étaient constitués des représentants du gouvernement local et des chefs traditionnels de Lubanda.



En outre, des réunions d'engagement seront faites en mi-Février 2014, avec les représentants du gouvernement à Lubumbashi, les chefs traditionnels et les communautés affectées à Lubanda et Katofio. Les résultats de l'évaluation seront inclus dans un rapport d'analyse socio-économique avec des recommandations pour des études supplémentaires. Ces derniers seront mis à la disposition de Terra et de la SFI.

**SRK VOUS INVITE A PARTICIPER A CETTE ETUDE.**  
**Pour plus d'informations, Veuillez contacter Philippe Katuta sur +243824312101**  
**ou sur PKatuta@srk.co.za.**

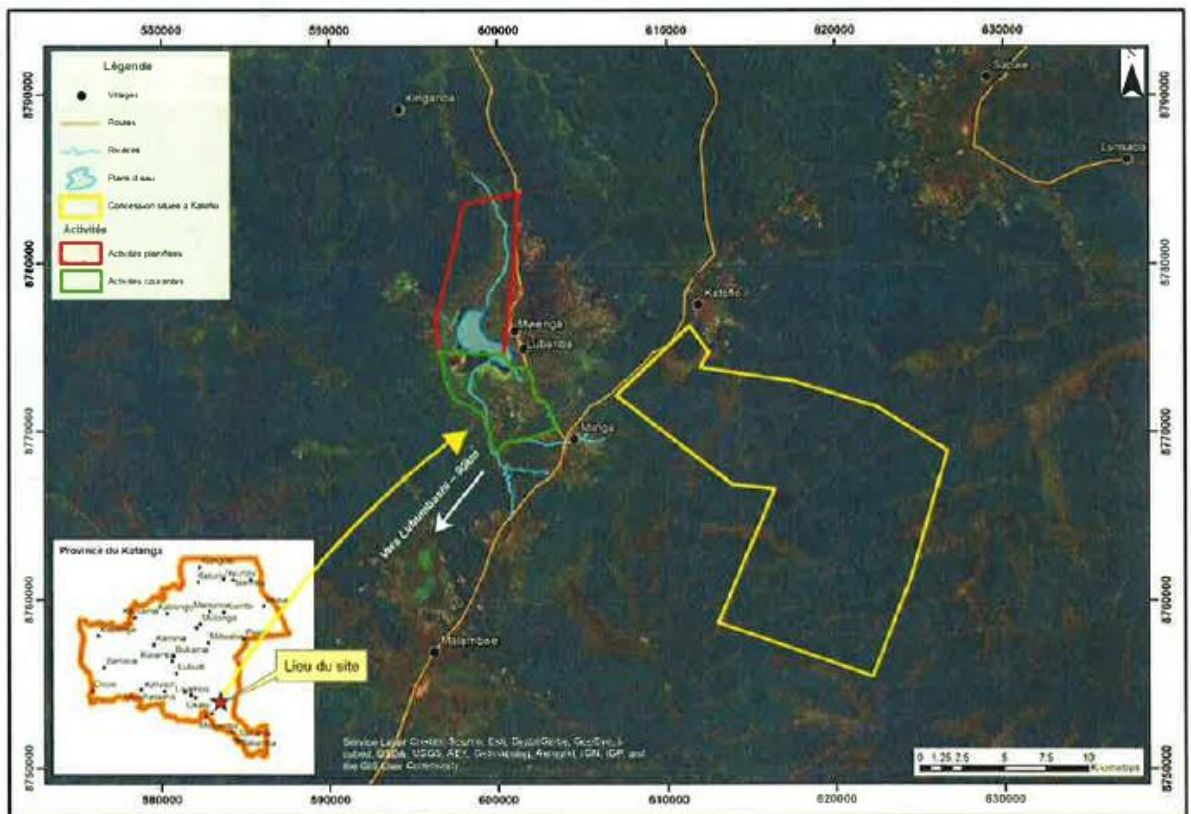


Figure 1: Emplacement du Projet Terra



**Appendix B: Attendance registers**

**PROVINCIAL MINISTER OF MINES AND ENVIRONMENT MEETING**

**7 MARCH 2014**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Organisation / Village Represented</b>	<b>Town / Village</b>
Chef	Audax	Sampwe	Provincial Minister	Department of Mines and Environment	Lubumbashe

**PROVINCIAL AGRICULTURE CABINET MINISTER MEETING  
LUBUMBASHE**

**19 FEBRUARY 2014**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Organisation / Village Represented</b>	<b>Town / Village</b>
Mr	Marc	Mutombo	Cabinet Minister	Agriculture and Development Rural	Katanga

**LUBANDA COMMUNITY MEMBERS MEETING  
LUBANDA VILLAGE**

**18 FEBRUARY 2014**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Organisation/ Village Represented</b>	<b>Town / Village</b>
Mr	Albert	Kimbalamuke	Directeur	D'Ecole	Kikole
Ms	Anastasio	Kibombo	Secretary	Associate des Mamans	Kalembe
Mr	Basile	Kashila Mulaswa		Reseau de Rassocerce Naturalle	Muti pula
Mr	Bernard	Gomar		Saint Andre Church	Kikole
Ms	Delphin	Mukala	Infirmieri	Saint Andre Church	
Ms	Germaine	Ngoy	Tresoriese	Association des Mamans	
Mr	Godefroid	Bwele		Chef D'antenne ANR Groupement Katete	Mutshipula Village
Ms	Hamonine	Kilufya	President	Association des Mamans	
Mr	Hippolyte	Kaluba	Civil Society	Missionnaire Associan des communautes	
Ms	Petronille	Kisanga	Twikatane Presidente	Association des Mamans	
Mr	Symphosier	Mbay		Saint Andre Church	Lubanda

**LUBANDA COMMUNITY LEADERS MEETING  
LUBANDA VILLAGE**

**18 FEBRUARY 2014**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Organisation / Village Represented</b>	<b>Town / Village</b>
Mr	Alice	Kabaso		Minga Village	Minga
Ms	Camilie	Mwewa		Kenka Village	Kenka
Mr	Godefroid	Bwele		Chef D'antenne ANR Groupement Katete	Mutshipula Village
Mr	Homa	Kanyimbwe		Terra Sprl	
Mr	Joseph	Katopwa	Localite Katopwa	Village Katopwa	Katopwa Village
Mr	Kandu	Kisebwe	Chef de Localite	Village Mutshipula	Mutshipula
Mr	Modestine	Kandu		Malitati Village	Malitati
Chef	Nasson	Kilambe	Chief	Filiki Village	
Mr	Obedi	Musanga	Chief	Mwenga Village	
Chef	Patrick	Ngandu	Chef	Ngandu Village	
Mr	Sindungu	Matabisi		Terra Sarl	Terra
Mr	Stephane	Kayembe Mwabi	Localite Kalemba	Village Katopwa	Katopwa Village
Chef	Venant	Muma Kasuba	Chief	Muma Kasuba Village	Muma Kasuba

**CHIEF TRADITIONAL MEETING****13 FEBRUARY 2014**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Organisation / Village Represented</b>	<b>Town / Village</b>
Chef		Katopwe	Chief	Katopwe Village	
Chef		Maritady	Chief	Maritady Village	
Chef		Mukeka	Chief	Mukeka Village	
Chef		Nutshipula	Chief	Nutshipula Village	
Chef	Besa	Ngandu	Chief	Ngandu Besa Village	Ngandu Besa
Chef	De Terre	Numakasuba	Chief	Numakasuba Village	
Chef	Kabale	Ngule	Chief	Kalulu Village	
Chef	Kayembe	Kalembe	Chief	Kalembe Village	
Chef	Kiri	Kabaso	Chief	Kabaso Village	
Chef	Nasson	Kilambe	Chief	Filiki Village	
Chef	Obedy	Nwange	Chief	Nwange Village	



**CHEF de GROUPEMENT KATETE MEETING  
LUBAND VILLAGE**

**12 FEBRUARY 2014**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Organisation / Village Represented</b>	<b>Town / Village</b>
Chef	Mumba	Fernand	Provincial Minister	Chef de Groupment Katete	Luband Village

## **Appendix C: Stakeholder Engagement Plan**

# TERRA Industrial Farming Complex: Stakeholder Engagement Plan

Report Prepared for

**TERRA S.P.R.L**



Report Number 471947



Report Prepared by

 **srk** consulting

April 2014

# TERRA Industrial Farming Complex: Stakeholder Engagement Plan

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## Disclaimer

The opinions expressed in this report have been based on the baseline information collected by SRK Consulting (Democratic Republic of Congo) Pty Ltd through social, stakeholder engagement and water resources site visits and interviews with key informants in the area. Additionally other primary and secondary information was supplied to SRK by TERRA SPRL. The opinions in this report are provided in response to a specific request from TERRA. SRK has exercised all due care in reviewing the supplied information and data from TERRA. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

## List of Abbreviations

ADB	African Development Bank
CCR	Community and Corporate Relations
CLO	Community Liaison Officer
CSI	Corporate Social Investment
DRC	Democratic Republic of Congo
ESDD	Environmental and Social Due Diligence
ESIA	Environmental and Social Impact Assessment
EMPP	Environmental Management Plan for the Project
IAP	Interested and Affected Party
IFC	International Finance Corporation
LACPF	Land Acquisition and Compensation Policy Framework
LRP	Livelihood Restoration Plan
PAP	Project Affected People
PS5	International Finance Corporation Performance Standard 5
PTOs	Permission to Occupy Certificates
RAC	Resettlement Advisory Committee
RAP	Resettlement Action Plan
SIA	Socio-Economic Impact Assessment
SEP	Stakeholder Engagement Plan
SOP	Standard Operating Procedure
SRK	SRK Consulting
TA	Traditional Authority
WBG	World Bank Group



# 1 Introduction

## 1.1 Project overview

TERRA operates a rain-fed maize farming project in the Katanga Province of the DRC, using hybrid seed, fertilisers, herbicide and pesticides. TERRA is currently cultivating maize in a 1 500 ha area located around the Lubanda Lake. In the year 2011-2012 TERRA produced approximately eight thousand tons of Grade A white maize. TERRA plans to increase their production by clearing an additional 8 500 ha of land for maize plantation. The maize will be grown on a total of 9 500 ha after allowances are made for access roads and related infrastructure, and will increase the Katanga Province's maize production. TERRA's production will, reach approximately 80 thousand tons a year, which is equivalent to 8% of the current national maize deficit in Katanga. With the production of that magnitude, the TERRA agricultural project is expected to become the largest maize farm in the DRC.

In addition to the excess demand that already exists, TERRA is expected to benefit from the opportunity created by a new legislation in Katanga that requires all mining companies in the province to supply 25kg per month of maize meal to all of their employees.

TERRA's related company African Milling Company Congo (AMCC) has invested in a 100,000 metric tonnes per year state of the art milling and storage facilities in Lubumbashi. The plant is expected to be commissioned in the first half of 2014 and will purchase all of the maize produced from the TERRA farms, which will address approximately 80% of its requirements. Additional maize inputs will be sourced from other farms and the open market. The milling facilities at AMCC will provide the population with quality maize flour, which is the staple food in Katanga at an affordable price and provide import substitution, as the Katanga province currently imports most of its maize and maize flour requirements.

## 1.2 Overview of the Stakeholder Engagement Plan

This Stakeholder Engagement Plan (SEP) outlines the consultation engagement strategy, which will assist TERRA with managing and facilitating future engagement through the various stages of the Project's life cycle including construction and operations.

This SEP adopts an inclusive life-of-operation perspective. It details engagement already undertaken with stakeholders and serves as a guide to current and future engagement. This version of the SEP is an initial guide to engagement and will need to be revised following project approval to inform on-going stakeholder engagement through the various stages of Project development. It is important to note however that this SEP does not cover engagement that may be required for specific studies and planning such as compensation and livelihood restoration. This engagement will be addressed by separate management plans and studies, which are usually developed in consultation with stakeholders.

## 1.3 Scope of this report

This report presents a stakeholder engagement strategy that facilitates effective consultation between stakeholders and TERRA. The overarching goals of this SEP are to:

- Understand the stakeholder engagement requirements of DRC legislation;
- Provide guidance for stakeholder engagement such that it meets the standards of International Best Practice;

- Identify key stakeholders that are affected, and/or able to influence the project and its activities;
- Identify the most effective methods and structures through which to disseminate project information, and to ensure regular, accessible, transparent and appropriate consultation;
- Guide TERRA to build mutually respectful, beneficial and lasting relationships with stakeholders;
- Outline a grievance procedure allowing stakeholders to log their concerns, and a procedure to address these concerns; and
- Assist TERRA with securing free, prior and informed consultation and maintaining a social license to operate throughout the life of the project.

## 2 An overview of stakeholder engagement

### 2.1 What is stakeholder engagement

Engagement is a process of *free, prior and informed* consultation<sup>1</sup>. It involves interactions between identified groups of people and provides stakeholders with an opportunity to raise their concerns and opinions (e.g. by way of meetings, surveys, interviews and/or focus groups), and ensures that this information is taken into consideration when making project decisions.

Effective stakeholder engagement develops a “social license” to operate and depends on mutual trust, respect and transparent communication between a company and its stakeholders. It thereby improves a company’s decision-making and performance by.<sup>2</sup>

- **Cutting costs:** Effective engagement can help project proponents avoid costs, while its absence can be costly both in terms of money and reputation
- **Managing risk:** Engagement helps project proponents and communities to identify, prevent, and mitigate environmental and social impacts that can threaten project viability
- **Enhancing reputation:** By publicly recognising human rights and committing to environmental protection, project proponents and financial institutions involved in financing the project can boost their credibility and minimise risks
- **Avoiding conflict:** Understanding current and emerging issues such as tension around influx and employment opportunities
- **Improving corporate policy:** Obtaining perceptions about a project, which can act as a catalyst for changes and improvements in corporate practices and policies
- **Identifying, monitoring and reporting on impacts:** Understanding a project’s impact on stakeholders, evaluating and reporting back on mechanisms to address these impacts
- **Managing stakeholder expectations:** Consultation also provides the opportunity for exploration and mining licence holders to become aware of and manage stakeholder attitudes and expectations.

### 2.2 Principles of effective stakeholder engagement

Stakeholder engagement is usually informed by a set of principles defining core values underpinning interactions with stakeholders. Common principles based on International Best Practice include the following:<sup>3</sup>

- **Commitment** is demonstrated when the need to understand, engage and identify the community is recognised and acted upon early in the process
- **Integrity** occurs when engagement is conducted in a manner that fosters mutual respect and trust
- **Respect** is created when the rights, cultural beliefs, values and interests of stakeholders and neighbouring communities are recognised

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<sup>1</sup> World Resources Institute, 2009, Breaking Ground Engaging Communities in Extractive and Infrastructure Projects, [www.wri.org](http://www.wri.org)

<sup>2</sup> Ibid.

<sup>3</sup> IFC, 2007, Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets.

- **Transparency** is demonstrated when community concerns are responded to in a timely, open and effective manner
- **Inclusiveness** is achieved when broad participation is encouraged and supported by appropriate participation opportunities
- **Trust** is achieved through open and meaningful dialogue that respects and upholds a community's beliefs, values and opinions.

## 2.3 Limitations of stakeholder engagement

Some common limitations of stakeholder engagement include:

- **It takes time and resources:** It takes time to develop and build trust based relationships with stakeholders. The consensus from practitioners is that from the outset relationships with stakeholders should develop and grow, and that these relationships should be nurtured and not fostered to fade. Additional stakeholders might be identified that also want to be engaged. No willing stakeholder should be excluded from the process of engagement. Some stakeholders will need to be educated about the concept of engagement itself, as well as on the complex issues requiring specialised and technical knowledge. These demands can increase the cost of consultation required to meet external expectations, and often this occurs at a time when a project lacks the internal capacity and resources to implement a broad engagement strategy.<sup>4</sup>
- **It raises expectations:** Stakeholders can have unrealistically high expectations of benefits that may accrue to them from a project. As such, from the outset project proponents must be clear on what they can and cannot do, establishing a clear understanding of their roles and responsibilities. In developing countries, project proponents are often expected to take on responsibilities that are usually the responsibility of the government (e.g. infrastructure development and the provision of healthcare and education facilities). This behaviour should be avoided, unless obligated to do so by the government as a precondition as by doing so, governments may be relieved of delivering on their responsibilities and a project proponent will be burdened with projects beyond the realm of their expertise. Instead the engagement processes should provide project proponent with an opportunity to develop relationships with stakeholders and potential project partners who can assist with implementing corporate social responsibility projects.
- **Securing stakeholder participation:** Cultural norms and values can prevent stakeholders from freely participating in meetings. Often there are conflicting demands within a community, and it can be challenging for a project to identify stakeholders who are representative of common interests. This might be avoided by employing local community liaison officers who are sensitive to local power dynamics, which requires project proponents developing an awareness of the local context and implementing structures to support and foster effective stakeholder engagement.<sup>5</sup>
- **Consultation fatigue:** Moreover there is evidence to suggest that stakeholders can easily tire of consultation processes especially when promises are unfulfilled and their opinions and concerns are not taken into consideration. Often stakeholders feel their lives are not improving as a result of a project and this can lead to consultation meetings being used as an area to voice complaints and grievances about the lack of development. This might be avoided by coordinating stakeholder engagement during an ESIA process and by ensuring practitioners do not make promises to stakeholders, but rather use the public consultation

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<sup>4</sup> Stakeholder Research Associates Canada Inc, 2005, The Stakeholder Engagement Manual Volume 1: The Guide to Practitioners' Perspectives on Stakeholder Engagement, [www.StakeholderResearch.com](http://www.StakeholderResearch.com).

<sup>5</sup> Stakeholder Research Associates Canada Inc, 2005, The Stakeholder Engagement Manual Volume 1: The Guide to Practitioners' Perspectives on Stakeholder Engagement, [www.StakeholderResearch.com](http://www.StakeholderResearch.com).

process as an opportunity to manage expectations, challenge misconceptions, disseminate accurate project information, and gather stakeholder opinions which are feedback to the client and other project specialists.

## 3 Regulatory and governance framework

### 3.1 Introduction

The encompassing process of stakeholder engagement has been promoted internationally by organisations such as the International Finance Corporation (IFC). At this level the nature of and requirements for engagement are well documented. In the context of DRC policy, engagement is not well defined. Typically the narrower process of public participation or consultation is addressed.

This section provides an overview of relevant international standards and guidelines, and seeks to identify key references to consultation and engagement in national policy and legislation. It is shown that environmental legislation speaks mainly of “participation” and “consultation” in the context of environmental and social impact assessments (ESIA). Broader “engagement” with mining stakeholders is envisaged in legislation promoting the empowerment of previously disadvantaged individuals and groups. In this latter context, the section briefly reviews the requirements of the DRC Mining Code<sup>6</sup>.

### 3.2 International standards and guidelines

In the past, a great deal of the consultation between large industries and stakeholders was driven by the regulatory requirements of ESIA. This form of consultation was confined largely to the project planning phase, with limited reference to ongoing life-of-mine activities. Today, “stakeholder engagement” is emerging as a broader, more inclusive, and continuous process that encompasses a range of activities, and spans the entire life of a project (IFC, 2007).

The shift in emphasis from public consultation to stakeholder engagement reflects changes in perspective among mining and financial institutions. Both increasingly recognise the need for a “social licence to operate” alongside legal permits and licenses. They are also aware of the reputational risks associated with poor stakeholder relations. In this context, greater emphasis is placed on developing and sustaining relationships with affected communities and other stakeholders throughout the life of the project. As such, good stakeholder engagement is increasingly being recognised as a prerequisite for good risk management (IFC, 2007).

#### 3.2.1 World Bank

The World Bank Group (WBG), which includes the World Bank (WB) and the IFC, has been instrumental in promoting stakeholder engagement. In 1998, the IFC published its guideline entitled *Good Practice Manual, Doing Better Business through Effective Consultation and Disclosure*. Since then, the IFC has been committed to sharing good practice around stakeholder engagement.

In 2007, the IFC prepared an updated and revised guide entitled *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets*. This guide details the “essentials” for managing stakeholder engagement. Some of the key components of stakeholder engagement described in the guide are listed in Table 3-1.

**Table 3-1: Components of Good Stakeholder Engagement (after IFC, 2007)**

<b>Stakeholder Engagement: IFC Good Practice Handbook for Companies Doing Business in Emerging</b>
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<sup>6</sup> Although the TERRA project is agricultural in nature, the Mining Code details stakeholder engagement during the ESIA process

<b>Markets</b>
<p>The following are the key components of good stakeholder engagement:</p> <ul style="list-style-type: none"> <li>• <i>Stakeholder identification and analysis.</i> Identification and prioritisation of stakeholders;</li> <li>• <i>Information disclosure.</i> Communication of meaningful and accessible information throughout the project lifecycle;</li> <li>• <i>Stakeholder consultation.</i> Planned, inclusive and documented consultation, with communicated follow-up;</li> <li>• <i>Negotiation and partnerships.</i> Good faith negotiations around complex issues, and value-adding partnerships;</li> <li>• <i>Grievance management.</i> An accessible and responsive means for stakeholders to raise concerns and grievances;</li> <li>• <i>Involvement in project monitoring.</i> Monitoring involvement by directly affected stakeholders, enhancing transparency and credibility;</li> <li>• <i>Reporting to stakeholders.</i> Reporting on environmental, social and economic performance;</li> <li>• <i>Management functions.</i> Building and maintaining sufficient company capacity to manage, track and report on stakeholder engagement.</li> </ul>

### 3.2.2 International Finance Corporation

Consultation and disclosure are threads that run through many of the IFC Performance Standards. PS1 is clear on consultation and disclosure requirements in the context of social and environmental assessment. These requirements are listed in Table 3.2 below.

**Table 3-2: IFC Stakeholder Engagement Principles (IFC, 2007)**

<b>IFC Stakeholder Engagement Principles</b>
<p>The following are the key components of good stakeholder engagement:</p> <ul style="list-style-type: none"> <li>• Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s)</li> <li>• Providing information in advance of consultation activities and decision-making</li> <li>• Disseminating information in ways and locations that make it easy for stakeholders to access it</li> <li>• Respect for local traditions, languages, timeframes, and decision making processes</li> <li>• Two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed</li> <li>• Inclusiveness in representation of views, including women, vulnerable and/or minority groups</li> <li>• Processes free of intimidation or coercion</li> <li>• Clear mechanisms for responding to people’s concerns, suggestions, and grievances</li> <li>• Incorporating feedback into project or program design, and reporting back to stakeholders</li> </ul>

### 3.2.3 International Association for Impact Assessments

The International Association for Public Participation<sup>7</sup> (IAP2) was founded in 1990. The Association aims to promote values and best practices associated with public participation. It developed a set of values and principles which are relevant to stakeholder engagement.

#### **Core participation values and principles**

- The public should have a say in decisions about actions that affect their lives;
- Participation includes the promise that the public's contribution will influence the decision;
- The public participation process communicates the interests and meets the process needs of

<sup>7</sup> IAP2 is an association of members who seek to promote and improve the practice of public participation in relation to individuals, governments, institutions, and other entities that affect the public interest in nations throughout the world.

participants;

- The public participation process seeks and facilitates the involvement of those potentially affected;
- The public participation process involves participants in defining how they participate.
- The public participation process provides participants with the information they need to participate in a meaningful way; and
- The public participation process communicates to participants how their input affected the decision.

### **3.2.4 Accountability 1000 – Stakeholder Engagement Standard 2011**

The AA1000 Stakeholder Engagement Standard (AA 1000SES) is a generally applicable framework for the design, implementation, assessment and communication of quality stakeholder engagement. It builds on, and is consistent with, Accountability's AA 1000 Series, particularly the AA1000

Accountability Principle Standard, launched in October 2008. AA1000SES describes how to establish commitment to stakeholder engagement; how to integrate stakeholder engagement with governance, strategy and operations; how to determine the purpose, scope and stakeholders for engagement; and the processes that will deliver quality and inclusive engagement practice, and valued outcomes. Please refer to [www.accountability.org](http://www.accountability.org) for more information on the AA1000 standard.

### **3.2.5 ISO 26000: 2010 – Guidance Document on Social Responsibility**

The International Standardisation Organisation (ISO) 26000 is a voluntary guidance standard on social responsibility designed for use by any organisation. It provides broad guidance, but does not offer specific instruction or require specific outcomes. Businesses that implement ISO 26000 have opportunities to identify and act on their own priorities, and to build stronger business models in the spirit of “continuous improvement”. Implementers of ISO 26000 will develop their unique corporate social responsibility programs and become models for others.

## **3.3 TERRA community policy**

TERRA conducts activities in a manner that promotes positive and open relationships with communities, government and other stakeholders to support sustainable benefits for local communities in areas where the company operates, throughout the life cycle of a project. TERRA recognizes the vital role that stakeholder engagement plays and through active engagement with stakeholders, strives to maximize the positive impacts of its activities as well as assist communities to ensure their self-sufficiency beyond the company's activities. TERRA is also committed to public reporting of their performance and stakeholder engagement.

Through the continual improvement of social assessments, community partnerships and local development assistance programs, TERRA aims to prevent, mitigate and ameliorate the environmental and social impacts of its operations. TERRA accommodates the different cultures and heritage of the communities in which the company operates and also supports community-based projects and small business opportunities. Furthermore, TERRA promotes hiring, education and training of employees from the local communities.



### 3.4 DRC Agricultural Law, LOI N° 11/022 of 24 December 2011

**Title 2, Chapter 3: Institutional framework: Article 6:** Government defines and implements national agricultural policies, which provinces must to consider when formulating their by-laws. These national policies encompass the following: exploitation, research, production, finance and commercialization of agricultural inputs.

**Article 7:** Provincial government is responsible for formulating policies which have a bearing on the following:

- Description of available farming resources;
- Requirements relating to type and quantity of farming products; and
- Environmental protection;

**Article 8:** government is required to establish a consultative committee comprising public and private stakeholders and members of the community. A similar consultative community must be established at provincial level. This is the responsibility of provincial government.

**Title 3, Chapter: Farming: Article 10:** Land distribution is the responsibility of national, provincial and local government.

**Article 17:** the agricultural contract establishes the type of produce and the minimum quantity the project proponent must produce.

**Article 18:** the law recognizes that local communities have customary land rights

**Article 19:** official certificates are not allotted when customary land is given to individuals of collectives for farming.

**Article 24:** land owners are permitted to sublet their land to a third party for the purpose of farming. It is the owner's responsibility to comply with his obligations vis-à-vis government

**Article 32:** the owner of the concession has the following rights:

#### **Inside the concession –**

- use water and forest resources for farming provided that the recommendation of the ESIA and EMPP are adhered to;
- dig irrigation systems; and
- Inside the concession – build haul roads

**Article 33:** the roads built by the project proponent can be used by neighbouring roads users provided that they don't impede on the functioning to the enterprise.

**Chapter 6, Aspects relating to health and safety: Article 47:** national and provincial government is responsible for formulating policies relating to the following:

- prevention and fight against harmful organisms, including those in quarantine;
- the use of production harmful to the environment and to community health;
- import and export of inputs and outputs.

**Title 4: Environmental Protection: Article 66:** the project proponent must conduct an ESIA prior the commencement of the operation

**Article 67:** the ESIA must be conducted according to the legislation on environmental protection

**Article 68:** the Minister of the Environment should conduct an audit for sites susceptible to environmental damage

**Article 69:** all agricultural activities in or close to protected areas are forbidden

**Article 70:** National, provincial and local governments are responsible for identifying measures aimed at protecting the environment and people's health.

## **4 Identification of stakeholders**

### **4.1 Introduction**

Stakeholder identification and analysis is the critical first step in stakeholder consultation and engagement. This section addresses the following themes in this context:

- Approach to the identification of stakeholders
- Description of the stakeholder groups
- Analysis of stakeholders to determine the extent to which they are potentially impacted by the Project, or could exert influence upon it.
- Overview of consultation and engagement approaches and tools relevant to various life-cycle phases.

### **4.2 Stakeholder identification approach**

Identification of stakeholders is a first and essential step in effective engagement. For the purposes of this SEP, stakeholders were identified through previous consultations. Stakeholder identification is a particular priority at the beginning of the ESIA process, but additional stakeholders will be identified as the ESIA proceeds. A stakeholder list will be updated during the ESIA process and through an iterative process and incorporated into updated versions of the SEP.

Following identification, stakeholder analysis describes stakeholders in terms of project impacts, and their potential to influence the project. A stakeholder analysis will inform the selection of engagement approaches and tools. This match has the potential to enhance the effectiveness of engagement.

### **4.3 Definition of stakeholders**

The IFC's Handbook on Stakeholder Engagement (2007) defines stakeholders as "persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively."

Stakeholders include locally affected communities and individuals and their formal and informal representatives, government, politicians, religious leaders, civic organisations, and other groups with special interests, the academic community, employees, their families and employee representatives, other businesses, shareholders and joint venture partners.

### **4.4 Stakeholder groups**

Specific stakeholder groups are identified in this section. Broadly, stakeholders can be divided into the following groups:

1. Impacted communities;
2. International watchdogs organisations;
3. Biodiversity organisations;
4. Multilateral organisations and donor agencies;
5. Security agencies;
6. Local civic organisations;
7. Media;

8. Traditional authorities;
9. Commerce and business;
10. Local government;
11. National and Provincial Government;
12. Shareholders; and
13. Service parastatals.

## 4.5 Stakeholder analysis

Stakeholder analysis determines the likely relationship between stakeholders and the project, and helps to identify the appropriate engagement methods for each stakeholder group during the life of the project. The stakeholder analysis process outlined in this SEP draws on the practical guidance notes developed by the International Council on Mining and Metals, which in 2012 prepared a Community Development Toolkit (CDT) to assist companies with fostering constructive working relationships and alliances among communities.

The CDT (ICMM, 2012) identifies the following methods to consult stakeholders:

- Phone/fax/email
- One-on-one interviews
- Workshop/focus group discussions
- Distribution of pamphlets and newsletters
- Notice boards
- Public meetings
- Newspaper/magazines
- Community radio.

When deciding the frequency and the appropriate engagement technique used to consult a particular stakeholder group, three criteria must be considered:

- The *extent of impact* of the project on the stakeholder group
- The *extent of influence* of the stakeholder group on the project
- The *culturally acceptable* engagement and information dissemination methods.

In general, engagement is directly proportional to impact and influence, and as the extent of impact of a project on a stakeholder group increases, or the extent of influence of a particular stakeholder on a project increases, engagement with that particular stakeholder group should intensify and deepen in terms of the frequency and the intensity of the engagement method used.

All engagement should proceed on the basis of what are culturally acceptable and appropriate methods for each of the different stakeholder groups. For example, when consulting government officials formal presentations are the preferred consultation method, while communities prefer public meetings, and informal focus group discussions facilitated by posters, non-technical pamphlets and other visual presentation aids including models and videos.

There are a variety of engagement techniques used to build relationships with stakeholders, gather information from stakeholders, consult with stakeholders, and disseminate project

information to stakeholders. When selecting an appropriate consultation technique, culturally appropriate engagement methods, and the purpose for engaging with a stakeholder group should be considered. Table 4-1 provides a list of different engagement techniques, and suggests the most appropriate application of these techniques.

**Table 4-1: Engagement Techniques**

ENGAGEMENT TECHNIQUE	MOST APPROPRIATE APPLICATION OF TECHNIQUE
Correspondence by phone/fax/email	<ul style="list-style-type: none"> <li>• Distribute project information to government officials, organisations, agencies and companies</li> <li>• Invite stakeholders to meetings</li> </ul>
Print media	<ul style="list-style-type: none"> <li>• Disseminate project information to large audiences, and literate stakeholders</li> <li>• Inform stakeholders about employment opportunities, grievance procedures, community development projects, and consultation meetings</li> </ul>
Noticeboards	<ul style="list-style-type: none"> <li>• Disseminate project information to large audiences, and literate stakeholders</li> <li>• Inform stakeholders about employment opportunities, community development projects, and consultation meetings</li> </ul>
Community Radios	<ul style="list-style-type: none"> <li>• Disseminate project information to large audiences, and illiterate stakeholders</li> <li>• Inform stakeholders about project activities including community development projects and public consultation meetings</li> <li>• Solicit views, opinions and grievances</li> </ul>
One-on-one interviews	<ul style="list-style-type: none"> <li>• Solicit views and opinions</li> <li>• Enable stakeholders to speak freely and confidentially about controversial and sensitive issues</li> <li>• Build personal relations with stakeholders</li> <li>• Recording of interviews</li> </ul>
Formal meetings	<ul style="list-style-type: none"> <li>• Present project information to a group of stakeholders</li> <li>• Allow the group of stakeholders to provide their views and opinions</li> <li>• Build impersonal relations with high level stakeholders</li> <li>• Distribute technical documents</li> <li>• Facilitate meetings using PowerPoint presentations</li> <li>• Record discussions, comments/questions raised and responses</li> </ul>
Public meetings	<ul style="list-style-type: none"> <li>• Present project information to a large audience of stakeholders, and in particular communities</li> <li>• Allow stakeholders to provide their views and opinions</li> <li>• Build relationships with neighbouring communities</li> <li>• Distribute non-technical project information</li> <li>• Facilitate meetings using PowerPoint presentations, posters, models, videos and pamphlets or project information documents, depending on the audience</li> <li>• Record discussions, comments/questions raised and responses</li> </ul>
Workshops	<ul style="list-style-type: none"> <li>• Present project information to a group of stakeholders</li> <li>• Allow the group of stakeholders to provide their views and opinions</li> <li>• Use participatory exercises to facilitate group discussions, brainstorm issues, analyse information, and develop recommendations and strategies</li> <li>• Recording of responses</li> </ul>
Focus group meetings	<ul style="list-style-type: none"> <li>• Allow a smaller group of between 8 and 15 people to provide their views and opinions of targeted baseline information</li> </ul>

ENGAGEMENT TECHNIQUE	MOST APPROPRIATE APPLICATION OF TECHNIQUE
	<ul style="list-style-type: none"> <li>• Build relationships with neighbouring communities</li> <li>• Use a focus group interview guideline to facilitate discussions</li> <li>• Record responses</li> </ul>
Surveys	<ul style="list-style-type: none"> <li>• Gather opinions and views from individual stakeholders</li> <li>• Gather baseline data</li> <li>• Record data</li> <li>• Develop a baseline database for monitoring impacts</li> </ul>

## 5 Stakeholder engagement activities

### 5.1 Past TERRA consultation activities

Consultation and interaction with various stakeholders and stakeholder groups took place during December 2013 and January, February and March 2014, as part of the ESIA conducted under the guidance of SRK. Stakeholders included representatives from local government, Ministry of Environment officials, Agriculture, and the traditional authorities, community leaders, and community members from surrounding villages. In addition to meetings and surveys, verbal presentations were made in Swahili and French. Stakeholders had the opportunity to provide written responses to questionnaire (translated into French). A list of the stakeholders consulted during this process was also compiled.

SRK undertook a series of focus group and key informant meetings in February 2014 for the ESIA, during which stakeholders were informed about progress with the project, and were invited to raise further comment about the project. Invitation letters to these meetings were distributed by hand before the meetings were held. Verbal presentations in French and Swahili were given by the SRK facilitators, and stakeholders were encouraged to comment verbally or via a questionnaire. Information sharing and planning meetings were also held with traditional and administrative authorities representing local communities and focus group meetings were held with groups of women, youth and men. Stakeholder comments received during the ESIA conducted SRK indicated a positive perception about the project, with perceived benefits including provision of job and business development opportunities, poverty reduction, promotion of education, improvement to infrastructure (notably roads and electricity) and health facilities, as well as increased social mobility being major themes. Government officials responded favourably in terms of expectations of macroeconomic benefits and improved availability, as well as pricing of maize in DRC.

Comments, issues and overall perceptions expressed by stakeholders consulted during the focus group meetings and key informant interviews undertaken by SRK in February 2014 for the ESIA mirrored those of the ESIA conducted in 2010 by GAC. Items noted included a request for support for local farmers, improved road access, improved lives for the youth, reduced reliance on charcoal-making which impacts on the environment, and alcoholism linked to unemployment. Opportunities for collaboration by TERRA with local non-governmental and government (including police) structures were noted. Concerns raised included perceived low salaries, limited availability of potable water for both communities, loss of agricultural land from the project footprint, as well as air pollution and dust impacts from the project.

Public disclosure of the ESIA was undertaken through the distribution of a Background Information Document (BID) in French. The BID describes the project and provides a summary of the key findings and recommendations of the specialist studies. Stakeholders were been notified by letter in French and Swahili, hand delivered by TERRA project team members. The BID indicates where to find the reports and how to comment.

Stakeholders had the opportunity to comment by:

- Completing the comment form available with the BID;
- Writing a letter or sending an email by 20 March 2014 to the contact details provided.

Copies of the BID together with the notification letter and comment form were also hand delivered to the relevant authorities in Lubumbashi, the Territory Office in Kasenga and Kipushi, as well as to traditional authorities and community leaders in the project area, for distribution to community members.

A total of approximately 100 comments sheets in French were distributed to stakeholders during scoping phase of the ESIA update. To date, the key comments received from stakeholders on the ESIA update, focus mainly on the following:

- Employment opportunities for local communities
- Concern about potential impacts of project related activities on water resources in the area.

The table below provides an overview of TERRA's stakeholder engagement activities to date.



**Table 5-1: Summary of TERRA's Stakeholder Engagement**

PARTICIPANTS	DATE	VENUE	TIME	ATTENDEES
<b>VILLAGE KATETE</b>				
<ul style="list-style-type: none"> <li>Chief of Groupement Katete</li> </ul>	Wednesday 12 Feb 2014	Chef de groupement House	<b>11:30 – 13:00</b>	TERRA : NAYAK LIQUIDAFRICA : FINHAI MUNZARA IFC: YOSUKE KOTSUJI (NAIROBI)JEREMY ANSELL (Washington) SRK team: PHILIPPE KATUTA, PATRICK MBOMA
<b>VILLAGE LUBANDA</b>				
<ul style="list-style-type: none"> <li>Traditional chiefs</li> </ul>	Thursday 13 Feb 2013	EP1 Lubanda	<b>9:30 – 11:30</b>	TERRA: NAYAK LIQUIDAFRICA : FINHAI MUNZARA IFC: YOSUKE KOTSUJI (NAIROBI)JEREMY ANSELL (Washington) SRK team: PHILIPPE KATUTA, PATRICK MBOMA
<ul style="list-style-type: none"> <li>NGOs,</li> <li>CBOs</li> <li>Community members</li> </ul>	Thursday 13 Feb 2013	EP1 Lubanda	<b>12:00 – 14:00</b>	TERRA: NAYAK LIQUIDAFRICA : FINHAI MUNZARA IFC: YOSUKE KOTSUJI (NAIROBI)JEREMY ANSELL (Washington) SRK team: PHILIPPE KATUTA, PATRICK MBOMA
<b>VILLAGE LUBANDA</b>				
<ul style="list-style-type: none"> <li>Traditional chiefs (Chief of Localité)</li> <li>Notable</li> </ul>	Tuesday 18 Feb 2014	EP1 Lubanda	<b>10:00 – 12:00</b>	TERRA : Ir. HOMA KANYINBWE SRK team : VUYO MATSHIKIZA, PHILIPPE KATUTA, SUSA MALEBA
<ul style="list-style-type: none"> <li>Community members;</li> <li>Civil society;</li> <li>CBOs ;</li> <li>Local NGOs</li> </ul>	Tuesday 18 Feb 2014	EP1 Lubanda	<b>12:30 – 14:30</b>	TERRA : Ir. HOMA KANYINBWE SRK team: VUYO MATSHIKIZA, PHILIPPE KATUTA, SUSA MALEBA
<b>LUBUMBASHI</b>				
<ul style="list-style-type: none"> <li>Provincial Minister of Agriculture</li> </ul>	Wednesday 19 Feb 2014	Minister of Agriculture	<b>9h00 - 11h00</b>	TERRA: NAYAK SRK team: VUYO MATSHIKIZA, PHILIPPE KATUTA, SUSA

PARTICIPANTS	DATE	VENUE	TIME	ATTENDEES
		OFFICE		MALEBA
<ul style="list-style-type: none"><li>Provincial Minister of Mines and Environment</li></ul>	Friday, 07 March 2014	Minister of Enviro Office	<b>15h00 - 17h00</b>	TERRA: NAYAK SRK team: PHILIPPE KATUTA, DESIRE TSHIBANDA

## 6 Current and future engagement

### 6.1 Introduction

In keeping with the requirements of the EMPL and International Best Practice, TERRA is required to consult with stakeholders during the ESIA process. Given that this is the most intense period of planned engagement, the IFC's Guideline "Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)" recommends that a project should:

- Plan stakeholder engagement during the ESIA as a component of a project's activities, with a schedule and a budget;
- Focus principal efforts on stakeholders most impacted by the project, whether because of proximity or vulnerability to change i.e. economic displacement;
- Demonstrate that stakeholder opinions are given serious consideration by incorporating their views in project decisions.

This section of the report will assist TERRA with engaging with stakeholders during the ESIA consultation process. It draws on the lessons learned from previous consultation meetings.

It is important to note however that this section does not cover engagement that may be required for specific studies such as compensation and livelihood restoration.

### 6.2 Goals of the SEP during the ESIA Process

Against this background the overarching goals of the SEP during the ESIA will be to:

- Ensure regular, accessible and appropriate dissemination of Project information to stakeholders
- Build and maintain mutually beneficial and long-lasting relationships with stakeholders
- Secure and maintain TERRA's social license to operate
- Involve stakeholders in Project decision-making and design
- Involve stakeholders in identifying and monitoring Project impacts
- Provide all stakeholders with the opportunity to raise concerns and grievances.

### 6.3 ESIA consultation methodology

In order to meet the recommendations set out in good international practice guidelines such as the IFC's Performance Standards, the ESIA consultation process should comprise several rounds of consultation. These rounds occur at various milestones in the ESIA process and include:

- Disclosure of the project description, inform stakeholders about ESIA process and baseline studies, and provide stakeholders with the opportunity to identify project impacts including social, economic, health and environmental
- Provide and obtain stakeholder feedback on the results of the baseline studies, and proposed mitigation measures. This round aims to provide stakeholders with an opportunity to review and comment on the draft ESIA
- Provide feedback on the project approval decision.

### 6.4 Recording of issues raised and responses

Feedback from ESIA consultation has been captured in an issues and response report. To ensure

that comments and suggestions relevant to the feasibility study are acknowledged and addressed, the following arrangements will be made:

- The issues registers will, in addition to recording stakeholder issues and concerns, indicate the action necessary to address each issue as well as the person or parties responsible for implementing the recommended action. This information will be provided to specialists at specialist workshop meetings.
- The environmental consultant will attend meetings with TERRA's environmental and technical staff where the issues registers will be presented and reviewed. At these meetings the Management Committee will identify the relevant actions and responsible parties. The Committee will ensure that the required actions are directed to the appropriate feasibility team members including the planning, design, ESIA, consultation, etc. as relevant.
- The responsible team member will report back to the Management Committee on the action taken and the outcome. This information will then be fed back to the relevant stakeholder as part of the stakeholder feedback process.

## **6.5 Interim grievance management**

TERRA has developed a grievance mechanism that systematically records, negotiates, and resolves disputes between TERRA and the complainant. This mechanism ensures that grievances are recorded and considered fairly and appropriately.

By providing a procedure for communities to raise their grievances, TERRA will increase community satisfaction, and build trust with stakeholders.

Although TERRA has notified community leaders about the grievance procedure, during ESIA consultation meetings, participating stakeholders and community members are also informed about the grievance procedure.

## 7 Life of operation engagement

### 7.1 Purpose

TERRA is committed to life-of-operation engagement with stakeholders. Thus the SEP is a *living document* and various versions of the SEP will be compiled and implemented over the life of the Project. Against this background, this Section simply outlines the key steps required to ensure and support ongoing stakeholder engagement in the context of a functioning agricultural operation.

### 7.2 Ensuring effective ongoing engagement

#### 7.2.1 Social management system

The Performance Standards of the IFC emphasise the requirement for an effective environmental and social management system to support and sustain management and engagement in these contexts. For the full range of life-of-operation stakeholder engagement to be effective, a social management system will be designed and implemented for the Project. The scope of this system and the resources dedicated to it remain to be determined. However, the social management system should have the following key elements:

- *Appropriate policies and principles.* TERRA has developed a suite of management standards and policies to lead interactions with stakeholders. These form a sound base for a social management system.
- *An appropriate organisational structure, with clear roles and accountability.*

In a typical management setup, key roles (including engagement in these contexts) might fall to the following:

- *Labour and working conditions: HR manager;*
- *Community health and safety: Safety, health and environment (SHE) manager;*
- *Stakeholder engagement: Community liaison manager;*
- *Social development: CSI manager.*

Other roles are specific, and management roles can be determined when required. Management of environmental impacts is usually the responsibility of the SHE manager. TERRA will need to review the appropriateness of this model and has identified a suitable candidate for the role should it be approved.

#### 7.2.2 Management plans

Management plans to guide aspects of engagement will continue to be developed as the Project progresses. Key plans are the following:

- Community Health and Safety Plan; and
- Sustainable Development Plan.

## 8 Resources and responsibilities

This section addresses human resources and responsibilities for implementing, monitoring, advising and supporting various aspects of stakeholder engagement during the ESIA process.

### 8.1 ESIA engagement resources and responsibilities

There should be ongoing engagement with stakeholders as the project expands. Table 8-1 provides a summary of management responsibility for various aspects of stakeholder engagement. This includes the specific roles and responsibilities that the appointed stakeholder engagement team, TERRA management will have to carry out in order to achieve successful implementation and sustainability of the engagement during these phases.

**Table 8-1: Responsibilities for implementation of engagement**

Stakeholder group	Team responsible	Responsibilities
Government authorities and service parastatals	<ul style="list-style-type: none"> <li>TERRA</li> </ul>	<ul style="list-style-type: none"> <li>Identify government representatives</li> <li>Setting up initial meetings</li> <li>Maintaining regular contact</li> </ul>
	<ul style="list-style-type: none"> <li>Stakeholder engagement team</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate meetings</li> <li>Report back on meetings</li> </ul>
Communities	<ul style="list-style-type: none"> <li>TERRA community development officer</li> </ul>	<ul style="list-style-type: none"> <li>Identify community representatives</li> <li>Setting up initial meetings</li> <li>Maintaining regular contact</li> </ul>
	<ul style="list-style-type: none"> <li>Stakeholder engagement team</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate meetings</li> <li>Report back on meetings</li> </ul>
NGOs and sectoral interests	<ul style="list-style-type: none"> <li>TERRA</li> </ul>	<ul style="list-style-type: none"> <li>Identify relevant representatives</li> <li>Setting up initial meetings</li> <li>Maintaining regular contact</li> </ul>
	<ul style="list-style-type: none"> <li>Stakeholder engagement team</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate meetings</li> <li>Report back on meetings</li> </ul>
Senior management, shareholders and	<ul style="list-style-type: none"> <li>TERRA</li> </ul>	<ul style="list-style-type: none"> <li>Regular report back</li> </ul>

## 9 Monitoring and reporting

### 9.1 ESIA engagement monitoring and reporting

Engagement monitoring will be pursued at defined timeframes throughout the phases of the project. At this stage it is not possible to detail the exact timeframes for engagement monitoring. It can however be noted that after each of the public consultation meetings the stakeholder engagement team should evaluate the effectiveness of the public consultation and determine if capacity building initiatives need to be developed.

Added to this, TERRA will develop a stakeholder engagement monitoring process where stakeholders can register their complaints and concerns with the project. This process will also assist with maintaining and improving the existing stakeholder database. In addition to this process, TERRA should develop a monitoring process that is able to assess the following key issues regarding stakeholder engagement:

- Accessibility, dissemination and use of technical summaries and reports of specialist studies and assessments;
- Effectiveness of meeting planning and execution;
- Effectiveness of representation at and participation in the various forms of engagement;
- Effectiveness of the mechanism to ensure stakeholder input to the feasibility study;
- Management of grievances.

The monitoring arrangement will be largely informal, with the following elements;

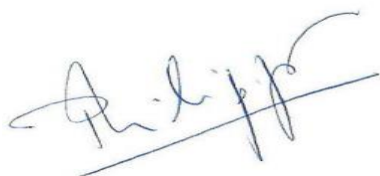
- Self-evaluation by the stakeholder engagement team and the TERRA project staff responsible for engagement arrangements;
- Review of major rounds of engagement at relevant management meetings;
- Review of major rounds of engagement by the project appointed external reviewer; and
- Evaluations of meetings by participants.

### Prepared by



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## **Appendix D: Preliminary Water Resource Assessment**

# Terra Agriculture Project: Environmental and Social Assessment

## Water Specialist Report

Report Prepared for



Report Number 471427



Prepared by



March 2014

# Terra Agriculture Project: Environmental and Social Assessment - Water Specialist Report

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# 1 Introduction

SRK Consulting (Democratic Republic of Congo) Pty Ltd (SRK) has been requested by TERRA SPRL (TERRA) to prepare an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Programme (ESMP) according to International Finance Corporation (IFC) standards to develop a maize farming project which is located 80km east of Lubumbashi town. The proposed project plans to establish a maize plantation of 10,000 hectares (ha) on two sites, Lubanda (5,000 ha) and Katofio (5,000 ha). Approximately 1,500 ha is being cultivated at the Lubanda site.

An ESIA for the TERRA project was conducted by a local consultant (GAC) in April 2010. This ESIA and ESMP needs to comply with good international industry practice (GIIP) based on the Equator Principles (EP) and IFC's Performance Standards (IFC, PS) on environmental and social sustainability, as well as align with TERRA's corporate policies. The ESIA report is commissioned mainly for the purpose of IFC funding and not for submission to the DRC government. This ESIA and ESMP are intended to fill in the gaps in the GAC report and prepare an ESIA and ESMP that meets EP and IFC PS standards.

This report forms part of the ESIA documentation and it considers the potential impacts that the existing and proposed Terra agricultural project activities will have in the water resources. The report focused on the existing farming area.

## 1.1 Geographical setting

The project site is located approximately 90 km east of Lubumbashi and 80 km south of Kundelungu National Park in the vicinity of the N5 road (Route Kasenga) to the south in the surrounding area of the Lubanda Village, Kasenga territory, Haut-Katanga District in Katanga Province of DRC. Figure 1 illustrates the regional locality of the TERRA project.

## 1.2 Study objectives

An Environmental Impact Assessment study was conducted by Groupe des Aménageurs de la République Démocratique du Congo (GAC) in 2009 but the study did not address any water related issues.

Water resource will require extensive management as the farm is developed by Terra. This project therefore outlines the existing water situation, determines the potential impacts and proposes water management actions. The current status of the water resource in the project area based on observation made during a site visit on the 12<sup>th</sup> of December 2014.

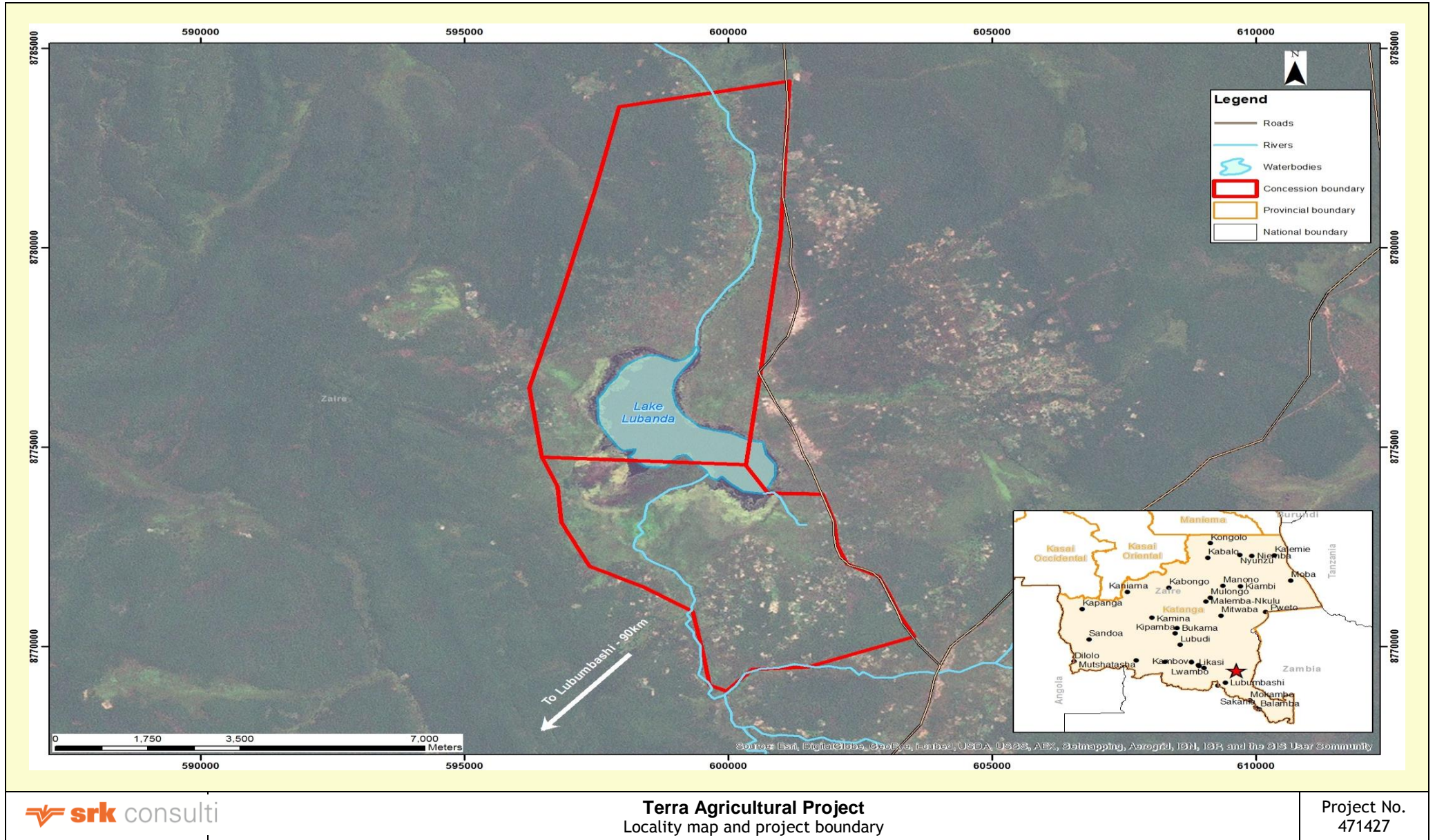


Figure 1: Locality Map and project boundary



## 1.3 Data gaps and limitations

Concerns regarding the description of the hydrological and hydrogeological baseline conditions for the Terra agricultural project compiled based on a limited data collection and evaluation of regional existing data and these include:

- Lack of historical hydrochemical data (no pre-farming information);
- No information is available on the stormwater management measures at the cultivated land and in the camp and storage areas and therefore, the study is based on the site visit;
- Lack or no information regarding the volumes of clean water being used currently and to be used after expansion;
- No information on volumes of sewage effluent to be treated and discharged;
- Current environmental management action plan or programme.

## 2 Methodology

To achieve the study objectives, a proposed scope of work was compiled as part of the initial overall study proposal which was submitted to Terra. However in view of the time available to complete the EIA (4 months) and limited existing data to describe the groundwater conditions of the area, data gathered by SRK in other areas closer to the project area were used in describing the hydrogeological condition of the Terra project area. The hydrogeological investigation programme completed consisted of the following components:

- A site visit was undertaken in December 2013 to assess the current status of the water resources in the area;
- A review of existing information from the nearby areas;
- Compiling a monitoring programme and propose monitoring points;
- Identification and rating of expected impacts.

The water monitoring programme recommended in this document will form part of the a water quality monitoring report that will be submitted to the relevant DRC Authority once 12-months of monitoring programme is completed. Monitoring is expected to begin in February 2014. Therefore, the water monitoring results do not form part of this report.

## 3 Site description

### 3.1 Climate

The Terra agricultural project is located south of the equator within a tropical wet and dry climatic zone, with a five-month dry season (May to September) and a seven-month rainy season (October to April). Monthly and daily Rainfall data from the on-site weather station was supplied to SRK.

The rainfall data was recorded for the rainy months only i.e September to May and from 2009 to 2013. The rainfall between June and September every year was considered to be zero and was not included in the supplied data (Figure 2). The average annually rainfall is 1 026 mm (2010 to 2013).

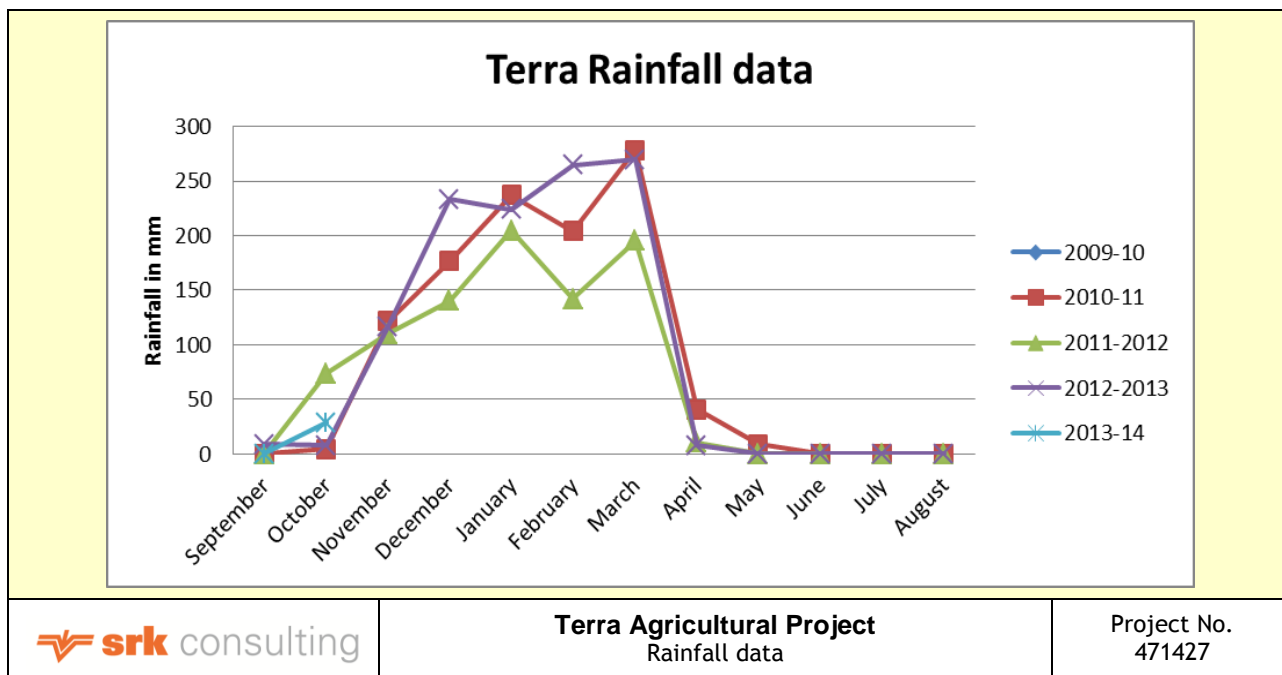


Figure 2: Rainfall data between 2009 and 2013 in Terra project area

### 3.2 Geology

No geological data existed for the project area. The geological setting of the area is based on several studies which were conducted in areas nearby.

#### 3.2.1 Geological settings

The Terra agricultural project area is entirely underlain by the Kundelungu Group (Figure 3) of the Katangan Series which forms part of the Central African Copper belt. The Kundelungu is 300 m thick, comprises mainly argillaceous to sandy clastic rocks and is underlain by the ‘Petit Conglomerat’ a diamictites (François, 1973; 1974; Batumike et al., 2006; 2007). The depositional environment is marine, but with a larger transgressive tract compared to that of the Nguba formation (Batumike et al., 2006; 2007). The facies is poorly diversified and laterally homogeneous over a large area of the whole basin (Batumike et al., 2006).

### 3.1 Existing water quality data

Water quality results were provided to SRK by Terra and compared to World Health Organisation (WHO) drinking water standards of 2008. The provided analytical results table is attached as Appendix A.

The analytical results indicates that the water is of good quality with the concentration levels of the analysed parameters being within the guideline limits with the exception of iron (with concentration ranging between 1.4 and 2 mg/l), which is above the stipulated concentration limit for drinking water of 0.3 mg/l.

The sample locations were not provided so very little additional interpretation can be made of the results. Enquiries to Terra to establish the locations of the sampled sites were unsuccessful as these were unknown.

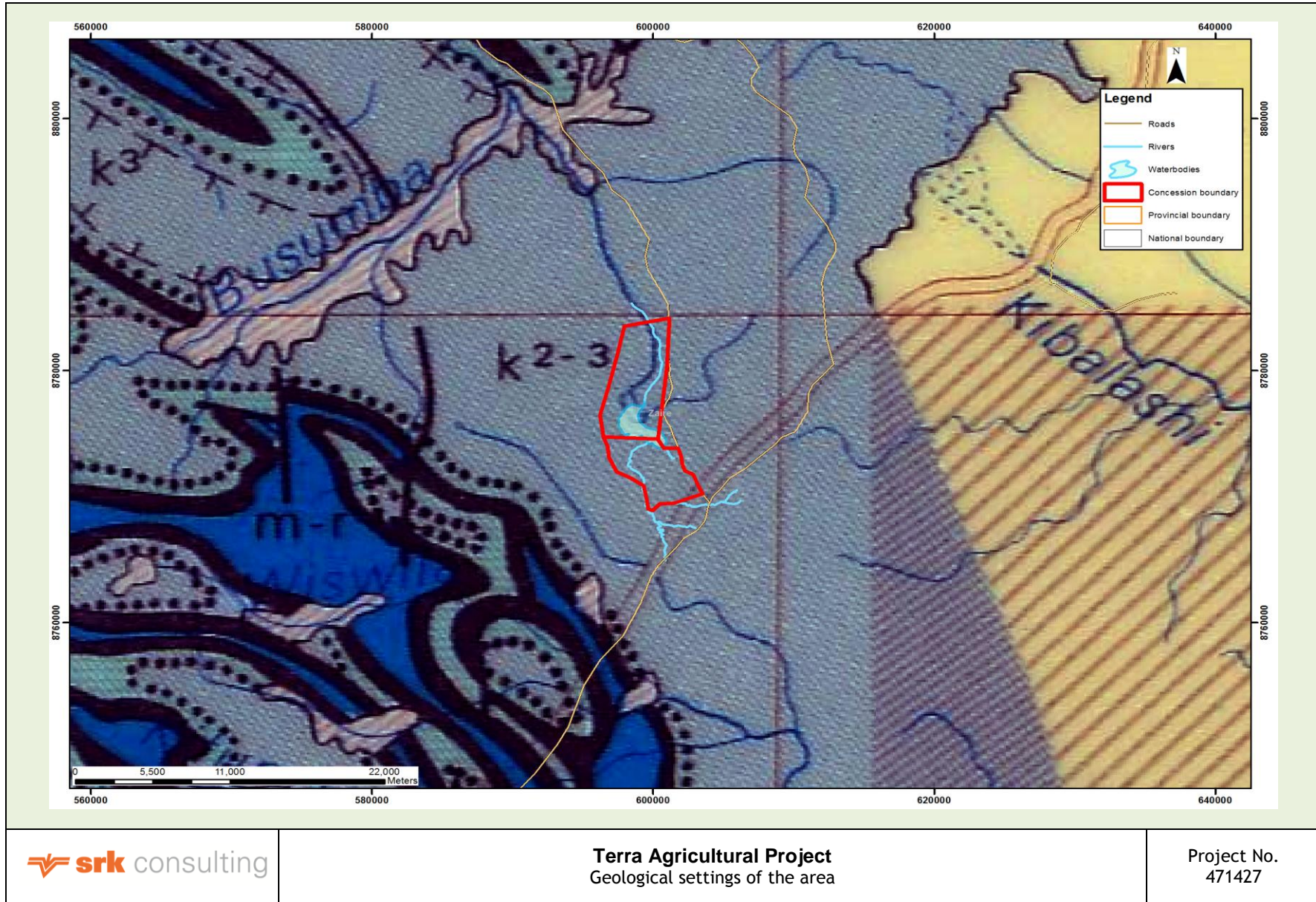


Figure 3: Geological map of the area

## 4 Site observations

### 4.1 Hydrocensus

The primary objective of the hydrocensus was to identify the baseline water use and users within the study area. During the hydrocensus the presence of boreholes, hand dug wells and surface water bodies including rivers within and in the vicinity of the study area were located and recorded. SRK personnel were accompanied by Terra employee to visit all the identified water sites and to confirm their status.

The coordinates were verified with a handheld GPS instrument and photographs were taken for each census point visited. Photographs (Figure 4 to Figure 6) were taken of each facility visited to serves a future reference and their positions are shown in Figure 7. No samples for laboratory analysis were taken during the census.

#### 4.1.1 Boreholes and Hand Dug Wells

Two production boreholes, TBH 1 (Figure 4) and TBH 2 are the only domestic water source for Terra Agricultural project Camp (Table 1). The depths of these boreholes were reported to be 75 and 100 meters below ground level (mbgl). Both boreholes are equipped with submersible pumps that deliver water into storage tanks. The pumping rates and pumping cycles of these boreholes are not known. Water level was not measured during the site visit and no sample was collected from these boreholes. The water consumption by the site camp is not known.



Figure 4: Borehole TBH 1

**Table 1: Summary of hydrocensus**

Site ID	Easting	Northing	Site type	Comments
TBH 1	602108	8772793	Borehole	Production borehole equipped with a submersible pump. Pumps to storage tanks.
TBH 2	601865	8772392	Borehole	Production borehole equipped with a submersible pump. Pumps to storage tanks.
HDW 1	597613	8771807	Hand dug well	Hand dug well located outside the southern project boundary used by local community for domestic water needs.
HDW 2	597607	8771746	Hand dug well	Hand dug well located within the project area. Used by local community for domestic water needs (Figure 5).



**Figure 5: Hand dug well, HDW 2**

#### 4.1.2 Rivers and lake

Two perennial rivers and a lake were visited during the site visit. The principal river in the area is Besa River (Figure 6) which flows east of the project area forming the eastern boundary of the project. Kafira River flows from southeast towards northwest into Lake Lubanda. Fish from Lake Lubanda is a primary source of income for some of the people located close to the lake. Terra will retain lake access to the community.



**Figure 6: Junior fishermen in Lake Lubanda**

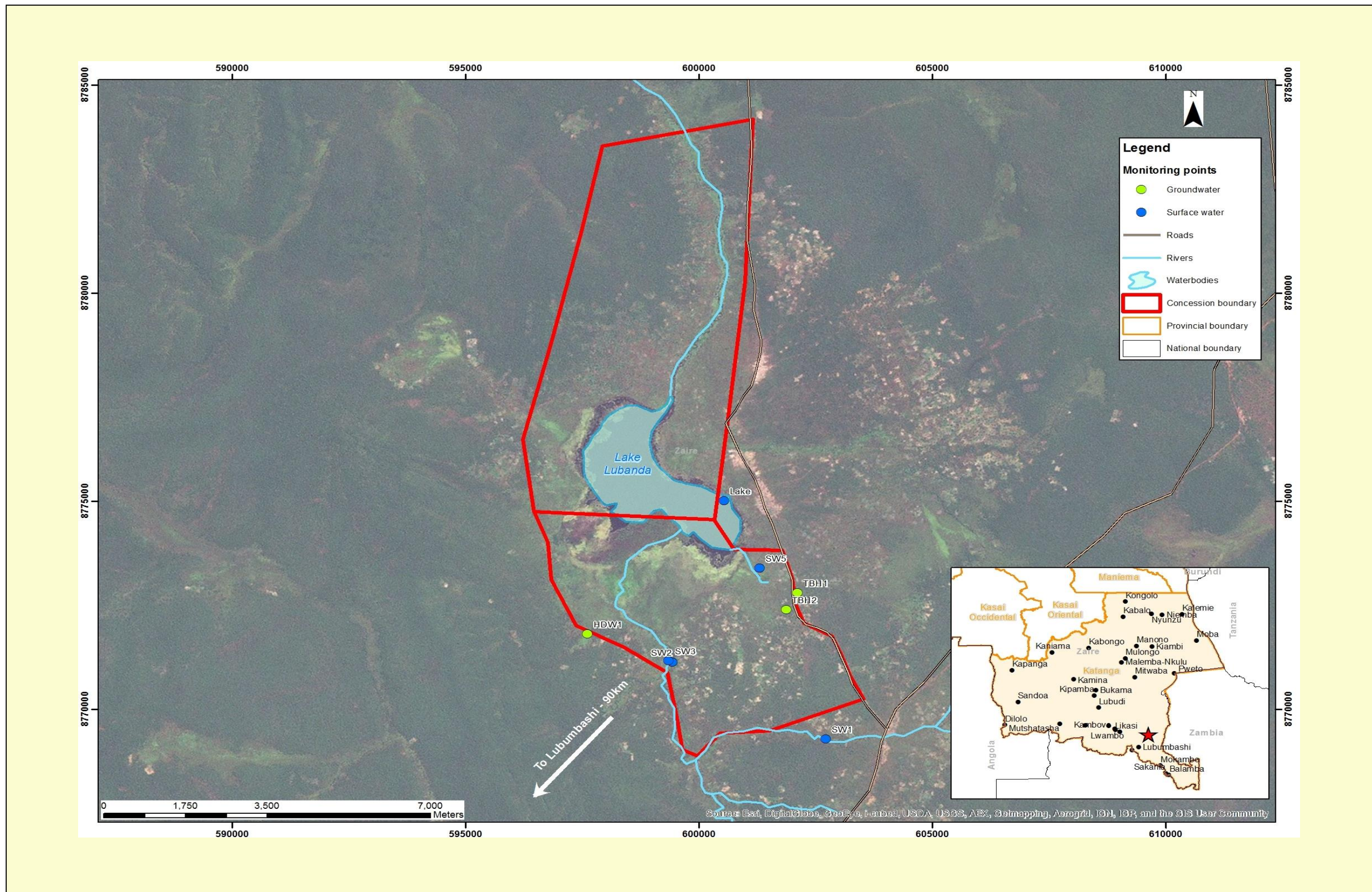


Figure 7: Positions of surface and groundwater water sources

## 4.2 Water demand

Terra Agricultural project is rain fed. Groundwater from boreholes TBH 1 and TBH 2 is used only for domestic water supply of the camp. No surface water from any of the rivers is being used for irrigation etc. by Terra.

The water required to meet the site camp demand is not known but it was reported that the existing boreholes are meeting the water demand and is anticipated to continue to sustain the camp into the future

## 4.3 Stormwater management

Terra has dug a trench (1.5 x 2 m) that surrounds the current ploughed areas. This trench is used for security purposes (to keep people and animals away from the project area) and for stormwater management. The trench has dedicated outlets to discharge the collected water into the two nearby rivers, Besa and Kafira.

Apart from the perimeter trench, there is a deeper and wider (2 x 3 m) trench cutting across the cultivated land, from the site camp into Kafira River. This trench also collects surface runoff from the cultivated land.



## 5 Potential impacts

The main potential impacts relating to surface and groundwater as a result of the proposed operations at Terra project are:

- Potential increase of runoff due to change in vegetation covers, from natural ecosystem to maize crops;
- Potential increase of soil erosion in the cultivated land and sedimentation in the water ways;
- Potential increase in groundwater recharge due to the change in land cover, from forest ecosystem to cultivated land;
- Potential leaching of nutrients from the soil due to the application of fertilizers in the cultivated land;
- Potential contamination of water resources due to application of pesticides and pesticides and phosphates associated with sediments;
- Potential water contamination due leakages at storage areas of fuel and chemicals and accidental spills thereof.

## 6 Impact Assessment

An impact assessment was undertaken according to the SRK methodology as prescribed in the terms of reference of the Terra study.

The impact significance rating matrix is presented in Table 2 and involves four parts:

- Part A: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/population and duration;
- Part B: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and
- Part C: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from Part B) and the probability of occurrence.
- Part D: Define the Confidence level.

Using the matrix, the significance of each described impact is rated. This rating assumes the management measures inherent in the Project design are in place. The rating is applied to before and after the listed mitigation and management measures are considered. The mitigation measures will be implemented or will form part of the project design during construction.

Practicable management measures are recommended, using the IFC's updated management hierarchy: recommendations for management should focus on avoidance, and if avoidance is not possible, then to reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design. The significance of impacts was then re-assessed with assumed management measures in place ("after management").

The management programme will be implemented to mitigate and monitor impacts on the water resource during expansion and operational phases of the Terra project. Monitoring programme presented in Section 7 will also form part of the water management programme.

**Table 2: Method for rating the significance of impacts**

<b>PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE</b>		
<i>Use these definitions to define the consequence in Part B</i>		
<b>Impact characteristics</b>	<b>Definition</b>	<b>Criteria</b>
<b>MAGNITUDE</b>	Major	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor+	Minor improvement; change not measurable; or threshold never exceeded
	Moderate+	Moderate improvement; within or better than the threshold; or no observed reaction
	Major+	Substantial improvement; within or better than the threshold; or favorable publicity
<b>SPATIAL SCALE</b>	Site or local	Site specific or confined to the project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
<b>DURATION</b>	Short term	Less than 3 years
	Medium term	3 to 15 years
	Long term	> 15 years

<b>PART B: DETERMINING CONSEQUENCE RATING</b>					
<i>Rate consequence based on definition of magnitude, spatial extent and duration</i>					
		<b>SPATIAL SCALE/ POPULATION</b>			
		Site or Local	Regional	National	
<b>MAGNITUDE</b>					
<b>Minor</b>	<b>DURATION</b>	Long term	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
<b>Moderate</b>	<b>DURATION</b>	Long term	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
<b>Major</b>	<b>DURATION</b>	Long term	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High
<b>PART C: DETERMINING SIGNIFICANCE RATING</b>					
<i>Rate significance based on consequence and probability</i>					
		<b>CONSEQUENCE</b>			
		Low	Medium	High	
<b>PROBABILITY (of exposure to impacts)</b>	<b>Definite</b>	Medium	Medium	High	
	<b>Possible</b>	Low	Medium	High	
	<b>Unlikely</b>	Low	Low	Medium	
<b>PART D: CONFIDENCE LEVEL</b>					
High		Medium		Low	

Notes: + denotes a positive impact.

## 6.1 Impact rating

The results of the impact assessment and ratings are presented below.

### 6.1.1 Impact W 1: Potential increase of runoff due to change in vegetation covers, from natural ecosystem to maize crops

The expansion of the additional 9 500 ha of agricultural land by Terra will lead to replacement of natural ecosystem by rain-fed maize crops. The maize crops because they are rain fed, they will only cover the ground during summer. The removal of natural vegetation will modify the partitioning of the water on the surface. The rainfall that falls directly onto the maize will have a greater potential for runoff than the existing forest.

Due to limited ground cover in the cultivated land, runoff will be increased leading to increased washing away of soil and development of rills and gullies within the cultivated land. If not managed, this might lead to land degradation. Surface runoff will end up in one of the nearby Rivers (Besa and Kafira) and Lubanda Lake. The increased run-off might also results in increased risk of flooding of the two rives and Lubanda lake.

#### Operations

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Major	Long term >15 years	Regional	Medium	Definite	HIGH	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>Technologies for reducing the energy of run-off water such as installation of diversion channels, sedimentation ponds, rock filter or dams will be implemented so that run-off does not carry significant sediments from the cultivated land</li> <li>Cultivation will be perpendicular to the slope to minimize run-off</li> </ul>								
After management	Moderate	Long term >15 years	Regional	Low	Definite	LOW	-	Medium

#### Closure

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Minor	Short term 3 years <	Local	Low	Possible	LOW	-	Medium

### 6.1.2 Impact W 2: Potential increase of soil erosion in the cultivated land and sedimentation in the water ways

The cultivation or tilling of the soil during ploughing season and leaving it without vegetation cover may increase the rate of soil erosion. The dislocated loose soil particles can be carried away by runoff water and eventually reach surface water resources such as Kafira and Besa Rives as well as the Lubanda Lake. In the rivers and lake, the sediments might cause various damages to water resources and to water users. This might include reduction in lake storage by siltation and affecting the wildlife habitat within the lake and rivers.

An increase in sediments deposit in the Lubanda Lake might reduce aquatic species diversity in the Lake and this might also affect the commercial and recreational services of the lake. The sediments stored in the lake and rivers might contain some pollutants which might become available and assimilated in the water resources.

Because Terra is applying fertilizers and pesticides as part of their agricultural practices, sediments washed from the cultivated land might contain toxic pesticides and nutrients bounded in the clay and silt particles.

**Operations**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Major	Long term >15 years	Local	Medium	Definite	HIGH	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes, silt traps and prompt re-vegetation, where possible.</li> <li>Technologies for reducing the energy of run-off water such as installation of diversion channels, sedimentation ponds, rock filter or dams will be implemented so that run-off does not carry significant sediments from the cultivated land</li> <li>Cultivation will be perpendicular to the slope to minimize iron and run-off</li> </ul>								
After management	Moderate	Long term >15 years	Local	Low	Possible	MEDIUM	-	Medium

**Closure**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Moderate	Short term 3 years <	Local	Low	Possible	MEDIUM	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>No cultivation therefore sediments runoff will cease because the ground will be covered by vegetation</li> </ul>								
After management	Minor	Short term 3 years <	Local	Low	Unlikely	LOW	-	High

**6.1.3 Impact W 3: Potential increase in groundwater recharge due to the change in land cover, from forest ecosystem to cultivated land**

The conversion of natural ecosystem to rain-fed agricultural land by clearing vegetation on the identified 10 000 ha of land is likely to reduce the rate of evapotranspiration. The change in land cover from natural forest to cultivated land will provides more water for groundwater recharge and baseflow. The increased recharge is attributed to replacement of deep-rooted forest by shallow-rooted seasonal maize crops. Increased recharge will also raise the level of the water table causing waterlogging and mobilisation of salt which were previously accumulated beneath the native vegetation.

Raised water levels suggest increased hydraulic gradients to the streams. Increase in recharge will also increase the baseflow in the rivers allowing more water available for downstream users which might results in an increasing in flood risk

**Operations**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Moderate	Long term >15 years	Local	Medium	Possible	MEDIUM	+	Low
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>None</li> </ul>								
After management	Moderate	Long term >15 years	Local	Medium	Possible	MEDIUM	+	Medium

**Closure**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Minor	Short term 3 years <	Local	Low	Possible	LOW	+	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>No cultivation therefore the natural vegetation will grow again</li> </ul>								
After management	Minor	Short term 3 years <	Local	Low	Unlikely	LOW	+	Medium

### 6.1.4 Impact W 4: Potential leaching of nutrients from the soil due to the application of fertilizers in the cultivated land

Terra is currently adding NPK (10-26-26) and Urea (46 -0-0) to their maize crops to improve the yields of their crops. These two fertilizers are chiefly composed of nitrogen, potassium and phosphorus. These nutrients are applied on annual basis to improve the crop yields. During rain, these nutrients are washed into the water resources and some seep into the groundwater through unconsolidated materials and fractured zones.

Nitrogen and phosphorus eroded from the cultivated land might accelerate algal production in the Lake Lubanda resulting in the variety of problems which might include fish kills and recreational opportunities. Apart from harming aquatic ecosystem, nitrate also poses health risk to infants.

The implementation of sediments trap and settlement of sediments in the settlements ponds will reduce the amount of nutrients entering the surface water body.

#### Operations

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Major	Long term >15 years	Local	High	Definite	<b>HIGH</b>	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes, silt traps and prompt re-vegetation, where possible.</li> <li>Technologies for reducing the energy force of run-off water such as installation of diversion channels, sedimentation ponds, rock filter or plastic dams will be implemented so that run-off does not carry significant sediments from the cultivated land</li> <li>Cultivation will be perpendicular to the slope to minimize iron and run-off</li> <li>Control the use of fertilizers</li> </ul>								
After management	Moderate	Long term >15 years	Local	Medium	Possible	<b>MEDIUM</b>	-	Medium

#### Closure

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Moderate	Short term 3 years <	Local	Medium	Possible	<b>MEDIUM</b>	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>No cultivation, therefore no addition of fertilizers.</li> <li>Natural vegetation re-establishes</li> </ul>								
After management	Minor	Long term >15 years	Local	Low	Unlikely	<b>LOW</b>	-	Medium

### 6.1.5 Impact W 5: Potential contamination of water resources due to application of pesticides and phosphates associated with sediments

A wide variety of pesticides are being applied in the cultivated maize crops to control insect pest, fungus, and diseases. The pesticides include:

- Herbicides** - Callisto, Dual gold, Gesaprim, Nucomax, Glyphosat
- Insecticide** - Actara, Regant (Anti-termitte)
- Fungicide** - Amistar

These pesticides are applied seasonally during maize plantation and some of these pesticides travel far from where they are being applied. Pesticides might migrate to Lubanda Lake and Besa and Kafira rivers through runoff or into groundwater through percolation and leachate. Pesticides can also be carried by air or sediments and deposited into the water bodies. In the water bodies, residues that reach the surface water system might harm freshwater and aquatic organism,

damaging the recreational and commercial fisheries of the Lubanda Lake. The presence of the pesticides in the water might also affect the health of the people who use the water for domestic purposes.

The presence of pesticides in the water or soil medium within the study area is not known. The persistence and toxicity of the pesticides used by Terra in their project is not known.

Some of the pesticides persists in the soil particles, therefore, even after the closure of the project, some of the pesticides will remain in the project area even though in a small quantities.

**Operations**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Major	Long term >15 years	Regional	High	Definite	HIGH	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>Construction of settlements ponds</li> <li>Use of biodegradable pesticides</li> <li>Reduce the pesticides dosage</li> </ul>								
After management	Moderate	Long term >15 years	Regional	Medium	Possible	MEDIUM	-	Medium

**Closure**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	Moderate	Short term 3 years <	Regional	Medium	Possible	MEDIUM	-	Medium
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>No cultivation, therefore, no pesticides application. But some pesticides will remain in the soil particles.</li> </ul>								
After management	Moderate	Long term >15 years	Local	Medium	Possible	MEDIUM	-	Medium

**6.1.6 Impact W 6: Potential water contamination due leakages from storage areas and accidental spills of fuel and chemicals**

Hydrocarbon fuel and lubricants for the vehicles and agricultural machinery are being stored in the project area together with the pesticides and fertilizers required for use during the cultivation programme. Terra is current storing fertilisers and pesticides in zinc shelters which are not bunded and have no cement slab to minimize pollution of groundwater from any leakages. No stormwater management strategy is in place around the fuel and chemical storages to control or minimize pollution of surface and groundwater resources from leakages from the storage facilities.

Accidental spills or any leakages of hydrocarbon and other chemical spills may contribute to the deterioration of groundwater quality, depending on the nature, extent, frequency and duration of such spills; but these are likely to be much smaller load of impacts compared to other impacts.

In the event of a chemical spill, clean-up procedure will be activated immediately to prevent infiltration and impact to the groundwater system.

**Operations**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	<i>Moderate</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>LOW</b>	-	<b>High</b>
<b>Mitigation and Management measures:</b>								
<ul style="list-style-type: none"> <li>Fuel and chemicals will be stored in a secured area.</li> <li>Fuel will be stored in a steel tank, preferably supplied and maintained by the fuel supplier and above the ground</li> <li>Leakage of fuel and other chemicals will be avoided</li> <li>All storages for fertilizers, pesticides and fuel will be located in an adequately bunded areas capable of preventing contamination of surface and groundwater resource</li> <li>Refuelling and maintenance of vehicles will be undertaken within the specific depots</li> <li>All repairs done on machinery using hydrocarbons as fuel will have a drip tray placed strategically to avoid incidentally spills</li> <li>Spill clean-up procedure will be implemented.</li> </ul>								
After management	<i>Minor</i>	<i>Long term &gt;15 years</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>LOW</b>	-	<b>High</b>

**Closure**

	Magnitude	Duration	Scale	Consequence	Probability	SIGNIFICANCE	+/-	Confidence
Before management	<i>Minor</i>	<i>Short term 3 years &lt;</i>	<i>Local</i>	<b>Low</b>	<b>Unlikely</b>	<b>NONE</b>	-	<b>High</b>



## 7 Water management Programme

### 7.1 Introduction

This chapter documents the Water Management Plan of the Project (WMPP) which outlines the management commitments that Terra will implement to mitigate and monitor negative impacts to the surface and groundwater resources, and enhance positive impacts identified in Section 6. The overall objective of all the management commitments is to ensure compliance with the relevant in-country legislation, as well as take into consideration relevant Terra policies.

The WMPP is a *living document* that will be periodically reviewed and updated by Terra in response to changes to the project description, changes in the organisational structure and changes in the legislation in the DRC as well as other guidelines and practices that the company subscribes to.

As part of on-going implementation, this WMPP will also be publicly disclosed.

Mitigation of the potential impacts is taken to represent all facets of actions taken to avoid or reduce negative effects and enhance positive effects, including the following hierarchy:

- Avoidance;
- Minimization;
- Rehabilitation;
- Compensation.

#### 7.1.1 Objectives

The water management action plan for the expansion and operation phases of the project includes various design features, mitigation measures and best management practices to achieve the following environmental management objectives:

- Undertake expansion and operation activities in a manner that will minimize the adverse effects of the on human and ecological beneficiaries of the current water regime;
- Changes in the water regime should be reversible to such an extent that there will not be any significant lasting adverse effects on the human and ecological beneficiaries;
- Undertake activities to allow for long-term sustainable use of the water resources.

## 7.2 Mitigation

### 7.2.1 Measures to mitigate potential water degradation or deterioration and water contamination or pollution hazards

The surface and groundwater action plans for the expansion and operation phases of the Terra agricultural project will include various design features, mitigation measures, and best management practices to achieve the environmental management objectives. Environmental management objectives pertaining to surface water will include using rain water for irrigation to minimize the pressure on surface water resources, minimizing the project's impact on surface water quality by releasing (non-contact water) storm water runoff to the environment or diverting it around the project area, recycling or containing contact water and minimizing the project's impact on surface water flows.

Environmental management objectives pertaining to groundwater include undertaking expansion and operation activities in a manner that will minimize the adverse effects of the project on human and

ecological beneficiaries of the current groundwater regime, planning that after operations changes in the groundwater regime are reversible and will not cause significant lasting adverse effects on the human and ecological beneficiaries, and undertaking activities to allow for long-term sustainable use of groundwater.

Mitigation measures for addressing potential pollution and water quality deterioration, pertaining to surface and groundwater, may include water management, chemical storage and handling, and cultivated land site layout designs. Each is discussed below.

Staff and contractors will be trained regarding the surface water management measures outlined in this action plan to ensure that their daily activities and actions do not compromise the action plan. The plant site "first flush" runoff will be captured in a containment facility sized to contain the first ten minutes of a precipitation event. The runoff from the chemical and hydrocarbons storage sites will be captured in storm water ponds. The storm water captured in the stormwater ponds may be used for dust suppression after adequate treatment. Where feasible, the storm water dams will be designed to spill no more than once every ten years, on average.

Proper storage facilities, with secondary containment, will be established for the storage of oils, grease, fuels, chemicals and other hazardous materials to be used during all phases of the project as appropriate. Fuel storage areas established to date are in a secure area in a steel tank above surface. New fuel storage areas will be designed with steel tanks and appropriate secondary containment systems. Furthermore, all storage tanks in the expansion area will be located in adequately bunded areas capable of containing 100 percent of the volume of the largest tank. The area inside the containment shall be built to prevent contamination of surface and groundwater and the installation of underground storage tanks will be avoided.

Refuelling and maintenance of vehicles will occur primarily within specified depots. Working areas and fuel transfer areas within these depots will be underlain by an impermeable surface and will have grease traps or oil/water separators to ensure that no spill of lubricants, oils or fuels reaches local water. Repairs done on machinery using hydrocarbons as fuels or lubricants will have a drip tray placed strategically to avoid incidental spills. Furthermore, the location of workshops, maintenance and refuelling sites and materials storage areas will be located away from watercourses.

Where possible, the volumes of pesticides, herbicides and fungicides will be reduced. In this regard, bio-degradable pesticides will be used to minimize pollution of surface and groundwater resources by the applied chemicals.

## **7.2.2 Measures to mitigate potential runoff and soil erosion from the cultivated land**

It is recommended that the agricultural practices are aimed at minimising potential runoff and soil erosion of the cultivated land so as to minimise off-site discharge of runoff and sediments. Generally erosion rates should be kept lower than the soil regeneration rate, estimated at 10t/ha/annum. In-field practices should include:

- Contour ploughing;
- Minimising exposed areas during the rainfall period;
- Establishing cropping systems with maximum cover;
- Agricultural practices that promote the ploughing of non-harvested plant matter back into the upper soil horizons;
- Establishing contour drainage channels and terraces to reduce downslope runoff velocities to a recommended minimum and

- Soil water management to promote infiltration of rain and irrigated water.

Off field measures should include:

- Toe cut off drains to discharge to holding ponds for re-use;
- Establishment of wetland areas or flow diversions at concentrated off-field discharge points to minimise velocities and sediment entrainment and
- Establishment of erosion protection structures where flow velocities are excessive.

## 7.3 Monitoring programme

The key objectives of the surface and groundwater monitoring programme are to:

- Establish the baseline surface and groundwater quality;
- Detect changes in background surface and groundwater quality;
- Detect any adverse water impacts caused by the project activities as soon as possible;
- Provide information that can be used to guide continuous improvement in surface and groundwater management approach and actions.

### 7.3.1 Baseline water monitoring

As part of the current study, SRK has developed a monitoring programme to guide baseline water quality monitoring and to gather data to be used in defining the baseline water quality condition of the area. The monitoring will begin in February 2014 and will continue for at least a period of one year. A groundwater monitoring protocol was compiled and sent to Terra for approval and implementation and is attached as Appendix B. Surface and groundwater monitoring started in February 2014.

The locations of the sampling points that constitute the current monitoring network are shown in Figure 8 and described in Table 3. The sampling frequencies are also presented in Table 3.

**Table 3: Surface and groundwater monitoring points**

Sample ID	Location	Sampling point rationale	Project coordinates (UTM 35 South, WGS84 datum)		Sample Frequency
			Easting	Northing	
Groundwater monitoring sites					
TBH 1	Water supply borehole	Groundwater level and ambient groundwater quality point	602108	8772793	Quarterly
TBH 2	Water supply borehole	Groundwater level and ambient groundwater quality point	601865	8772392	Quarterly
HDW 1	Community water supply Hand dug well	Groundwater level and ambient groundwater quality point	597613	8771807	Quarterly
Surface water monitoring sites					
SW 1	Upstream monitoring point at Besa River	Ambient water quality point	602711	8769291	Monthly
SW 2	Downstream monitoring point in a channel	Discharging canal from the cultivated land into Kafira River	599425	8771132	Monthly
SW 3	Monitoring point at Kafira River	Ambient water quality point	599348	8771171	Monthly

Sample ID	Location	Sampling point rationale	Project coordinates (UTM 35 South, WGS84 datum)		Sample Frequency
			Easting	Northing	
SW 4	Downstream monitoring point in a channel	Discharging canal from the cultivated land into Lake Lubanda	601293	8773398	Monthly
Lake	Lake Lubanda	Ambient water quality point	600535	8775008	Monthly

The collected samples will be analysed for the analytical suites stipulated in Table 4.

**Table 4: Water quality analytical suites**

Field parameters	Conventional Parameters	Nutrients	Major Ions	Metals
pH, Temperature  Turbidity, Electrical Conductivity,  dissolved oxygen	total alkalinity, total dissolved solids, total suspended solids, total organic carbon, dissolved organic carbon, chemical oxygen demand, biochemical oxygen demand, Hardness, Color.	Ammonia, total Kjeldahl nitrogen, Nitrate, Nitrite, total phosphorus, dissolved phosphorus.	Bicarbonate, Calcium  Chloride, Fluoride, Magnesium  Potassium, Sodium, Sulfate,  Hydrogen sulphide.	ICP scan for dissolved metals and metalloids

### 7.3.2 On-going water monitoring

#### Surface water

The surface water quality monitoring program will include a continuation of monitoring at the identified baseline monitoring points (Table 3). Additional monitoring sites or changes to prior monitoring sites will be considered to the network when the cultivated land expands.

The surface water flow monitoring program will include monitoring at all the baseline surface water quality sites. The monitoring sites are listed in Table 3. Additional monitoring sites or changes to prior monitoring sites may be considered to the network as the cultivated land expands. Surface water flows will be monitored monthly, except where automatic monitors are installed to provide continuous data.

#### Groundwater

The groundwater quality monitoring program will include continuing with the existing baseline groundwater quality monitoring network (Table 3), and removing obsolete or adding new sites to the network to accommodate the expansion of the cultivated land. Monitoring sites to the north of the current cultivated land will be established. Locations will be added and modified as appropriate to address the full extent of effects due to the expansion.

There is no surface and groundwater monitoring programme outside the project area.

### 7.3.3 Water sample collection

SRK DRC personnel are currently collecting water samples for baseline studies. After three to four months, SRK will train the Terra personnel on sample collection and sample shipping. All the samples will be sent to an accredited laboratory in South Africa for analysis.

Terra will be responsible for sampling and submitting the samples to the laboratory. SRK will provide technical support and data management during the monitoring programme.

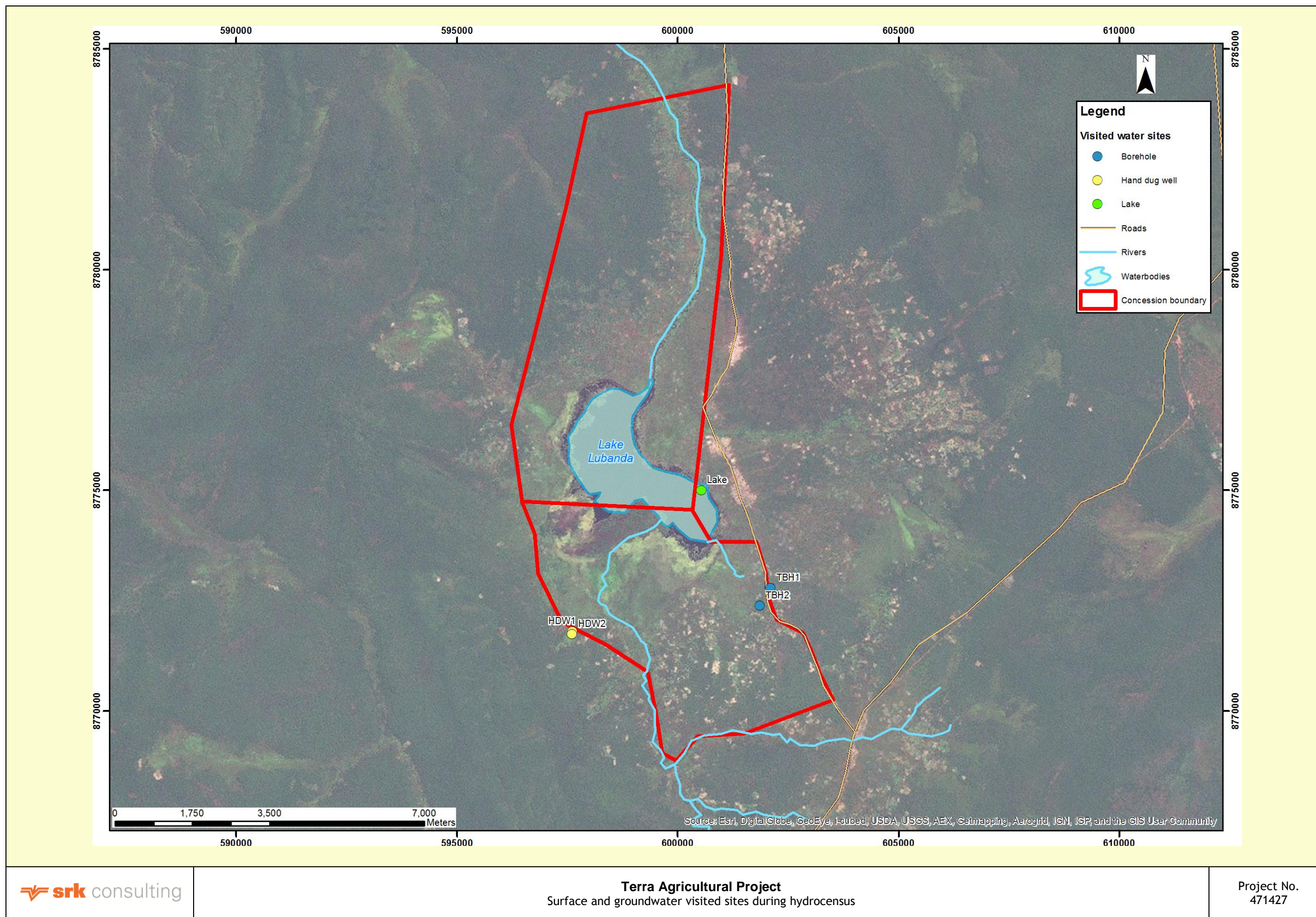


Figure 8: Surface and groundwater monitoring sites

## 8 Conclusions and Recommendations

### 8.1 Conclusions

The preliminary identified impacts to the water resources, based on site specific data are:

- Potential increase of runoff due to change in vegetation covers, from natural ecosystem to maize crops;
- Potential increase of soil erosion in the cultivated land and sedimentation in the water ways;
- Potential increase in groundwater recharge due to the change in land cover, from forest ecosystem to cultivated land;
- Potential leaching of nutrients from the soil due to the application of fertilizers in the cultivated land;
- Potential contamination of water resources due to application of pesticides and phosphates associated with sediments;
- Potential water contamination due leakages from storage areas and accidental spills of fuel and chemicals.

The mitigation and management strategies currently implemented by Terra to minimise the contamination of water resources by their agricultural practices are not known. The following measure must be implemented during the design and construction of the fields:

- Fuel and chemicals will be stored in a secured area;
- Fuel will be stored in a steel tank, preferably supplied and maintained by the fuel supplier and above the ground;
- Leakage of fuel and other chemicals will be avoided;
- All storages for fertilizers, pesticides and fuel will be located in an adequately bunded areas capable of preventing contamination of surface and groundwater resource;
- Refuelling and maintenance of vehicles will be undertaken within the specific depots;
- All repairs done on machinery using hydrocarbons as fuel will have a drip tray placed strategically to avoid incidentally spills;
- Spill clean-up procedure will be implemented;
- Settlement ponds must be constructed to settle out fines from runoff prior to discharge to surface water bodies;
- Use biodegradable pesticides to prevent contamination;
- Reduce the pesticides dosage, where possible;
- Erosion control measures will be selectively applied, and this will include the development of stable embankment slopes, silt traps and prompt re-vegetation, where possible;
- Technologies for reducing the energy force of run-off water such as installation of diversion channels, sedimentation ponds, rock filter or plastic dams will be implemented so that run-off does not carry significant sediments from the cultivated land;
- Cultivation will be perpendicular to the slope to minimize iron and run-off, where possible;

- Control the use of fertilizers;

## 8.2 Recommendations

SRK recommends that:

- Detailed hydrological baseline investigations be conducted,
- Stormwater management assessment and strategies be undertaken,
- Monitoring of surface and groundwater resources should continue for at least 12 months.

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pp Peter Shepherd

Principal Hydrologist and Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

## 9 References

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# Appendices

## **Appendix A: Chemical Analysis Results**

## CLIENT DETAILS

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 Order Number **471427**  
 Samples 8  
 Sample matrix WATER

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 Laboratory Manager  
 SGS Reference JB14-04889 R0  
 Report Number 0000006533  
 Date Received 2014/02/27 10:20:32AM  
 Date Reported 2014/04/02 11:41:15AM

## COMMENTS

The document is issued in accordance with SANAS's accreditation requirements.  
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Analysis of TDS for sample JB 14-04889.003 was unable to be determined, analysis was completed but did not produce satisfactory results and insufficient sample remained for reanalysis.  
 Analysis of Alkalinity for sample JB 14-04889.003 was unable to be determined due to insufficient sample.

## SIGNATORIES

\_\_\_\_\_  
 James Drynan  
 Technical Manager/Technical Signatory

\_\_\_\_\_  
 Joanne O'Sullivan  
 Laboratory Manager/Technical Signatory



# ANALYTICAL REPORT

JB14-04889 R0

Report number: 000006533

Client reference: 471427

Sample Number	JB14-04889.001	JB14-04889.002	JB14-04889.003	JB14-04889.004	JB14-04889.005
Sample Name	TBH1 19	TBH2 19	HDW1 19	SW1 19	SW2 19
Sample Matrix	February 2014 Water	February 2014 Water	February 2014 Water	February 2014 Water	February 2014 Water

**Parameter**  
pH in water Method: ME-AN-016

**Units**      **LOR**

pH in water at 25°C	-	0.1	8.0	7.6	6.9	7.5	7.2
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**Conductivity on waters** Method: ME-AN-007

Conductivity in mS/m @ 25°C	mS/m	2	69	70	4.1	21	12
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**ICP-OES Metals on waters (Dissolved)** Method: ME-AN-027 D

Calcium	mg/l	0.5	72	71	<0.5	17	7.6
Magnesium	mg/l	0.01	20	22	0.11	6.9	4.4
Sodium	mg/l	0.5	25	30	4.8	5.9	4.2
Potassium	mg/l	0.2	1.4	1.9	0.6	1.0	0.7

**Ammonia on waters by Continuous Flow Analyser** Method: ME-AN-032

Ammonia as N	mg/l	0.08	0.10	0.15	0.27	0.26	0.10
Ammonia	mg/l	0.1	0.12	0.18	0.33	0.32	0.12

**Alkalinity on waters by titration** Method: ME-AN-001

Total Alkalinity as CaCO3	mg/l	13	335.36	335.36	-	78.60	49.78
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**Anions on Waters by Ion Chromatography** Method: ME-AN-014

Chloride	mg/l	0.05	15	15	2.7	0.89	0.53
Nitrate	mg/l	0.1	<0.1	<0.1	4.3	0.4	<0.1
Nitrate as N	mg/l	0.03	<0.03	<0.03	0.97	0.10	<0.03
Sulphate	mg/l	0.05	32	30	1.1	23	12

**Fluoride on waters by Ion Selective Electrode** Method: ME-AN-021

Fluoride by ISE	mg/l	0.05	0.09	0.08	0.06	0.10	0.06
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**Total and Volatile Suspended Solids** Method: ME-AN-009

TSS (0.7µm) @ 105°C	mg/l	21	<21	<21	104	116	54
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**Total Dissolved Solids (TDS) in water at 105 deg** Method: ME-AN-011

TDS (0.7µm) @ 105°C	mg/l	21	400	400	-	95	80
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Sample Number	JB14-04889.006	JB14-04889.007	JB14-04889.008
Sample Name	SW3 19	SW4 19	Lake 19
Sample Matrix	February 2014 Water	February 2014 Water	February 2014 Water

**Parameter**  
pH in water Method: ME-AN-016

**Units**      **LOR**

pH in water at 25°C	-	0.1	7.0	6.8	7.4
---------------------	---	-----	-----	-----	-----

**Conductivity on waters** Method: ME-AN-007

Conductivity in mS/m @ 25°C	mS/m	2	8.0	17	82
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## METHOD

## METHODOLOGY SUMMARY

ME-AN-001	An aliquot of aqueous sample is titrated first to pH 8.3 and then to 4.3 using standardised acid. The volumes of acid titrated are used to calculate total alkalinity and/or alkaline species. The method is based on EPA 310.2 and APHA 2320 B.
ME-AN-007	The conductivity of an aliquot of aqueous sample is measured electrometrically using a standard cell connected to a calibrated meter with automated temperature correction. This method is based on APHA 2510.
ME-AN-009	Total suspended solids (TSS) is determined gravimetrically by filtering an aliquot of well-shaken aqueous sample through a pre-weighed filter which is then dried at 105 deg C. The method is based on APHA 2540 D.
ME-AN-011	Total dissolved solids (TDS) is determined gravimetrically on a filtered aliquot of aqueous sample by evaporating the sample to dryness in a pre-weighed container at 105 deg C. The method is based on APHA 2540 C.
ME-AN-013	Total, calcium and magnesium hardness on aqueous samples are determined by calculation from the ICP-OES results for Ca and Mg. The method is based on APHA 2340 B.
ME-AN-014	Inorganic anions (Br, Cl, F, NO <sub>3</sub> , NO <sub>2</sub> , SO <sub>4</sub> ) are determined on aqueous samples by ion chromatography. The method is based on EPA 300.1 and APHA 4110 B.
ME-AN-016	The pH of an aliquot of aqueous sample is measured electrometrically using an electrode connected to a calibrated meter with automated temperature correction. This method is based on APHA 4500-H B.
ME-AN-021	Fluoride is measured on an aliquot of aqueous sample using a fluoride ion selective electrode and calibrated meter. The method is based on APHA 4500-F C.
ME-AN-027	Dissolved metals are determined on a filtered and acidified (to 1% HNO <sub>3</sub> ) portion of aqueous sample by inductively coupled plasma optical emission spectrometry (ICP-OES). The method is based on EPA 200.7 and APHA 3120.
ME-AN-032	This method is based on ISO 11732:2005(E). In a continuously flowing, air-segmented, buffered carrier stream, ammonia reacts with hypochlorite (previously liberated from dichloroisocyanurate) to form monochloramine. This reacts with salicylate, under catalysis from nitroprusside, to form blue-green indophenol, which is measured in a flow photometer at 660nm. This is based on the modified Berthelot reaction.

## FOOTNOTES

IS	Insufficient sample for analysis.	QFH	QC result is above the upper tolerance
LNR	Sample listed, but not received.	QFL	QC result is below the lower tolerance
^	Performed by outside laboratory.	-	The sample was not analysed for this analyte
LOR	Limit of Reporting	*	<i>Results marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory / certification body / inspection body".</i>
↑↓	Raised or Lowered Limit of Reporting		

Samples analysed as received.  
Solid samples expressed on a dry weight basis.

Unless otherwise indicated, samples were received in containers fit for purpose.

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## **Appendix B: Baseline Water Monitoring Protocol**



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