PART I: EXECUTIVE SUMMARY

THE PROPOSED BALAMA GRAPHITE MINE IN THE CABO DELGADO PROVINCE IN THE DISTRICT OF BALAMA IN NORTHERN MOZAMBIQUE



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DRAFT FOR REVIEW

1. Background

Twigg Mining & Exploration Lda, a subsidiary of Syrah Resources Limited, proposes to develop a graphite mine in northern Mozambique, approximately 7 km east from the small town of Balama. The Syrah Balama Project (SBP) is located on a 106 km² Prospecting Licence in northern Mozambique, within the District of Balama in the Cabo Delgado Province. The project area is approximately 265 km by road (3.5 hours' drive) west of the port town of Pemba, and 515 km to the port town of Nacala, where deep water ports are strategically located, and which is the preferred option for product export (Figure 1).

In December 2011, Syrah acquired 100% ownership of the Balama Graphite Project and has since conducted a large diamond drilling resource program to define a graphite resource with a very strong potential to be developed into a mining operation. Syrah aim to produce a high purity graphite concentrate (between 90-99% total graphite content - TGC), with a requirement to preserve flakes. Balama is a very large graphite deposit and excluding market considerations, has the potential to deliver a mine life of 100 years at a process rate of 2 million tpa. A mining license application for a period of 25 years will be submitted (an effective mine life of 23.5 years to allow for closure) with an option to extend for a further 25 years. The plant will operate 365 days per year.

The proposed project (Balama Graphite Mine), triggers an EIA and is classified as a category A project, requiring a full EIA. In accordance with Mozambican regulatory requirements the issuing of an environmental licence requires the preparation of an Environmental Impact Assessment (EIA). The Mozambican Ministry for Co-ordination of Environmental Affairs (MICOA) is the lead environmental agency in Mozambique, and it is MICOA who is responsible for the review and issuing of an environmental licence.

This ESHIA report intends to ensure that environmental and social concerns are integrated into the proposed development, and suggests ways of preventing, minimising, mitigating and/or compensating for possible adverse environmental and social impacts which may arise due to the proposed development.

2. Project Overview

The mine will consist of two open pits, Balama East and Balama West. Balama East is located approximately 1 km east of the process plant, whereas Balama West is located approximately 2.5 km south west of the processing plant. Both open pits are designed for a maximum depth from surface of less than 50 m.

It is the intention that conventional open pit mining be used to extract the ore, with a baseline scenario of 2 million tonnes per annum. The extraction of the graphite will require conventional flotation processing. The Chipembe dam, located approximately 13 km northwest of the project site, will be the primary source of water for this process. Water will be transferred to site via a pipeline.

Ore will be delivered from the mine onto stockpiles at the processing plant using haul trucks. The ore will then be fed into the crusher bin, which is the first step in the crushing process. The crusher plant will consist of primary and downstream crushers. The crushed ore will be fed via a conveyor into a mill feed silo and then milled. The ore will then undergo cleaning, flotation and regrinding. All tailings from the process will be transferred to a tailings storage facility (TSF). The final concentrate will be pumped to final concentrate holding tanks ahead of a filter. This material will then be dried and bagged for transport. Once the graphite concentrate has been produced, it will be transported by road to the deep water port at Nacala and subsequently exported.



Figure 1: Locality map indicating the position of the proposed Balama Graphite Mine area

Infrastructure required for the graphite mine includes:

- A pipeline (±13 km) from the Chipembe dam to the project site;
- Pump houses at the dam and project site;
- Water reservoirs, for process and waste water;
- Internal roads to enable access to various parts of the development and for transportation of materials, equipment, supplies and employees;
- Grid power connection as well as a diesel powered electricity generation plant, inclusive of bunded storage areas for diesel fuel, lubricants and waste oil; and
- An ore processing plant.

The project will also require infrastructure related to auxiliary services including the following:

Offices

- Accommodation at the project site for approximately 250 people;
- A lay-down area for construction materials and equipment. This area will continue to be used during the operational phase, although the actual area of land required may be reduced;
- Workshops for repair of equipment and machinery;
- Stores and a lay-down area(s) for equipment, spares and consumables;
- Offices for site staff;
- Ablution facilities and associated sewage treatment plants;
- Security measures



Figure 2 – Diagram of the overall layout of the operation

Raw and Potable Water - The Chipembe dam, located approximately 13 km northwest of the project site, will be the primary source of water during the operational phase of the project. It is estimated that 1 m³ of water (1000 litres) will be required per tonne of ore processed, resulting in a minimum water requirement of 2 million m³ per annum. Based on discussions between Twigg (Syrah) representatives and ARA-Norte, availability has been confirmed (Licence no 07/2012 valid till October 2018). The pump station will be located adjacent to the dam and the 13km above-ground pipeline will deliver water to a raw water storage pond to provide local storage in the event of pipeline maintenance.

Water will be pumped from this pond to a 300 m³ tank at the offices and a second 300 m³ tank located at the accommodation village. These tanks will provide water for general use and for fire water storage for fire fighting. Water will be distributed via a pump and piped reticulation system for general use and to a potable water treatment facility that will make potable water to be stored in a potable water tank, and reticulated for use in the office complex, change houses and tea room.

Process water - Tailings return water will be pumped to the process water tank and used for a variety of process applications. Storm water and a portion of the water used for general washing applications will be collected in process water ponds from where it will be recycled by pumping it to the process water tank.

Process water will be circulated through the plant in a ring main. Each required take off will be fitted with an isolation valve. The mill discharge, flotation feed, scavenger tails and tailings pumps will have flushing water connected to the suction line. The flushing points will be manually operated.

Reagent mixing water, fire water, sample cutter rinse water and gland service water will be supplied from a raw water tank.

Mine dewatering - The mine is not expected to generate large quantities of water. Water in the mine will be collected in sumps and either pumped into water trucks for dust suppression

on the mine haul roads or pumped to the process water pond to be used for processing.

Power - Grid power will be supplied from a 33 kVA line to the established by EDM. The power line is part of EDM's electrification programme to supply electricity to the area. A diesel generation plant will provide back-up power on site. In the event that grid power is unable to provide sufficient capacity, or has not come on line at the start of the project, the generation plant will provide the required electricity on a 24 hour, seven days a week basis. The ESIA assesses the option of 24/7 diesel powered generation in the event that EDM power is not yet available.

Roads- Mine site roads will consist of the following:

- A partial upgrade of 3km of the road meeting the main road at Piriri and running to Ntete village;
- A new road approximately 2.5 km from the provincial road (No. 242) to the mine office, workshop and processing area;
- A new road approximately 2.5 km from the mine office, workshop and processing area to the accommodation village;
- Mine haul road from the Balama East open pit to the ROM pad;
- Mine haul road from the Balama West open pit to the ROM pad;

Construction and Operation Accommodation - A permanent rural village has been proposed by Syrah Resources, as part of the Balama Graphite mining operations. This village will become an important contributor to the local economy and an opportunity to enhance the welfare and opportunities of many of the local residents. The village will be located on existing rural land in close proximity to the existing Ntete and Nquide villages as well as the proposed Balama Graphite mine. The village will be situated at the base of a 100 m high granite ridgeline. The location and design of the village has been selected based on areas with the least visual impacts and most suitable land in terms of environmental parameters to showcase the best global practices in mine workers' accommodation. Currently an existing gravel road links the Nquide and Ntete Villages with Balama. A new road network is planned to connect the mine to the existing villages as well as the proposed agricultural and rural village. Accommodation at the village will accommodate approximately 250 people, mainly workers, and will not include families or children. The local production of food will be integrated to supply some of the food requirement at the accommodation village.

The village will be structured to include the following:

- A residential area consisting of clusters of living pods;
- A recreational building, gym and barbeque courtyard (serving as an outdoor cinema as well);
- A mess hall, senior staff accommodation and visitor accommodation buildings;
- An administration building (office space, storage space);
- A medical clinic with a small pharmacy;
- A housekeeping area (e.g. laundry, linen stores, cleaning stores and parking house);
- A village hub (e.g. service area, barber shop, hairdresser, stationary store, small grocer, clothing store and guesthouse);
- A soccer field and basketball court adjacent to the hub;
- Bicycle paths running parallel to the main road; and

The construction of the following infrastructure will be required:

- Roads and paths for access (bitumen paved/spray sealed);
- Substation and generating plant;
- Electricity supply;
- Sewerage system;
- Water supply will be via a branch line from the main pipeline from the Chipembe

reservoir to the raw water distribution system;

• Small water treatment plant;

Locally sourced materials and labour will be used where possible.

Sewage System - The construction and operational phases' workforce of approximately 250 individuals (at peak period) will generate sewage and wash water that will need to be managed. The anticipated general sewage and domestic wash water effluent streams associated with the construction and operational phases of the Syrah Balama Graphite project have been calculated and are presented in the report.

Packaged sewage plant specification - Based on the calculated estimate of generated sewage and domestic wash water during the construction and operational phases of the project, a packaged sewage treatment plant with the capacity of treating $\sim 40m^3$ of domestic effluent per day is required for installation.

Landfill Site - The design and construction of the Syrah Balama Graphite general waste landfill site should be in accordance with international best practice as described in EPA (2000), details of which have been provided in the Minimum Requirements for Waste Disposal by Landfill, 3rd ed. (DWAF, 2005).

3. Key findings of specialist assessments

The key issues which have been identified by the various specialist assessments and the proposed mitigation and management actions which will be required in order to reduce all risks associated with the project to an acceptable level are discussed below.

Vegetation Assessment - Eleven impacts were identified and assessed for Construction and Operational Phases. The majority of the impacts will occur during the construction phase of the project. Three impacts were classified as HIGH NEGATIVE and six impacts were classified as MODERATE NEGATIVE. With mitigation, two of the HIGH impacts can be reduced to LOW NEGATIVE and three of the six MODERATE impacts can be reduced to LOW NEGATIVE. The following are key findings:

- Inselberg's form important "stepping stones" or linkage corridors between fragmented vegetation and have been documented as important features for the conservation and dispersal of different species. It is therefore important that a portion of the inselberg Mount Nassilala, where the graphite deposit has been identified, is conserved so that this process can continue.
- Infrastructure such as the tailings storage facility, mine camp and mine plant should be located in areas of low and moderate sensitivity. The position of the mine camp on Mount Coronge has been shifted out of this area of high sensitivity.
- Current land use is having a large impact on the natural vegetation in the low lying areas. Large tracts of land have been cleared and planted with crops such as cotton, maize and cassava.
- The vegetation on the slopes of Mount Nassilala and Mount Coronge is relatively intact. The plant communities on these inselbergs are important refugia for plant and animal species and they provide important ecosystem services for local human communities.
- The highest biodiversity was recorded in the *Riparian Woodland*. Although these exist as thin strips surrounded by a sea of agriculture they currently form important, natural ecological corridors and should therefore be rehabilitated, conserved and protected.

• The intact *Miombo Woodlands: Plains* that occurs near Nquide village has the next highest species diversity after the *Riparian Woodlands* and contains important species such as *Habenaria sp.* (Orchidaceae). This area should be conserved and protected

Faunal Assessment - Most of the observed amphibian fauna are characteristic species of wetlands in the lowlands of northern Mozambique, from which 25 species are recorded and a further 13 species are possible. No amphibians in the Balama region are endemic or of conservation concern. No amphibians are endemic to northern Mozambique. There is no evidence of significant direct utilization of amphibians in the region, either for international trade or for food consumption. Amphibian threats are thus indirect, of which the most significant is habitat loss due to existing agricultural practises

Of the potential 87 reptiles that may occur in the Balama region, only 20 were recorded during the survey. A further eight large or conspicuous species were reported by mine personnel and local villagers to be present. One lizard of scientific interest was collected during the survey. A series of small, snake-eyed skinks (*Panaspis* cf *wahlbergii*) were collected beneath cashew trees near Nquide village. The most significant threats to reptiles are indirect, and result mainly from habitat loss due to existing agricultural practises. Proposed industrial developments in the region will compound this threat, especially from the resulting habitat fragmentation that leads to elevated mortality from road traffic and exposure to predators as reptiles (particularly tortoises, snakes and monitors) move over the landscape.

Of the possible 300+ bird species which may occur in the study area, 133 were observed during the wet season survey. The number of birds recorded is to be expected for a short-term survey, especially as it is likely that many intra-African and Palaearctic migrant birds had already departed at the time of the field trip. No bird species which are considered threatened by the IUCN were recorded on site. However, several (11) CITES listed species were recorded, while a further 61 bird SSC may occur in very low numbers or as vagrants on site.

Of the possible 145 mammal species which may occur in the study area (including 13 large mammals now locally extinct), only 14 were recorded during the wet season survey. A further 21 species were reported to still occur in the region, although some are now acknowledged to be very rare. Domestic mammals observed on site included: cats (*Felis catus*), dogs (*Canis africanis*), zebu cattle (*Bos* sp.), pigs (*Sus scrofa*), and goats (*Capra aegagrus*). Eight mammal SSC were identified for the study area: three of these occurred in the area during historical times, but local people report no recent records and they are highly unlikely to still occur locally; two mammal SSC (African Elephant and Hippopotamus) were reported by locals to still occur in the area.

Ecological sensitivity - No habitats were classified as highly threatened or unique ecosystems and they are not associated with key evolutionary processes. While these habitats are not classified as critical habitats they have been classified as natural habitats using the IFC definition *"areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition."* (IFC, 2012).

In terms of ecological sensitivity (Figure 2), a large portion of the project area has been cleared for agricultural crops such as cotton, maize and cassava, resulting in these areas having a low sensitivity as they have been transformed through anthropogenic activities and are highly degraded. Areas of natural vegetation, such as the degraded Miombo Woodland: Plains, were assigned a medium ecological sensitivity as they still have a relatively high species richness and form important ecological process areas for small mammals and birds

in the area. These areas can withstand a limited loss of, or disturbance to, natural areas.

Areas of high sensitivity were assigned to the Miombo Woodland: Granite and Miombo Woodland: Graphite, the intact Miombo Woodland: Plains and the Riparian Woodland. These vegetation types were assigned a high sensitivity score as these areas are all relatively intact and have high species diversity. They also contain species of special concern such as *Sterculia appendiculata* (listed as Vulnerable on the Mozambique red Data Lists). A number of these species were noted to occur on the slopes of the Granite Inselberg (Mount Coronge). Although highly degraded in most parts, the Riparian zone was assigned a high sensitivity score as it is an important process area for ecosystem functioning. It also scored a high biodiversity value.



Figure 3 - Ecological sensitivity map of the project area.

Aquatic Assessment - The Mehucua River flows through the southern section of the project site in a south-west to north-east direction. At this point it joins the Montepuez River 25 km downstream of the project site. The Mehucua River has three major tributaries; two of which - the Namiticu and the Naconha rivers - are upstream of the project area and the third tributary joins the Mehucua some distance downstream of the project area.

In situ and ex situ water quality indicated that in general the water quality was good when compared to the various relevant water quality guidelines, specifically the MICOA standard for Category (a) human consumption (Ministerial Diploma of 18/2004).

Aquatic macroinvertebrates were collected using the standard South African Scoring System (SASS5) protocol. The number of aquatic macroinvertebrate taxa ranged from 16 at the Chipembe Dam site to 10 at the Mehucua River site. The moderate/high percentage contribution (25 - 30%) of Ephemeroptera, Trichoptera and Plecoptera (EPT taxa) to the

overall invertebrate assemblage in the general area indicates that biotic integrity remains high despite the impacts of riparian zone clearance and sediment load increases due to local farming practices. The relatively low levels of taxon richness measured at all sites can be attributed to the relatively poor habitat availability. This was due to various reasons related to seasonality, including high flow levels and flood damage to marginal vegetation. It is anticipated that the dry season taxon richness may be higher.

All rivers in the Study Area are considered to be seasonal and only flow in the wet summer months, considered to be from November to March or April. During the dry winter months when flow ceases, the rivers within the Study Area mostly consist of disconnected, shallow pools, barely able to support fish life. In addition, there are a few deeper pools with permanent surface water that provide refuge during the dry season.

A total of eleven fish species were observed and captured in the study area, with most of the species found at more than one site (Table 4.12). Most species appear to be common throughout the study area and have widespread distributions throughout Southern Africa. However, one species (the Mozambique tilapia, *Oreochromis mossambicus*) is near threatened and two species, the sand catlet (*Zaireichtys cf. monotapa*) and the orange finned killifish (*Nothobanchius sp. "orange fins*") appear to be previously un-described scientifically.

Hydrogeology Assessment - Groundwater levels in the project area range between 2 meters below ground level (mbgl) at Pirrira BH3 (Balama west) to 33 mbgl in BH8 (Balama east). There are two sets of aquifer systems in the project area: a weathered aquifer and a fractured aquifer system. The aquifer associated with the weathered bedrock varies in thickness throughout the area, but it can extend to depths of about 40 mbgl. The weathered aquifer is fairly permeable as only minor seepages were recorded in the weathered material during drilling. The pockets of deeper weathering may allow seepage migrating to the fractured zone aquifer.

During the recent borehole drilling programme 8 boreholes were installed. All major water strikes intercepted during drilling were between 40 and 60 mbgl. The major water strikes had yields between 0.78 and 9 L/s. Besides the fault gouge at Balama East, all major water strikes were associated with fractured intrusives at contact zones. Six of these boreholes are still open and accessible for water abstraction. Of these eight boreholes, three are fit for human consumption and three would be fit for consumption if treated.

Geochemistry - The Acid-base Accounting (ABA) procedure measure the acid- and alkaline-producing potential of undisturbed soil and rock (overburden) in order to determine if, after disturbance, the waste material will produce acid and subsequently leach metals. This procedure includes Nett Acid Generation (NAG) tests that evaluate the Nett acid generation and neutralising potential of the material. From the ABA and NAG results the following can be concluded:

- The paste pH values of the waste rock material (hanging wall and footwall) are all above 8 with the exception of one sample;
- The mineralised zone has neutral paste pH values with only one sample showing a acidic formation in the material paste;
- The sulphur content of all the samples are above the margin concentration of 0.3% S with the exception of two samples being below 0.01%;
- Material with a sulphur content above 0.3% shows a tendency for acid generation if the neutralising potential of the rocks are not high enough;
- If the Nett Neutralising Potential (NNP) of a sample is below 0 the sample has the potential to produce acid. This is the case in all the samples with the exception of

two;

- All the samples with the exception of two are classed a rock type I and are thus potentially acid forming
- The acid forming nature of the rocks is of concern as it can lead to AMD formation as well as increase the leachability of metals and ions into the receiving environment.

The SPLP tests are a leachate procedure in which the contaminants that can potentially seep into the groundwater and surface water reserves from waste facilities and stockpiles can be determined. The quality of the leachate was classed against the SANS 241:2005 drinking water guidelines, as well as WHO drinking water guidelines to evaluate its suitability for human consumption and the potential for contamination; should leachate reach and mix with local water resources. WHO guideline values were only used where the SANS guideline do not give criteria for that specific parameter. SANS 241:2005 identifies 3 classes namely Class 1 (recommended operational limit), Class 2 (maximum allowable concentration for limited duration) and Class 3 (Not recommended for human consumption). The metals found to be above the recommended drinking water guidelines, but within the maximum allowable limits were Ca, Co, Cr, Mn, Se and Zn.

Based on the results of the Geochemistry assessment discussed above, it is evident that material representing the waste rock as well as the ore body has samples that could potentially generate acid drainage. The waster rock dumps and tailings storage facility has a moderate potential for AMD due to the high Sulphur content and acid generation potential in the samples that were tested. The ore material has a potential for AMD formation due to the high Sulphur concentrations and low paste pH levels, which could result in leachate water with a low pH and increased metal content. The high concentrations of U, Sr, Se and Rb in the graphite zone were also found to be potentially radioactive posing a health risk.

Land, Natural Resource Use and Agriculture Assessment - Almost all households are heavily reliant on the natural resources for their livelihoods. Natural resources are used for construction, medicinal consumption and to supplement their food. Charcoal production was also evident in the project site.

Socio-Economic Assessment - The proposed mining operation is being developed in an area that is poor and faced with limited economic opportunities at present, Most villagers are self-employed farm workers and lead a predominantly subsistence agricultural lifestyle supporting large and extended families. The largest industry in the area is Plexus, a cotton producer which supports many farmers in the area with cotton production. Some farmers do receive agricultural support either from companies such as Plexus, and the government through seed provision and support. Under the traditional jurisdiction of the Macua Tribe, the area and its people are male-dominated and very patriarchal. Thus, any development in the area has the potential to reinforce this system, which disempowers and marginalises vulnerable groups such as women, the elders, and the youth.

The SIA identified several impacts which need to be mitigated. Most of these issues revolve around a central theme of land and food security. The mining operation will affect a large area which is currently extensively utilised by almost all the households for agricultural farming. Nearly all the households have farms or machambas, many of which will be either affected or lost during the mine development. The extent of economic displacement is significant (more than 200 machambas will be lost), for which purposes the greatest mitigation measure proposed to manage social impacts is a Resettlement Action Plan (RAP) and the development of associated procedures to guide compensation (which has already been drafted). The most significant issue that needs to be addressed is future food security. Affected villagers should be empowered and provided with the capacity to continue with their preferred livelihoods after the mine has closed, which should not leave them being worse off. Large areas to be mined are also used by most villagers for natural resource harvesting,

whilst small areas used for cultural and religion practices will also be lost or affected by the development.

The proposed development is seen as needed in the area, especially since the villagers suffer from food insecurity and severe poverty. The villagers' socio-economic status would not improve without an external economic intervention. Local employment opportunities will be created, and the impact of even providing one household member with employment cannot be disregarded. The income dependency is very high, which means that even one regular income stream in one household might sustain a series of households in these villages. The development should create an economic opportunity which can, in the long-term, boost and empower these villages with education, skills, training and agricultural productions.

Health Assessment - Ten health issues were identified and discussed, namely:

Communicable diseases linked to housing design and overcrowding: Tuberculosis is widespread in Mozambique. There is poor case detection in the district. Acute respiratory infections are a major cause of morbidity especially in children under five years of age. Poverty, poor environmental health conditions and poor nutrition play a role in community susceptibility to infectious diseases.

Vector-related diseases: Malaria is a major public health challenge in the project area and is regarded as the biggest concern related to burden of disease. It accounts for a significant portion of consultations at the local level. Community knowledge on transmission and prevention of malaria is good. Ownership of insecticide-treated nets is good, although it is difficult to assess proper utilisation. There are a number of interventions in the area to reduce the burden of disease from malaria but monitoring and evaluation activities are limited.

Sexually transmitted infections, including HIV/AIDS: HIV/AIDS remains an increasing public health challenge in the area. HIV prevalence is about 6-8% in the general population. Although commercial sex work is not common in the area, there is a potential for this to increase. Knowledge and awareness related to HIV appeared good. However, this does not translate into behaviour change and high risk practices are reported. Stigma was still high within the communities. Moreover, comprehensive knowledge of HIV prevention and transmission is low due to the belief of some misconceptions within the community. There are frequent HIV campaigns in the area. However, the limited functionality of the community health worker units may affect the delivery of services.

Soil-, water- and waste-related diseases: Generally poor access to drinking water sources. Water is generally available during wet and dry seasons. With the exception of Chipembe Dam, improved water sources, such as water pumps are common in some communities while others rely on non-improved water sources. The vast majority of households throughout the villages do not have access to their own improved sanitation facility. Diarrhoeal diseases are common. Intestinal parasites and urogenital schistosomiasis are also common.

Food- and nutrition-related issues: Malnutrition and micronutrient deficiencies are challenges in the project area. These are generally linked to food shortages and poor feeding practices. Anaemia is a major concern in the area although the true burden is not known. It is mainly linked to malnutrition, intestinal parasites and malaria.

Accidents and injuries: Road traffic accidents (RTA) are the most common form of non-accidental injury in the area

Exposure to potentially hazardous materials, noise and malodours: Communities residing in the Project area live in close contact to their environment and are thus vulnerable to any changes in water and air quality, as well as to noise pollution. There have been no cases of heavy metal pollution or toxicity in the project areas. Exposures and environmental health determinants as a result of the project will be covered in other specialist reports.

Social determinants of health: There is very good health-seeking behaviour in the project area, and very few people consult traditional healers. However, most communities do not have easy access to a health facility. Affordability is an issue as not all health services are free. Transportation to health care facilities is a major determinant in evaluating affordability. Education is an existing need.

Health systems issues: Limited diagnostics and human resource skills at the health centre level reduced the fidelity of data around the PACs.

Non-communicable diseases: Non-communicable diseases are not well documented in the area due to limited capacity in the local health facilities.

Noise Assessment - The overall pre-mitigation significance of the noise impact from the proposed Balama Graphite Mine is moderate to high during the construction and operational phase and drops to a low significance during the decommissioning phase.

The noise contributions can be reduced through the implementation of the recommended mitigation measures, especially the construction of the earth berms around the pits, which will help with the noise attenuating towards the villages. Depending on the general construct of the earth berms, an effective noise contribution decrease of between 5dBA and 10dBA can be achieved. The post-mitigation significance of the noise impact is considered to be moderate to low.

Traffic and Transport Assessment - The most significant contribution to traffic will be due to transport of the graphite concentrate from the mine site to the port of Nacala or the Port of Pemba. The mine will produce approximately 380,000tons of graphite per year, which will require approximately 29 truck-loads per day (delivery 360 days per year, payload 37t) to the warehouse. Graphite will then be containerised at the warehouse, and transported the short distance to the port.

From the mine site to Nacala/Pemba, trucks will need to pass through a number of settlements, some of which have markets along the roadside. Pedestrians and shoppers frequently cross the road, or the sheer number of people present spill into the road. Additional hazards are caused by taxis, vehicles and bicycles pulling off and pulling onto the road. Drivers of trucks will need to be vigilant in these areas and will need to exercise extreme caution. Completion of the upgrade of the road between Balama and Montepuez is scheduled for December 2015. When this upgrade is complete there will be no gravel roads between the mine site and Pemba/Nacala and therefore dust generation due to transport will not be an issue. However, if construction begins before December 2015, or if the completion of the upgrade is delayed, dust generation may be an impact and mitigation measures for this have been suggested.

Impacts that have been identified and assessed relate to: safety of other road users, the generation of dust, and the transport of abnormal loads. Mitigation measures have been suggested which will significantly relieve the seriousness of these impacts. Many of the impacts identified will no longer be applicable of the upgrade of the EN242 is completed prior to the initiation of construction.

4. Construction Phase Environmental Impacts

During the construction phase there are two impacts of VERY HIGH, and eight of HIGH significance before mitigation. However, after mitigation there is only one impact of HIGH significance, caused by the loss of Miombo Woodland on the graphite outcrops which cannot be effectively mitigated. There are also two socio-economic impacts of VERY HIGH, and eight of HIGH significance before mitigation, and one positive impact of MODERATE significance. After mitigation there are no negative impacts of HIGH or VERY HIGH significance, and with optimization of the socio-economic benefits arising from the project, there are nine positive impacts, one of HIGH significance. There is one impact of VERY HIGH significance after mitigation. This, together with an increase in traffic frequency are the only waste and process related impacts of MODERATE significance after mitigation.

Impact	Significance Without Mitigation	Significance With Mitigation		
BIOPHYSICAL IMPACTS				
Impacts on topography and geology	LOW -	N/A		
Removal of topsoil and soil erosion	MODERATE -	LOW -		
Soil contamination	MODERATE -	LOW -		
Disturbance to existing soil profile will result in a decrease in agricultural capability	HIGH -	MODERATE -		
Loss of agricultural land due to establishment of mining infrastructure	VERY HIGH -	MODERATE -		
Loss of subsistence crops due to establishment of mining infrastructure	VERY HIGH -	LOW -		
Sedimentation and elevated turbidity levels	HIGH -	MODERATE -		
Contamination of non-ore pollutants	MODERATE -	LOW -		
Aquatic habitat modification	HIGH -	MODERATE -		
Loss of aquatic species of special concern	HIGH -	MODERATE -		
In-stream structures blocking migrations (bridges, causeways)	HIGH -	LOW -		
Over-utilization of fish resources	MODERATE -	LOW -		
Loss of riparian woodland	MODERATE -	MODERATE -		
Loss of Miombo woodland: graphite	HIGH -	HIGH -		
Loss of Miombo woodland: granite	MODERATE -	LOW -		
Loss of intact Miombo woodland: plains	MODERATE -	LOW -		
Loss of degraded Miombo woodland: plains	MODERATE -	MODERATE -		
Loss of biodiversity (general)	HIGH -	MODERATE -		
Loss of floral species of special concern	MODERATE -	MODERATE -		
Fragmentation of vegetation and edge effects	HIGH -	MODERATE -		
Disruption of ecological systems and functions	MODERATE -	LOW -		
Loss of amphibian diversity	MODERATE -	LOW -		
Loss of reptile diversity	MODERATE -	LOW -		
Loss of bird diversity	MODERATE -	LOW -		
Loss of mammal diversity	MODERATE -	MODERATE -		
Loss of faunal species of conservation concern	MODERATE -	LOW -		
Faunal impact of habitat fragmentation and loss	MODERATE -	LOW -		
Ecological impacts from dust	MODERATE -	LOW -		
Disruption to fauna from increased noise levels	MODERATE -	MODERATE -		
Chemical pollution	MODERATE -	LOW -		

Table 1: Impacts as a result of the construction phase

Impact	Significance Without Mitigation	Significance With Mitigation
SOCIO-ECONOMIC IMPACTS		
Reduced access to productive land and economic displacement	VERY HIGH -	MODERATE
Increased Food Insecurity	HIGH -	LOW +
Reduced access to Natural Resources	HIGH -	MODERATE -
Loss Sacred and culturally significant sites	HIGH -	LOW -
Loss of graveyards/sites	VERY HIGH -	LOW -
Community safety risk	MODERATE -	N/A
Employment, Skills traps	MODERATE +	HIGH +
In-migration in search of job opportunities	HIGH -	LOW-
Stakeholder and community engagement	MODERATE -	MODERATE +
Road traffic accidents and other accidental injuries	MODERATE -	MODERATE +
Air pollution, noise and mal-odours	MODERATE -	LOW +
Chemicals, pesticides and heavy metals	MODERATE -	LOW -
Gender-based violence, alcohol and drugs	HIGH -	MODERATE +
Social cohesion and well being	HIGH -	MODERATE +
Health system strengthening	HIGH -	HIGH +
Non-communicable diseases	MODERATE -	MODERATE +
Permanent loss of fruit trees, wood sources and other natural resources	MODERATE -	LOW -
Increasing demand for natural resources	HIGH -	MODERATE -
IMAPCTS ASSOCIATED WITH WASTE INFRASTRUCTURE AND PR	OCESS RELATED	ISSUES
Pollution of land and water (general waste)	MODERATE -	LOW -
Pollution of land and water (hazardous waste)	VERY HIGH -	MODERATE -
Nuisance impact (production of odours, visual impact and attraction of pests and vermin) from solid waste	MODERATE -	LOW -
Pollution of soil and water from domestic wastewater and sewage sludge	MODERATE -	LOW -
Health impacts to employees and communities	MODERATE -	LOW -
Nuisance impact (odour and flies) from domestic wastewater and sewage sludge	MODERATE -	LOW -
Pollution of land and water from disposal of run-off / storm water	MODERATE -	LOW -
Increase in traffic frequency through villages	MODERATE -	MODERATE -
Transport of abnormal loads	LOW -	LOW -
Dust generated from traffic	MODERATE -	LOW -
Impact of traffic noise on surrounding noise sensitive receptors in terms of annoyance during the construction phase	MODERATE -	LOW -
Impact on air quality as a result of site clearing (removal of topsoil and vegetation and stockpiling of overburden topsoil)	MODERATE -	LOW -
Impact on air quality as a result of the construction of any surface infrastructure	MODERATE -	LOW -
Impact on air quality as a result of the transportation of materials and workers on site	MODERATE -	LOW -
Impact on air quality as a result of temporary storage of hazardous products	MODERATE -	LOW -

During the operational phase there is potentially one impact of VERY HIGH and nine of HIGH significance before mitigation. After mitigation all impacts are reduced to either MODERATE or LOW significance. There is potentially one socio-economic impact of VERY HIGH and nine of HIGH significance before mitigation. After mitigation there are no

negative socio-economic impacts of HIGH or VERY HIGH significance, and five MODERATE negative impact. Optimization of benefits results in 13 of the 18 identified socioeconomic impacts being positive, of which five are HIGH positive, and seven MODERATE positive. Potentially two negative impacts of VERY HIGH, and six of HIGH significance before mitigation are waste, infrastructure and process related. However, after mitigation there is only one impact of HIGH significance (Increase in traffic frequency through villages) with the rest being either of MODERATE or LOW significance.

Impact	Significance Without	Significance With	
	Mitigation	Mitigation	
BIOPHYSICAL IMPACTS			
Impacts on topography and geology	MODERATE -	N/A	
Soil contamination	HIGH -	LOW -	
Possible contamination of groundwater through leaching of toxic materials from tailings storage facility	VERY HIGH -	LOW -	
Sedimentation and elevated turbidity in rivers	HIGH -	MODERATE -	
Contamination from non-ore pollutants	MODERATE -	LOW -	
Ore contamination	MODERATE -	LOW -	
Alteration of river flow-dynamics	MODERATE -	LOW -	
Mine dewatering	MODERATE -	LOW -	
Mine water contamination	MODERATE -	LOW -	
Hydrocarbon spillage	MODERATE -	LOW -	
Aquatic habitat modification	HIGH -	MODERATE -	
Loss of aquatic species of special concern	HIGH -	MODERATE -	
In-stream structures blocking migrations	HIGH -	LOW -	
Over-utilization of fish resources	HIGH -	LOW -	
Invasion of floral alien species	HIGH -	LOW -	
Loss of ecosystem services provided by the plant communities identified in the project area	HIGH -	MODERATE -	
Disruption of ecological systems and functions	HIGH -	LOW -	
Loss of faunal biodiversity	MODERATE -	LOW -	
Loss of faunal species of conservation concern	MODERATE -	MODERATE -	
Introduction of alien fauna	LOW -	LOW -	
Faunal impact of habitat fragmentation and loss	MODERATE -	MODERATE -	
Impact of increased dust levels on fauna	MODERATE -	MODERATE -	
Impact of noise pollution on fauna	MODERATE -	MODERATE -	
Impact of chemical pollution on fauna	MODERATE -	LOW -	
Threats to animal movements	MODERATE -	MODERATE -	
SOCIO-ECONOMIC IMPACTS			
Temporary or permanent in-migration in search of job opportunities HIGH - MODERATE -			
Reduced access to the inselberg's forest cover and small wildlife	HIGH -	MODERATE -	

Table 2: Impacts as a result of the operational phase

Impact	Significance Without Mitigation	Significance With Mitigation
Personnel safety risk	MODERATE	N/A
Health services and water provision	MODERATE	MODERATE +
Employment opportunities and the stimulation of economic growth in the region	MODERATE +	HIGH +
Stakeholder and community engagement	MODERATE	HIGH +
Transmission of communicable diseases due to overcrowding	HIGH -	MODERATE +
Malaria burden	HIGH -	HIGH +
Transmission of STIs and HIV/AIDS	VERY HIGH -	MODERATE +
Soil, water and waste related issues	HIGH -	HIGH +
Malnutrition	MODERATE -	MODERATE +
Road traffic accidents and other accidental injuries	MODERATE -	MODERATE +
Air pollution, noise and mal-odours	MODERATE -	LOW +
Chemicals, pesticides and heavy metals	MODERATE -	LOW -
Gender-based violence, alcohol and drugs	HIGH -	MODERATE +
Social cohesion and well being	HIGH -	MODERATE +
Health system strengthening	HIGH -	HIGH +
Non-communicable diseases	MODERATE -	MODERATE +
Increasing demand for natural resources	HIGH -	MODERATE -
IMPACTS ASSOCIATED WITH WASTE INFRASTRUCTURE AND PROCESS	RELATED ISSUES	
Health and safety of employees and local communities	HIGH -	LOW -
Disruption of ecological function	MODERATE -	LOW -
Pollution of soil and water resources as a result of the storage of effluent in the process water pond	MODERATE -	
		LOW -
Risk to health and safety of employees due to storage of effluent in the process water pond	HIGH -	LOW -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals	HIGH - VERY HIGH -	LOW - LOW - MODERATE -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals	HIGH - VERY HIGH - VERY HIGH -	LOW - LOW - MODERATE - MODERATE -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages	HIGH - VERY HIGH - VERY HIGH - HIGH -	LOW - LOW - MODERATE - MODERATE - HIGH -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic	HIGH - VERY HIGH - VERY HIGH - HIGH - MODERATE -	LOW - LOW - MODERATE - MODERATE - HIGH - MODERATE -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase	HIGH - VERY HIGH - VERY HIGH - HIGH - HIGH -	LOW - LOW - MODERATE - MODERATE - HIGH - MODERATE - MODERATE -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase Impact on air quality as a result of removal of ore material (opencast mining process) and ROM Stockpile	HIGH - VERY HIGH - VERY HIGH - HIGH - HIGH - MODERATE -	LOW - LOW - MODERATE - MODERATE - HIGH - MODERATE - MODERATE - LOW -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase Impact on air quality as a result of removal of ore material (opencast mining process) and ROM Stockpile Impact on air quality as a result of operation of infrastructure	HIGH - VERY HIGH - VERY HIGH - HIGH - MODERATE - MODERATE -	LOW - LOW - MODERATE - MODERATE - MODERATE - MODERATE - LOW - LOW -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase Impact on air quality as a result of removal of ore material (opencast mining process) and ROM Stockpile Impact on air quality as a result of the storage, handling and treatment of hazardous products	HIGH - VERY HIGH - VERY HIGH - HIGH - MODERATE - MODERATE - MODERATE -	LOW - LOW - MODERATE - MODERATE - MODERATE - LOW - LOW -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase Impact on air quality as a result of removal of ore material (opencast mining process) and ROM Stockpile Impact on air quality as a result of the storage, handling and treatment of hazardous products Moderate potential for acid mine drainage (AMD) formation from waste rock dumps (WRD) and tailings storage facility (TSF)	HIGH - VERY HIGH - VERY HIGH - HIGH - MODERATE - MODERATE - MODERATE - MODERATE -	LOW - LOW - MODERATE - MODERATE - HIGH - MODERATE - LOW - LOW - LOW -
Risk to health and safety of employees due to storage of effluent in the process water pond Risk to health and safety of employees due to disposal of potentially hazardous process chemicals Pollution of water resources and soil due to disposal of potentially hazardous process chemicals Increase in traffic frequency through villages Dust generation as a result of traffic Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase Impact on air quality as a result of removal of ore material (opencast mining process) and ROM Stockpile Impact on air quality as a result of operation of infrastructure Impact on air quality as a result of the storage, handling and treatment of hazardous products Moderate potential for acid mine drainage (AMD) formation from waste rock dumps (WRD) and tailings storage facility (TSF) Potential trace element contamination from the WRD seepage into the receiving environment with high concentrations of Mn, Fe, Ni and U	HIGH - VERY HIGH - VERY HIGH - MODERATE - MODERATE - MODERATE - MODERATE - MODERATE -	LOW - LOW - MODERATE - MODERATE - HIGH - MODERATE - LOW - LOW - LOW - LOW - LOW -

Trace element contamination from stock piles and exposed ore zones with a high potential of metal contamination with concentrations of Al, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U entering the receiving environment	HIGH -	MODERATE -
Radiation (public exposure)	MODERATE -	LOW -
Radiation (worker exposure)	MODERATE -	LOW -

After the implementation of a closure report, there will be no residual impacts of HIGH significance, with the majority of impacts being of LOW SIGNIFICANCE.

Impact	Significance Without Mitigation	Significance With Mitigation
BIOPHYSICAL IMPACTS		
Sedimentation and elevated turbidity in rivers	HIGH -	MODERATE -
Contamination from non-ore pollutants	MODERATE -	LOW -
Ore contamination	MODERATE -	LOW -
Alteration of river flow-dynamics	MODERATE -	LOW -
Mine water contamination	MODERATE -	LOW -
Mine decant	MODERATE -	LOW -
Aquatic habitat modification	HIGH -	LOW -
Loss of aquatic species of special concern	MODERATE -	LOW -
Over-utilization of fish resources	MODERATE -	LOW -
IMPACTS ASSOCIATED WITH WASTE INFRASTRUCTURE AND PROCE	SS RELATED ISSUES	
Impact of increased dust levels on fauna	MODERATE -	LOW -
Impact of chemical pollution on fauna	MODERATE -	LOW -
Impact of noise pollution on fauna	MODERATE -	LOW -
Mine decommissioning traffic and transport impacts	MODERATE -	LOW -
Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the decommissioning phase	LOW -	LOW -
Impacts on air quality as a result of the demolition and removal of all infrastructure	MODERATE -	LOW -
Impacts on air quality as a result of rehabilitation (spreading of soil, revegetation and profiling/contouring)	MODERATE -	LOW -
Impact on air quality as a result of storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discard)	MODERATE -	LOW -
Impact on air quality as a result of post-closure monitoring and rehabilitation	MODERATE -	LOW -
Geochemistry related impacts	MODERATE -	LOW -

Table 3: Residual impacts as a result of the decommissioning phase

5. Recommendations

It is critical that the various mitigation measures outlined in the ESHIA report are implemented in order for reduce the significance of negative impacts to the "with mitigation" ratings, and optimize the benefits arising from the project. The preparation of an Environmental & Social Management Plan (ESMPr) and a Resettlement Action Plan are key management instruments to deal with the management of environmental and social impacts. Both these reports have been prepared as part of this ESHIA process.

In addition to the above, the following management plans will need to be developed *prior to the construction phase* to ensure that the various recommendations are implemented:

- 1. A Site Specific Construction Environmental & Social Management plan (CESMP).
- 2. A Labour Recruitment, Procurement and In-migration Management Plan.

- 3. A Cultural Heritage Management Plan
- 4. Occupational Health and Safety Management Plan

The following management plans will need to be developed *during the construction phase* and prior to the operational phase:

- 1. Site Specific Operational Environmental & Social Management plan, incorporating:
 - a. An Alien Management Plan
 - b. Ecological and Conservation Management Plan
 - c. Integrated Pest Management Plan
- 2. Integrated Waste Management Plan
- Emergency Preparedness Management Plan
 Community Health and Safety Management Plan
 Environmental & Social Monitoring Plan
- 6. Hazardous Chemical Management Plan
- 7. Roads and Transport Management Plan
- 8. Storm Water Management Plan
- 9. Security Management Plan
- 10. A Radiation Management Plan
- 11. A Closure and Rehabilitation Management Plan
- 12. A Greenhouse Gas and Energy Management Plan

6. Conclusion

It is the opinion of the authors of this ESHIA that the Balama Graphite Mine will result in environmental, social and health impacts that can be managed to levels of significance that would be regarded as acceptable to society and the natural environment, provided the recommendations presented in this report are implemented as part of the social and environmental management programme developed as part of the EIA process (available as Part III of this document.

PART II: ENVIRONMENTAL, SOCIAL AND HEALTH IMPACT ASSESSMENT

THE PROPOSED BALAMA GRAPHITE MINE IN THE CABO DELGADO PROVINCE IN THE DISTRICT OF BALAMA IN NORTHERN MOZAMBIQUE



FEBRUARY 2015

FINAL REPORT

This report should be cited as follows: Coastal and Environmental Services. 2015. *Environmental, Social and Health Impact Assessment: Proposed Balama Graphite Mine in the Cabo Delgado Province in the District of Balama in Northern Mozambique.* Final report.



Coastal and Environmental Services

Report Title:

Report Version:

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Name	Responsibility	Signature	Date

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ii

LIST OF ACRONYMS

CES	Coastal and Environmental Services
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
EPDA	Environmental Pre-feasibility Scoping Study
EPFI	Equator Principles Financial Institution
ESHIA	Environmental, Social and Health Impact Assessment
ESIA	Environmental and Social Impact Analysis
ESMP	Environmental and Social Management Plan
GDP	Gross Domestic Product
ha	Hectare
l&APs	Interested and Affected Parties
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
MICOA	Ministério Para a Coordenação da Acção Ambiental
MSL	Mean sea level
NGO	Non-governmental Organisation
NPO	Non-profit Organisation
PS	Performance Standards
PPP	Public Participation Process
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SEP	Stakeholder Engagement Plan
WWF	World Wildlife Fund

TABLE OF CONTENTS

<u>1.</u>	INTROE	DUCTION	1
	1.1	Purpose of this report	1
	1.2	Project Overview	1
	1.3	Environmental Impact Assessment Team	4
	1.3.1	Core team members	4
	1.3.2	Internal specialist team members	5
	1.3.3	External specialist team members	8
	1.4	Details of the client	9
2.	LEGISL	ATIVE REQUIREMENTS IN MOZAMBIQUE	10
_	21	The legislated EIA process in Mozambique	10
-	211	The Constitution of Mozambique	12
	212	The Environment I aw - I aw nº 20/97	12
	213	Licences	13
	214	Water I aw -I aw no 16/1991	14
	2.1.5	Regulation regarding Standards for Environmental Quality and Discharg	e of
		Effluent (decree no. 18/2004. dated June 2)	14
	2.1.6	The Land Act (No.19/97 and decree No 66/98)	15
	2.1.7	Land Law Regulations (2003)	16
	2.1.8	Decree 31/2012 - Regulations of Resettlement Process resulting	from
		Economic Activities	17
	2.1.9	The Fisheries Law No 3 of 1990	18
	2.1.10	National Heritage Protection Law of 1988	18
	2.1.11	Forest and Wildlife Act No 10 of 1999	18
	2.1.12	Land Planning Law (Law 19/2007 of 18 July)	19
	2.1.13	Decree n.º 61/2006 of 26 December - technical Regulation on Safety	and
		Health in Mining Activities Geologic	19
	2.1.14	Decree no 67/2010, dated December 31 (amendments to Appendix	V to
		Decree no. 18/2004, dated June 2)	19
	2.1.15	International Environmental Conventions to which Mozambique is signatory	19
2	2.2	International Legislation and Guiding Principles	20
	2.2.1	IFC Performance Standards and requirements	20
	2.2.2	IFC / World Bank Group Environmental, Health & Safety Guidelines	22
	2.2.3	The Equator Principles	24
2	2.3	Key Policy and Legal Institutions	27
	2.3.1	Ministry for Co-ordination of Environmental Affairs (MICOA)	27
2	2.4	Stakeholder engagement activities	27
	2.4.1	Introduction and requirements	27
	2.4.2	Stakenolder Engagement activities to date Deliverables and specialist scope of work	28 29
4	2.0	Deriverables and specialist scope of work	23
<u>3.</u>	PROJE	CT DESCRIPTION	35
	3.1	Introduction	35
	3.2	Syrah Balama Pit and Waste Rock Dump	36
	3.3	Mining Method	37
	3.4	Mining Method and Processing	38
	3.4.1	Run of Mine (ROM) Handling	39
	3.4.2	Crushing	39
	3.4.3	Milling	39
	3.4.4	Flotation/Secondary Grinding	40
	3.4.5	Regrinding	40
	3.4.6	Thickening	40

3.4.7	Drying and Graphite Product Handling	40
3.4.8	Reagent Storage	41
3.4.9	Dust Emissions and Handling	41
3.4.10	Plant Area Containment	42
3.4.11	Tailings Disposal	42
3.5	Infrastructure	46
3.5.1	Raw and Potable Water	46
3.5.2	Power	46
3.5.3	Roads	47
3.6	Ancillary Infrastructure	47
3.6.1	Construction and Operation Accommodation	47
3.6.2	Sewage System	50
3.6.3	Landfill Site	50
4. DESCR	RIPTION OF THE BIOPHYSICAL ENVIRONMENT	52
4.1	Introduction	52
4.2	Physical Environment	52
4.2.1	Climate	52
4.2.2	Topography	55
4.2.3	Geology and Soils	57
4.2.4	Air Quality	61
4.2.5	Noise	62
4.2.6	Radiation	63
4.2.7	Surface water	65
4.2.8	Groundwater	68
4.2.9	Geochemistry	71
4.3	Biological Environment	75
4.3.1	Vegetation	75
4.3.2	Fauna	86
4.3.3	Aquatic environment	95
4.3.4	Spatial Planning Tools	98
4.3.5	Land use	101
5. DESCR	RIPTION OF THE SOCIAL ENVIRONMENT	103
5.1	A Demographic overview of the Project-Affected Communities	103
5.2	Socio-Economic Living Conditions	104
5.2.1	Village Social Amenities	104
5.2.2	Education	104
5.2.3	Services	105
5.3	Livelihood Strategies	105
5.3.1	Employment	105
5.3.2	Agriculture	106
5.3.3	Animal Husbandry	107
5.3.4	Natural Resource-Use	107
5.4	Health	108
5.4.1	General Health Profile of the Country	108
5.4.2	General Health Profile of Project Region	111
6. ASSES	SMENT OF BIOPHYSICAL IMPACTS	112
6.1	Planning and Design Phase Impacts	112
6.2	Impacts resulting from the existing land use / no-go options	112
6.2.1	Impacts on topography and geology	112
6.2.2	Impacts on soils and agriculture	112
6.2.3	Impacts on surface and groundwater resources	112

6.2.4	Impacts on the aquatic environment	113
6.2.5	Impacts on flora	113
6.2.6	Impacts on fauna	117
6.3	Mining related impacts resulting from the construction phase	119
6.3.1	Impacts on topography and geology	119
6.3.2	Impacts on soils and agriculture	119
6.3.3	Impacts on surface and groundwater resources	123
6.3.4	Impacts on the aquatic environment	126
6.3.5	Impacts on flora	129
6.3.6	Impacts on fauna	136
6.4	Mining related impacts resulting from the operational phase	143
6.4.1	Impacts on topography and geology	143
6.4.2	Impacts on soils and agriculture	143
6.4.3	Impacts on surface water resources	145
0.4.4	Impacts on groundwater resources	140
0.4.3	Impacts on the aquatic environment	102 154
0.4.0		104
0.4.7 6 5	Impacts on rauna Impacts resulting from the decommissioning phase	160
651	Impacts resulting norm the decommissioning phase	162
652	Impacts on topography and geology	162
653	Impacts on surface water resources	162
654	Impacts on groundwater resources	164
655	Impacts on the aquatic environment	165
656	Impacts on flora	167
657	Impacts on fauna	167
6.6	Cumulative Impacts	169
6.6.1	Impacts on topography and geology	169
6.6.2	Impacts on soils and agriculture	169
6.6.3	Impacts on surface and groundwater resources	169
6.6.4	Impacts on the aquatic environment	170
6.6.5	Impacts on flora	170
6.6.6	Impacts on fauna	170
<u>7.</u> <u>ASSES</u>	SMENT OF SOCIO ECONOMIC IMPACTS	171
7.1	Introduction	171
7.2	Planning and Design Phase Impacts	171
7.3	Impacts resulting from the existing land use / no-go options	171
7.3.1	Socio-economic impacts	171
7.3.2	Health related impacts	171
7.3.3	Impacts on natural resources	171
7.4	Impacts resulting from the construction phase	172
7.4.1	Socio-economic impacts	1/2
7.4.2	Health related impacts	183
7.4.3 7 F	Impacts on natural resources	199
1.5 7.5 1	Impacts resulting from the operational phase	201
1.3.1 7 E 0	Sucio-economic impacts Health related impacts	201
7.5.2	Impacts on natural resources	204
7.0.0	Impacts on natural resources Impacts resulting from the decommissioning phase	204
761	Socio-economic impacts	205
762	Health related impacts	203
763	Impacts on natural resources	206
7.7	Cumulative impacts	207

7.7.1	Socio-economic impacts	207
7.7.2	Health related impacts	207
7.7.3	Impacts on natural resources	207
<u>8.</u> <u>ASSES</u>	SMENT OF INFRASTRUCTURE, WASTE AND PROCESS RELA	TED ISSUES208
8.1	Planning and Design Phase Impacts	208
8.2	Impacts resulting from the existing land use / no-go options	208
8.2.1	Impacts related to waste and wastewater	208
8.2.2	Impacts related to traffic and transport	208
8.2.3	Impacts related to noise	208
8.2.4	Impacts related to air quality	208
8.3	Impacts resulting from the construction phase	209
8.3.1	Impacts related to waste and wastewater	209
8.3.2	Impacts related to traffic and transport	215
8.3.3	Impacts related to noise	218
8.3.4	Impacts related to air quality	218
8.3.5	Geochemistry related impacts	221
8.3.6	Radiation related impacts	221
8.4	Impacts resulting from the operation phase	221
8.4.1	Impacts related to waste and wastewater	221
8.4.2	Impacts related to traffic and transport	226
8.4.3	Impacts related to noise	228
8.4.4	Impacts related to air quality	229
8.4.5	Geochemistry related impacts	232
8.4.6	Radiation related impacts	234
8.5	Impacts resulting from the decommissioning phase	236
8.5.1	Impacts related to waste and wastewater	236
8.5.2	Impacts related to traffic and transport	237
8.5.3	Impacts related to noise	238
8.5.4	Impacts related to air quality	238
8.5.5	Geochemistry related impacts	240
8.5.6	Radiation related impacts	241
8.6	Cumulative Impacts	241
8.6.1	Impacts related to waste and wastewater	241
8.6.2	Impacts related to traffic and transport	243
8.6.3	Impacts related to noise	243
8.6.4	Impacts related to air quality	243
8.6.5	Geochemistry related impacts	244
8.6.6	Radiation related impacts	244
<u>9. EFFEC</u>	TS OF THE PROJECT ON GLOBAL CLIMATE CHANGE	245
9.1	Introduction	245
9.2	Climate Change: Cause and Effect	245
9.3	Mozambique and the Cabo Delgado Province	246
9.3.1	Geographical Context	246
9.3.2	Projected Climate Fluctuations	247
9.4	Climatic Hazards	248
9.5	Climate change-related impacts of the proposed project	250
9.5.1	Contribution to climate change	250
9.5.2	Exacerbation of climate change impacts	252
<u>10.</u> <u>ALTER</u>	NATIVES	254
10.1	Introduction	254
10.1.1	Fundamental Alternatives	254

10.1.2	Incremental Alternatives	254
10.2	No Development Alternative	254
10.3	Design and Layout Alternatives	255
10.3.1	Location of the haul road	255
10.3.2	Location of the tailings storage facility	259
10.3.3	Location of the mine camp	262
<u>11.</u> <u>DECOM</u>	IISSIONING AND CLOSURE PLAN	264
11.1	Introduction	264
11.1.1	Background	264
11.1.2	Development of a preliminary mine closure plan	264
11.1.3	Applicable legislation and international standards	265
11.1.4	Social components of closure	267
11.2	Decommissioning, rehabilitation and closure of specific components	267
11.2.1	Overview of closure activities	268
11.2.2	Mine void / Pits	268
11.2.3	Waste Rock Dump	269
11.2.4	Tailings storage facility (TSF)	269
11.2.5	Roads	270
11.2.6	Ore processing plant and other infrastructure	270
11.2.7	General Surface Rehabilitation	271
11.3	Post closure mine site inspection, environmental monitoring	and
	reporting	271
11.4	Closure cost estimates	272
11.5	Conclusions	276
<u>12.</u> FINAL (CONCLUSIONS AND RECOMMENDATIONS	277
12.1	Key findings of specialist assessments:	277
12.1.1	Vegetation Assessment	277
12.1.2	Faunal Assessment	279
12.1.3	Aquatic Assessment	280
12.1.4	Hydrogeology Assessment	282
12.1.5	Geochemistry	284
12.1.6	Radiation	285
12.1.7	Socio-Economic Assessment	285
12.1.8	Land, Natural Resource Use and Agriculture Assessment	286
12.1.9	Health Assessment	288
12.1.10	Air Quality Assessment	293
12.1.11	Noise Assessment	295
12.1.12	Waste Assessment	295
12.1.13	I rattic and Transport Assessment	296
12.1.14	Mine Closure Report	297
12.2	Residual Impacts	298
12.3	Conclusion	304
<u>13. REFER</u>	ENCES	305

APPENDIX 1: MICOA APPROVAL FOR SCOPING REPORT	307
APPENDIX 2: IMPACT RATING METHODOLOGY	320
APPENDIX 3: CURRICULUM VITAE	323

TABLE OF FIGURES

Figure 1.1: Locality map indicating the position of the proposed Balama Graphite Mine area Figure 2.1: EIA process flow diagram (maximum periods allocated for report revision/approval by	2
MICOA are indicated in red).	11
Figure 2.2: The EIA process in Mozambique	11
Figure 3.1: Balama Graphite Deposit	36
Figure 3.2: Proposed process flowsheet for the Balama Graphite Plant	45
Figure 3.3: Proposed village Masterplan (Source: Equinox, 2013)	49
Figure 4.1: Average monthly precipitation	53
Figure 4.2: Average monthly temperature	54
Figure 4.3: Wind Rose	54
Figure 4.4: Average monthly relative humidity	55
Figure 4.5: Contour map for the proposed Syrah Balama Graphite Project (the project site is demarcated in red).	
Figure 4.6. Detailed geological map of the area	58
Figure 4.7. General soil types found within the mining concession area	60
Figure 4.8: Radiation sampling points east pit	
Figure 4.9: Radiation sampling points west pit	65
Figure 4.10: River systems in and around the project area (Source: Aquatic Impact Assessment.	
2014)	68
Figure 4.11: Groundwater sampling site	70
Figure 4.12: Vegetation map of the project site	77
Figure 4.13: Ecological Sensitivity map of the Project area (Source: Vegetation assessment, 2013)).
Note: SP – Stock pile; LG – Low Grade	85
Figure 4.14: WWF Eco Regions surrounding the site	99
Figure 5.1: Project-Affected Community Members' Educational Status (% of those above 18 years	of
age)	.104
Figure 5.2: Project-Affected Community Access to Energy (%)	.105
Figure 5.3: Project-Affected Community Access to Water (%).	.105
Figure 5.4: Project-Affected Community Household Natural Resource-Use (%)	. 108
Figure 5.5: Ten major causes of death in children under 5 years, 2008	.110
Figure 10.1: Sensitivity of the project area	255
Figure 10.2: Haul road options	.258
Figure 10.3: Options for the tailings storage facility	260
Figure 10.4: Comparison of the four TSF alternatives	261
Figure 10.5: Alternative locations for the mine camp	263
Figure 11.1: The integrated mine closure planning approach as recommended by the ICMM (2008)
	265

TABLE OF TABLES

Table 2.1: International Environmental Conventions to which Mozambique is a signatory	.20
Table 2.2: The International Finance Corporation Performance Standards (January 2012)	.21
Table 2.3: IFC requirements for Environmental, Social and Health Impact Assessment Reports	.22
Table 2.4: Stakeholder Engagement Planned Activities	.28
Table 2.5: Summary of Stakeholder Engagement Activities for the Scoping Phase of the Project	.29
Table 2.6: Terms of Reference for the Specialist Studies undertaken in the EIA Phase of the Balam	a
	.30
Table 4.1: Average monthly precipitation	.52
Table 4.2: Average monthly temperature	.53
Table 4.3: Dust fallout results for the proposed Balama Project Site (2013)	.61
Table 4.4: General noise sources during baseline measurements	.63
Table 4.5: Number of taxa, SASS and ASPT scores at the five sample sites	.66
Table 4.6: Whole rock chemistry results summary (concentration in ppm)	.73
Table 4.7: Total Area of Each vegetation type and the area that will be directly impacted	.82
Table 4.8: Vulnerable Plant Species that could occur in the project site	.83
Table 4.9: All possible and recorded bird SSC for the project region	.90
Table 4.10: Mammals present in the region and their use as a faunal resource	. 92
Table 4.11: Mammals SSC which are likely to occur or have occurred within the project area	.94
Table 4.12: The 6 sites sampled for fish within the Study Area at the Syrah Balama Graphite mine	
(from north to south) during both the wet season (March) and/or dry season (August)	
2013	.95
Table 4.12: An annotated list of fish species (listed alphabetically) collected during the fish surveys	in
the Study Area at the Syrah Balama Graphite Mine Study Area in March 2013, in the We	et
Season (W) and in August 3013 in the Dry Season (D)	.97
Table 5.1: Direct Project-Affected Community Demographics 1	103
Table 5.2: Project-Affected Community Members' Age Profile1	103
Table 5.3: Project-Affected Community Social Amenities and Basic Infrastructure1	104
Table 5.4: Balama District Employment Sectors* 1	106
Table 5.5: Estimated DALYs ('000) by cause, 20041	109
Table 5.6: Estimated total death ('000) by cause Mozambique1	111
Table 9-1: Current Strategies to Cope with the Main Hazards (Sacramento et al., N.D)	249

TABLE OF PLATES

Plate 4.1: Riparian Woodland	6
Plate 4.2: Dominant species found in the Riparian Woodland A) Brachystegia boehmii. B) Grewia	
forbsii, C) Albizia adianthifolia D) Xylotheca kraussiana flower and D) Xylotheca	
kraussiana fruit7	8
Plate 4.3: Miombo Woodland (on the hill slopes) associated with the graphite deposit7	9
Plate 4.4: Miombo Woodland (on the hill slopes) associated with the granite intrusions	0
Plate 4.5: Intact woodland found in the flat plains near the Nquide village	1
Plate 4.6: Example of typical agricultural fields with a single Baobab tree	1
Plate 4.7: An array of amphibians which were recorded during the site visit (Top: Arthroleptis	
stenodactylus, Chiromantis xerampelina. Bottom: Amietophrynus gutturalis,	
Amietophrynus maculatus)8	6
Plate 4.8: An array of reptiles recorded during the site visit (Top: Trachylepis varia, Panaspis	
wahlbergii. Bottom: Trachylepis margaritifer, Hemidactylus platychephalus)8	8
Plate 4.9: A) Ground nuts planted around a homestead; B) Maize intercropped with ground nuts; C) A	١
maize food garden; D) Large machambas planted with maize in the background and to the	Э
right; and E) A small grain storage structure10	1
Plate 4.10: Recently burned field at the Project site	2
Plate 4.11: Trees and shrubs are used for charcoal production in the study area10	2
Plate 10.1: The intersection of the Avenida 25 de Septembro and the Avenida 16 de Junho25	7

1. INTRODUCTION

1.1 Purpose of this report

In accordance with Mozambican regulatory requirements the issuing of an environmental licence requires the preparation of an Environmental Impact Assessment (EIA). The Mozambican Ministry for Co-ordination of Environmental Affairs (MICOA) is the lead environmental agency in Mozambique, and it is MICOA who is responsible for the review and issuing of an environmental licence. The proposed project (Balama Graphite Mine), triggers an EIA and is classified as a category A project, requiring a full EIA (see Chapter 2: EIA standards, process and legislation in Mozambique).

The EIA undertaken for the Balama Graphite Mine must also meet the Equator Principles and best international practice, which is generally defined by the International Finance Corporations Performance Standards 1 to 8 (as described in Chapter 2). In order to meet these standards, and Environmental, Social & Health Impact Assessment (ESHIA) is required, and this document is henceforth therefore referred to as an ESHIA.

The key purpose of this ESHIA is to assess the environmental, social and health impacts of the proposed establishment of a graphite mine, and to provide interested and affected parties (I&APs) with an opportunity to comment on the findings of the ESHIA. The role of MICOA is to administer the ESHIA review process and issue decisions on projects submitted for review.

This ESHIA report intends to ensure that environmental and social concerns are integrated into the proposed development, and suggests ways of preventing, minimising, mitigating and/or compensating for possible adverse environmental and social impacts which may arise due to the proposed development.

It provides information about the proposed Graphite Mine and its development, the legal framework for the ESHIA, a summary of the baseline studies that have been completed to assess this project; and an outline of the ways in which I&APs can be involved in the ESHIA process (public participation). It also provides an assessment of impacts on the natural and social environment, and presents recommendations to mitigate these effects. Further detail on these recommendations will be presented in an Environmental and Social Management Plan.

1.2 **Project Overview**

Twigg Mining & Exploration Lda, a subsidiary of Syrah Resources Limited, proposes to develop a graphite mine in northern Mozambique, near the small town of Balama. In December 2011, Syrah acquired 100% ownership of the Balama Graphite Project and has since conducted a large diamond drilling resource definition program to establish a graphite resource with a very strong potential to be developed into a mining operation. Balama is anticipated to be a very large graphite deposit. Excluding market considerations, it has the potential to deliver a mine life of 100 years at a process rate of 1 800 000 tpa. A mining license application for a period of 25 years, at a process rate of 2 000 000 tpa will be submitted (an effective mine life of 23.5 years to allow for closure) with an option to extend for a further 25 years. The plant will operate 365 days per year.

Balama is located on a 106km² Prospecting Licence in northern Mozambique, within the District of Balama in the Cabo Delgado province. The project area is approximately 265 km by road (3.5 hours' drive) west of the port town of Pemba, and 515 km to the port town of Nacala, where deep water ports are strategically located (Figure 1).



Figure 1.1: Locality map indicating the position of the proposed Balama Graphite Mine area

It is the intention that conventional open pit mining will be used to extract the ore with a baseline scenario of 2 million tonnes per annum. The extraction of the graphite will require conventional flotation processing. The Chipembe dam, located approximately 13 km northwest of the project site, will be the primary source of water for this process. It is estimated that 1 m³ of water will be required per tonne of ore processed. This requirement of water has been discussed between Twigg (Syrah) representatives and ARA-Norte and the availability of 2 million m³ has been confirmed (Licence no 07/2012 valid till October 2018). Water will be transferred to site via a 13 km pipeline.

Ore will be delivered from the mine onto stockpiles at the processing plant using haul trucks. The ore will then be fed into the crusher bin using. The crusher plant will consist of a primary crusher, and downstream crushers. The crushed ore will be fed via a conveyor into a mill feed silo and then milled. The ore will then undergo cleaning, flotation and regrinding. All tailings from the process facility will be transferred to a tailings storage facility, with flocculent may be added if required. The final concentrate will be pumped to final concentrate holding tanks ahead of a filter. The cake will then be dried and bagged for transport.

Once the graphite concentrate has been produced, it will be transported by road to the deep water port at Nacala and subsequently exported

Infrastructure required for the graphite mine that will be assessed as part of this ESHIA will include:

- A pipeline (±13 km) from the Chipembe dam to the project site;
- Pump houses at the dam and project site;
- Water reservoirs;
- Internal roads to enable access to various parts of the development and for transportation of materials, equipment, supplies and employees;
- Haul road;
- A diesel powered back-up electricity generation plant and bunded storage areas for diesel fuel, lubricants and waste oil; and
- An ore processing plant.

The project will also require infrastructure related to auxiliary services including the following:

- Offices and accommodation at the project site to accommodate 250 people;
- A lay-down area for construction materials and equipment. This area will continue to be used during the operational phase, although the actual area of land required may be reduced;
- Workshops for repair of equipment and machinery;
- Stores and a lay-down area(s) for equipment, spares and consumables;
- Offices for site staff;
- Ablution facilities and associated sewage treatment plants;
- Security measures

Grid power will be supplied from a 33 kVA line to the established by EDM. The power line is part of EDM's electrification programme to supply electricity to the area. A diesel generation plant will provide back-up power on site. In the event that grid power is unable to provide sufficient capacity, or has not come on line at the start of the project, the generation plant will provide the required electricity on a 24 hour, seven days a week basis. The ESIA assesses the option of 24/7 diesel powered generation in the event that EDM power is not yet available.

In addition, a Tailings Storage Facility and a waste rock dump will be required. The location of these has, as far as possible, taken into account environmental sensitivities.

3

1.3 Environmental Impact Assessment Team

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67 African Street, P.O. Box 934 Grahamstown, 6139, South Africa. Telephone: +27 46 622 2364 Fax: +27 46 622 6564 Website: www.cesnet.co.za Email: info@cesnet.co.za *Also in Port Elizabeth and East London*

CES is one of the largest specialist environmental consulting firms in southern Africa. Established in 1990, and with offices in Grahamstown, East London, Cape Town, Johannesburg and Port Elizabeth in South Africa and Maputo in Mozambique, we primarily specialise in assessing the impacts of development on the natural, social and economic environments. CES's core expertise lies in the fields of environmental assessment, plans, environmental management environmental management systems. ecological/environmental water requirements, environmental risk assessment, environmental auditing and monitoring, integrated coastal zone management, social impact assessment and state of environment reporting. In addition to adhering to all relevant national legislative requirements, which we are often required to review and summarise for specific projects, acquisition of equity funding from the majority of financial institutions demands that developments must meet certain minimum standards that are generally benchmarked against the Policy and Performance Standards of the International Finance Corporation and the World Bank Operational Directives and Policies. The quality of our work during our long and extensive association with mining in Africa (we have worked on large projects in South Africa, Mozambique, Malawi, Kenya, Madagascar, Zambia and Egypt) has been acknowledged by international lenders such as the World Bank and the International Finance Corporation, and the large mining companies continue to approach us as their preferred environmental consultant for this type of project.

1.3.1 Core team members

Below are brief bio-sketches of the key EIA project team members.

Dr A.M (Ted) Avis (Director) – Project Leader

Ted is a leading expert in the field of Environmental Impact Assessments, having projectmanaged numerous large-scale EIAs to international standards (e.g. World Bank and International Finance Corporation). Dr Avis was principle consultant to Corridor Sands Limitada for the development of all environment aspects for the US\$1billion Corridor Sands Project. This involved the completion of five Environmental Impact Assessments, as well as Environmental Management Plans for the entire project. Dr Avis has also managed EIA studies of similar scope in Kenya and South Africa. Dr Avis was instrumental in developing a professional course in Environmental Impact Assessments, based on his past experience running an honours module in EIA practice at Rhodes University. He is a Visiting Fellow in the Environmental Science Department at Rhodes University, and a certified Environmental Assessment Practitioner. He has delivered papers and published in the field of EIA, SEA and ICZM and has been a principal of CES since its inception 22 years ago, and managing director for the past 10 years, during which time the company has grown rapidly.

Dr Chantel Bezuidenhout (Principal consultant) – Project manager

Chantel holds MSc and PhD degrees in Botany (estuarine ecology) and a BSc degree in Botany and Geography from NMMU. Chantel's main focus is estuarine ecology and she has done extensive work on 13 systems from the Orange River Mouth in the Northern Cape to the Mngazi Estuary in the Transkei. As a result she has been involved in a number of ecological reserve determination studies including the Kromme, Seekoei and Olifants systems. Chantel has been an Environmental Consultant for approximately 5.5 years and as such has been focused on environmental management and impact assessment. Chantel is well versed in environmental legislation and has been involved in number of environmental impact assessments and management plans in South Africa, Zambia and Madagascar. She is currently employed in the Port Elizabeth office of CES.

Mrs Kim Brent (Environmental consultant) – Report writing (compilation of ESHIA)

Kim holds a BSc degree with majors in Botany and Geography as well as a BSc (Hons) degree, both from NMMU. Her honours year focussed on Environmental Impact Assessments, environmental management and Geographic Information Systems. Kim's research projects in her honours year focussed on Plant physiology and Biological factors of the Velddrif Solar Saltworks. Kim's interests include Basic Assessments, Environmental Impact Assessments, Environmental Management Plans, Environmental auditing, Geographic Information Systems and Botanical assessments. Kim has 3 years' experience in the consultancy environment and is currently employed in the Port Elizabeth office of CES.

Ms Carina Saranga (Administrative assistant) - Public Participation Process Facilitation, Compilation of Reports, Quality control

Carina holds a Bachelor's degree in Law, with specialization in Public Law (2011), from the University of São Tomás, in Mozambique. She is presently concluding her degree research project on the topic: "Complexity of the resettlement process in Mozambique". Carina joined CES in 2013 where she is involved in the preparation and coordination of the public participation process, as well as doing field research for a resettlement process. Prior to that, she worked as a public participation assistant, where she liaised with the various interested parties so as to ensure their participation at the public meetings.

1.3.2 Internal specialist team members

Dr Eric Igbinigie (Senior consultant)- Report writing (Waste and By-products)

Eric is a Senior Environmental Consultant and a registered Professional Natural Scientist (Pr.Sci.Nat.). Eric holds a PhD in Environmental Biotechnology and his professional interest is in Sustainable Integrated Environmental Management with a keen interest in Waste & wastewater specialist assessment, Environmental due diligence, Contamination assessment and remediation, and Environmental & Social management compliance audits. Eric has successfully conducted several related local and international environmental projects across Africa in compliance with the requirement of multinational lenders such as the IFC, SWEDFUND, DEG and AfDB, where he served as both specialist consultant and project manager. Before joining CES Eric served as a Senior Research Scientist at the Institute for Environmental Biotechnology, Rhodes University conducting postgraduate lectures and led a research group tasked with the successful beneficiation of coal spoils facilitating the revegetation of coal mine dump sites evident in Witbank, South Africa.

5

Dr Kevin Whittington-Jones (Director) – Reviewer (e.g. Waste and By-products), quality control

Kevin holds a PhD in Environmental Biotechnology and an MSc in Zoology (marine ecology) and is a Director at CES. His professional interests include environmental business risk, management systems, waste management and climate change. Prior to joining CES he held various academic posts at Rhodes University, including that of Senior Lecturer at the Rhodes Investec Business School. Kevin has undertaken environmental work at many of the ports in South Africa, including environmental risk assessments, a climate change risk assessment, strategic environmental assessments and an integrated waste management plan. Kevin has also been involved in a number of industrial EIA projects within South Africa and internationally, both as Project Manager and as a waste management specialist. More specifically, he has conducted specialist waste management studies for the Port of Mossel Bay (South Africa), two heavy mineral mining projects (Egypt and Madagascar), manganese smelters (Kalagadi and Exxaro, both in South Africa), biofuel projects (Sierra Leone and Mozambique), brewery projects (Mozambique) and the Rabai Power Station (Kenya). He is currently managing the EIA for a large biofuel development in Mozambique and the EIAs for numerous wind energy developments.

Dr Cherie-Lynn Mack (Principal consultant) – Report writing (Aquatic Impact Assessment)

Cherie-Lynn holds a PhD and MSc (with distinction) degrees in Environmental Biotechnology, with a BSc degree in Microbiology and Biochemistry. She has postgraduate research experience in industrial and domestic wastewater treatment technologies, with particular emphasis on the coal and platinum mining industries. Her interests lie in the water sector, with experience in ecological reserve determination and water quality monitoring and analysis. She has experience in water quality analysis and industrial wastewater treatment research.

Mr Bill Rowlston (Director) – Reviewer (e.g. Aquatic impact assessment), Quality Control

Bill has more than 35 years' experience in the English and South African water sectors. He spent 24 years with the Department of Water Affairs and Forestry in Pretoria, where he contributed to the development of approaches for protecting water resources, including the determination of the ecological Reserve. Bill was closely involved with the development of the National Water Policy (1997) and the National Water Act (1998), and was responsible for compiling the National Water Resource Strategy, First Edition (2005), much of which he wrote. He also supervised the development of guidelines for the preparation of sub-national catchment management strategies. He joined CES in April 2007.

Ms Tarryn Martin (Environmental consultant) – Report writing (Ecological Impact Assessment)

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and a MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C3 and C4 Panicoid and non-Panicoid grasses within the context of climate change. She has spent time at Rhodes University working as a research assistant and has spent many years working within the corporate tourism industry as a project manager. Her research interests include biodiversity conservation, ecotourism and climate change.

Dr Greer Hawley (Principal consultant) – Reviewer (e.g. Ecological Impact Assessment)

Greer has a BSc degree in Botany and Zoology and a BSc Honours in Botany from the University of Cape Town. She completed her PhD thesis (Microbiology) at Rhodes University. Greer has been involved in a number of diverse activities. The core academic focus has been directed in the field of taxonomy both in the plant and fungal kingdom. Greer's research ranges from studying fresh and marine algae, estuarine diatoms, Restio species classification in the fynbos and forest vegetation and fungal species identification and ecology. Greer's study of fungi have also contributed towards an understanding of soil ecology and "below ground" ecology. Greer has focused here expertise on the study of floral biodiversity and has undertaken numerous biodiversity/ecological studies, with particular reference to the Niassa district in Mozambique. It is also worth noting that Greer undertook a number of studies for the Addax BioEnergy project in Sierra Leone, including the Ecological Impact and Carbon Stock Assessment, contributing towards the development of the biofuel development from concept to implementation. She is currently working on numerous impact assessments at the East London branch.

Mr Thomas King (Environmental consultant) – Report Writing (Traffic and transport Assessment)

Thomas holds a BSc degree with specialisation in Zoology from the University of Pretoria and an Honours degree in Biodiversity and Conservation from Rhodes University. As part of his Honours degree, Thomas was trained in Geographical Information Systems (GIS) and Community Based Natural Resource Management (CBNRM) in addition to the required biological sciences courses. His honours thesis investigated the rate at which Subtropical Thicket recovers naturally after heavy grazing by ostriches (*Struthio camelus*). His interest areas are: climate change and the investigation of possible solutions, waste management, and rehabilitation ecology.

Mr Jan Anton Hough (Social scientist) – Report Writing (Social Impact Assessment)

Anton is a social scientist in the company engaging, amongst others, in Social Impact Assessments (SIAs), social baseline studies, Social Management Plans, Relocation Action Plans (RAPs) and Public Participation Processes (PPPs). His academic qualifications and accomplishments include a Masters Degree in Sociology obtained from the University of Stellenbosch in South Africa, in addition to one published ISI-listed academic publication and two forthcoming publications. Before CES he has gained experience as a social scientist mostly in the mining and community development sector, but also the socio-environmental arena; the latter for which he has published web-based articles on socio-environmental concern in Africa.

Mr Lungisa Bosman (Senior consultant) - Report Writing (Social Impact Assessment)

Lungisa holds a Bachelor of Social Science (1993) from UCT, with majors in Public Administration & Sociology, and a Post Graduate Diploma in Organisation and Management. Lungisa has gained considerable experience in social facilitation and community education and has been involved in a number of projects where he has brought his facilitation skills to bear. These include the ADM and Chris Hani State of Environment studies.

Mr Roy de Kock (Senior consultant) -Report writing (Land, Natural resource use and Agriculture)

Roy is a Senior Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela Metropolitan University in Port Elizabeth. His MSc thesis focused on Rehabilitation Ecology using an open-cast mine as a case study. He has been working for CES since 2010, and is based at the East London branch where he focuses on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa, Mozambique and Malawi.

7

1.3.3 External specialist team members

Prof W.R. Branch (Faunal Specialist)

Over the years, Prof Bill Branch has been involved in the study and research of fauna, specialising in herpetology. He is currently one of the foremost experts in faunal studies and applications to EIAs in Africa and Madagascar.

Dr Anton Bok (Ichthyology and Aquatic Faunal Specialist)

Anton Bok has a PhD in Ichthyology from Rhodes University (JLB Smith Institute of Ichthyology, now South African Institute for Aquatic Biodiversity or SAIAB) in South Africa and has over 30 years of experience in the field of fish distribution and conservation management of aquatic systems in Southern Africa. He has conducted fish ecological surveys and provided specialist input for EIA projects impacting on sensitive aquatic environments (including impacts of proposed mining operations) as a fish specialist throughout South Africa, Mozambique and the Democratic Republic of Congo.

Dr Matthew Ojelede (Digby Wells)- Report writing (Air Quality)

Matthew Ojelede holds a PhD from the University of Johannesburg. His main interest has been the public health risk posed by atmospheric dust emissions from gold mine tailings on the Witwatersrand. He has focused on economic opportunities to reprocess the legacy tailing storage facilities to extract residual gold. He has co- authored several articles on tailings. He has closely with the University of the Witwatersrand, University of Pretoria and the National Health Laboratory Service (NHLS) in looking at the "Adverse Health Impacts Associated with Dust Emissions from Gold Mine Tailings" for the Mine Health and Safety Council. At Digby Wells he is responsible for carrying out Air Quality Impact Assessments including dispersion modelling, emissions inventory and baseline assessments.

Vumile Dlamini (Digby Wells) – Report writing (Health Impact Assessment)

Vumile Dlamini is an Environmental Consultant employed within the Environmental Management Services Department, offering support to the Community Health Impact Assessment Division. She holds a Bachelor of Social Sciences (Honours) degree in Environmental Analysis and Management from the University of Pretoria. Before joining Digby Wells, Vumile has spent time as a Client Services Executive under Ernst and Young's Climate Change and Sustainability Services Department, offering Environmental Auditing and advisory services around sustainable development strategies and frameworks. Vumile is also well versed in Environmental Impact Assessments, GIS and Remote sensing, as well as Environmental Law practices.

Francis Kom (Digby Wells) – Report writing (Geohydrology)

Francis Kom is a French and English speaking Hydrogeologist at Digbywells with over two and a half years of experience as a consultant. He holds an Honours degree in Hydrogeology obtained at the University of the Free State and a BSc Degree in Geology, minor in Chemistry obtained from the University of Buea in Cameroon. He is currently doing his MSc degree in contaminant hydrogeology at the University of Pretoria. Francis has gained lots of field experience for the past two years while working as a field Hydrogeologist in most mining projects all over Africa. His fields of expertise include hydrogeological assessments, mine dewatering management and EIA/EMP assessments, drilling supervision, groundwater contamination investigation and groundwater geophysical exploration which he has done for various mines in and outside of South Africa.

Stephen Fonkem (Digby Wells) – Report writing (Geohydrology)

Stephen Fonkem is a senior environmental consultant and hydrogeologist at Digby Wells. Stephen holds an MSc in hydrogeology from the University of the Free State. Stephen has over 6 years of experience on hydrogeological assessment for a wide range of Southern and
West African mining and mineral development projects. He specialises in numerical groundwater modelling, environmental impact assessment and groundwater resource assessment and management. Stephen is fluent in French, English and Pidgin English.

Hlayiseko Mashaba (Digby Wells) – Report writing (Closure and Rehabilitation Plan)

Hlayiseko Mashaba completed his BSc (hons) in Environmental analysis and management at the University of Pretoria in December 2012. During his honours program, Hlayiseko attended several courses which include Environmental Impact Assessments (EIA), Environmental Compliance, Environmental principles, Urban Geography of SA etc. Hlayiseko joined Digby Wells in April 2013 and is currently working as an Environmental Consultant in the Mine Closure and Rehabilitation Department. He is involved in conducting liability assessments, mine rehabilitation and closure plans.

Brett Coutts (Digby Wells) – Report writing (Closure and Rehabilitation Plan)

Brett Coutts is the unit manager of the biophysical department and has been appointed to assist with the management and co-ordination of all relevant specialist studies that are undertaken by the department. In addition he is responsible for the compilation of the Geographic Information System (GIS) component of Biodiversity Action Plans (BAP). Prior to his appointment, he gained experience as a junior project manager on environmental rehabilitation projects at Hydromulch and then was appointed by Terra Pacis as an Environmental Consultant where his roles and responsibilities included the compilation of Basic Assessment (BA) reports, S&EIR, compilation of Environmental Management Plans (EMP), GIS mapping and Biophysical Studies.

Lukas Sadler (Digby Wells) – Report writing (Noise Impact Assessment)

Lukas Sadler has a B.COM degree in Geography and Environmental Management, including short courses in Environmental Noise Assessments, Environmental Noise Control and Air Quality Management as well as local and international work experience in the environmental sciences field. This includes experience working with projects in accordance with the International Finance Corporation (IFC) and World Bank standards. Lukas has also gained experience working in Africa namely Mali, Senegal, Ghana, Sierra Leone, DRC, Liberia, Mozambique and Namibia. At Digby Wells, Lukas' core focus is working on Environmental Noise impact assessments, which includes baseline noise monitoring surveys, noise dispersion modelling and noise management programmes.

1.4 Details of the client

- Developer's name: Syrah Resources Limited
- Balama Graphite Mine, contact person and designation:
 - Name: Mr Dinis Napido
 - Email: dinis.napido@gmail.com
 - Phone: + 258 (84/82) 554 0440
- Construction will start as soon as all statutory permits and approvals are in place.

2. LEGISLATIVE REQUIREMENTS IN MOZAMBIQUE

2.1 The legislated EIA process in Mozambique

The EIA process in Mozambique is regulated by a number of key acts that include the Constitution of Mozambique as the overarching law in terms of environmental protection. The Environmental Law of Mozambique (Decree 76/98 of 29 December 1998) and the Regulations for the Environmental Impact Assessment Process (Decree No 45/2004) define the principles and actions needed in EIA respectively.

In Mozambique, an EIA process is a legal requirement under the Environmental Law (Law no. 20/97 of 1 October) for any activity which may have direct or indirect impacts on the environment. These are regulated by the Environmental Impact Assessment Regulations (Decree no. 45/2004 of 29 September and Decree no. 42/2008 of 4 November, which amends some articles of Decree no. 45/2004). Article 2 of Decree no. 45/2004 states that EIAs required for oil, gas and minerals resources related activities or developments are regulated by specific regulations.

In Mozambique, there are regulatory requirements specific for mining operations which outline the need for an EIA for mining activities. In respect of mining operations, the EIA process is set out by Mining Law 14/2002 of 26th June, Mining Law Regulation- Decree 28/2003 of June 17th and Environmental Regulations for Mining Activities -Decree 26/2004 of August 20th which together compile the environmental regulations for mining operations.

The EIA Regulations define three project categories (A, B, and C). Depending on the category, the extent of the EIA is determined by MICOA (Figure 2). Three categories of projects are defined by the new Regulations (Article 3):

- Category A: Activities presented in Annex I are considered to have significant adverse impacts on the environment and are subject to an EIA;
- Category B: Activities listed in Annex II are those for which potential environmental impacts are less adverse than those of Category A and are subject to a Simplified Environmental Assessment (SEA); and
- Category C: Activities listed in Annex III are exempt from an EIA and SEA, but still require observance of good management practices.

The Balama Graphite Mine project is a Category A project, thus full scoping and EIA reports are required.

The Ministério para a Coordenação da Acção Ambiental (Ministry for the Coordination of Environmental Affairs, or MICOA), established in 1995, paved the way for sustainable environmental management in Mozambique. MICOA is charged with the responsibility of regulating the EIA process, as set out in Regulations on the EIA Process, Decree No 45 of 2004, which replaced those of 1998.

The EIA process in Mozambique is summarised in Figure . Once the category is determined, the EIA process begins. An EIA report (and specialist reports) are prepared and disclosed to the public; these reports, together with a Public participation Report are then submitted to MICOA, who review the reports. MICOA may request clarification on some issues, after which a final set of reports must be submitted to them. The final report may be rejected, meaning the development cannot go ahead, or accepted with certain conditions. If the EIA is accepted by the authorities, the proponent must pay for the environmental license, which is then issued by MICOA.



Figure 2.1: EIA process flow diagram (maximum periods allocated for report revision/approval by MICOA are indicated in red).



Figure 2.2: The EIA process in Mozambique

2.1.1 The Constitution of Mozambique

The Constitution of the Republic of Mozambique, November 16, 2004- Article 98.1 specifies that any natural resources located in the soil and subsoil, in domestic waterways, in territorial ocean waters, on the continental shelf and in the exclusive commercial zone are the sole property of the State. Article 102 authorizes the State to promote knowledge and inventory and assessment of natural resources and determination of the conditions for their use and enjoyment with protection of the interests of the country.

2.1.2 The Environment Law - Law nº 20/97

The Environmental Law aims to define the legal basis for the sound use and management of the environment and its components for the purpose of forming a system of sustainable development in Mozambique. The Environmental Law is applicable to all public or private activities, which may influence the environment either directly or indirectly. The law requires that activities, that by their nature, location or dimensions, are likely to cause significant environmental impacts be licensed by MICOA, based on the outcomes of an EIA process. Some of the core principles for environmental management contained in the Environmental Law and applicable to this Project are:

- i. The rational management and use of environmental components that envisage the improvement of the quality of life of the citizens and the protection of biodiversity and ecosystems;
- ii. The recognition and valuation of traditions and the knowledge of local communities;
- iii. The priority for establishment of systems to prevent actions that are harmful to the environment;
- iv. A holistic and integrated perspective of the environment;
- v. The importance of public participation;
- vi. The polluter pays principle; and
- vii. The importance of international co-operation.

The Environment Law (Lei do Ambiente), Law nº 20/97, of 1 October is the foundation for the whole set of legal instruments regarding the preservation of the environment. This is an umbrella law for environmental matters and is an important instrument for the enactment of specific regulations. It provides the overarching principles and foundations for all forms of environmental legislation, policy and practice. Its overall objective is defined as follows:

"Article 2: The current Act has the objective of defining the legal basis for the utilisation and correct management of the environment and its components, with a view of ensuring a system of sustainable development in this country."

Article 8 of the Environmental Law requires that the Government creates adequate mechanisms so as to involve the various sectors of civil society, local communities and environmental protection organizations in the preparation of policies and legislation for the management of the country's natural resources.

Article 9, related to environmental pollution prohibits the production and deposit of any toxic and polluting substances on soils, sub-soils, water or atmosphere as well as the conduct of activities that will tend to accelerate erosion and desertification, deforestation or any other form of environmental degradation beyond the limits established by law.

While Article 15 and 16 give a legal basis for EIA in Mozambique, they do not provide the specific regulations and criteria needed to ensure due process. As such, supporting legislation has been promulgated.

As established in Article 2, the objective of the Environment Law is to define the legal basis for judicious utilisation and management of the environment and its components, with a view to achieving sustainable development in the country. The ambit of the Environmental Law comprises all activities public or private, which directly or indirectly may influence the environment.

Taking into account the constitutional provision for "*an ecologically balanced environment*" for all citizens, Article 4 of the Law establishes, *inter alia,* the following basic principles for environmental management:

- i. Rational utilisation and management of the environment with a view to the promotion of improved quality of life of citizens and for the maintenance of biodiversity and ecosystems;
- ii. Recognition of traditions and local knowledge which may contribute to the conservation and preservation of natural resources and the environment;
- iii. Precaution in the sense that activities that might harm the environment must be prevented even if there is insufficient scientific certainty on the likelihood of the occurrence of such impacts;
- iv. A global, integrated vision of the environment as a grouping of interdependent ecosystems which must be managed in such a way as to maintain their functional equilibrium without exceeding their intrinsic limits;
- v. Public participation;
- vi. Equitable access to natural resources by all; and
- vii. Commitment to minimising trans-boundary impacts.

In legal terms, principles can be defined as statements expressing the direction of the law. The above principles are central to the Environmental Law, as they contain the main policy statements regarding the environment.

The Environmental Law sets out the following:

- Chapter I General Dispositions including definitions;
- Chapter II Environmental Management Institutions;
- Chapter III Environmental Pollution;
- Chapter IV Special Measures for Environmental Protection;
- Chapter V Prevention of Environmental Damage;
- Chapter VI Citizen's Rights and Duties;
- Chapter VII Exercise of Economic Activities;
- Chapter VIII Environmental Supervision; and
- Chapter IX Final Dispositions.

Chapter V of the Environment Law refers to the Prevention of Environmental Damage. Under this clause, licensing of activities that are liable to cause significant environmental impacts is required. The issuance of an Environmental Licence is dependent on the appropriate level of EIA being completed and accepted by MICOA. Importantly, the Environment Law obliges all sectorial legislation that deals in any way with the management of components of the environment to be reviewed and revised so that it is in conformity with the new act (Article 32).

2.1.3 Licences

Article 15 of the Environmental Law states that the licensing and registration of activities which may cause a significant impact on the environment must be carried out according to the EIA regulations and that the issuance of an Environmental Licence must be based upon

an approved EIA for the proposed activity. The Environmental Licence is a pre-requisite to the issuance of any other licence or permit which may be legally required. The activity for which an Environmental Licence has been issued has to start within 2 years from the date of the issue of the licence. If the developer fails to commence his activity within that period, he can request permission from MICOA to extend the licence period, in writing, no less that 90 days before the licence expires. MICOA will then decide to extend the period of validity, request new information or request a new EIA. Environmental Licences for Category A projects will be valid for a period of 5 years, renewable for an equal period. The application for renewal has to be submitted at least 180 days before the licence expires.

2.1.4 Water Law -Law no.16/1991

The National Water Policy (Resolution No.46/2007, dated October 30) and Water Law (Law no.16/1991, dated August 16), is based on the principles of environmental sustainability, the Water Law establishes the water resources that correspond to the public domain, water management principles, the need to inventory all water resources that exist in the country, the general regime for their use, general rights of users and the corresponding obligations, among other items. The Regulation regarding water licensing and concessions (Decree no. 43/2007 dated October 30), regulates the process to obtain the rights of private use and benefit of water. This regulation gives special attention to environmental issues, requesting an EIA, Environmental License or its official exemption as a condition to obtain the rights for water use. An application for a water license will be required for this project in terms of the Law.

The discharge of effluents is also subject to a specific license or concession. The surface water body or aquifer where the effluent will be discharged must be identified, or where these will be discharged on land, the following parameters are identified: the discharge point, quantity, volume and frequency, as well as the nature and composition per volume unit and the known temperature, proposed treatment methods, equipment and facilities required. The methods proposed to measure the effluents and the expected impacts on the environment as well as the methods that will be used for analysis and control shall also be included.

2.1.5 Regulation regarding Standards for Environmental Quality and Discharge of Effluent (decree no. 18/2004, dated June 2)

This Regulation defines the environmental quality and effluent emission standards for receiving bodies of water, treatment technologies, systems and methods. It governs the elimination of liquid industrial effluent into the receiving environment, which must be carried out through an appropriate entity. The final effluent must be discharged in accordance with certain emission or discharge standards. It requires that the location of the point of discharge or emission be determined during the environmental licensing process so that there is no change to water quality in the receiving body. The discharge of liquid effluent or pollutants that affects or may affect swimming areas must be controlled based on sanitary quality monitoring of the respective waterways and beaches.

This legislation was taken into account during the development of mitigation measures as part of the ESHIA and environmental management plan.

Atmospheric emissions and air quality are regulated by Decree no.67/2010, dated December 31 (amendments to Appendix I and inclusion of Appendices 1A and 1B to Decree No.18/2004, dated June 2). This Decree, among other items, amends Air Quality Standards and adds Appendices 1A and 1B which cover organic and inorganic carcinogenic atmospheric pollutants and substances with odorous properties, respectively. Parameters are set for atmospheric, water and soil pollution as well as for noise pollution. The legislation

also deals with extraordinary emissions resulting from accidents or other unusual circumstances. In such cases, and in accordance with the principle of "polluter pays", the organisation responsible for the emission is required to obtain a licence from MICOA and pay a fee.

Another regulation, Resolution no.78/2009, dated December 22, is related to the management of substances that destroy the ozone layer. This Law is intended to establish the environmental quality and effluent emission standards intended to control and maintain admissible levels of pollutant concentration in environmental components.

2.1.6 The Land Act (No.19/97 and decree No 66/98)

As people generally reside on customary land the Land Act of 1997 is applicable. The law provides the legal framework for land ownership, as well as the control of land and natural resources in Mozambique. The process of determining land rights is also explained by this law.

The law was created with the intention of encouraging the use and benefit of land, such that it contributes to the development of the national economy. The law establishes the terms under which all activities - relating to the right of land-use and benefits - operate (Article 2). It provides the basis for defining people's land-use rights, and gives details on these rights based upon customary claims and the procedures for the acquisition of title for use and benefits by communities and individuals. The law recommends a consultation-based process that recognises customary rights as the means for identifying the claims of communities and individual members of communities without title.

Article 24 identifies that, in rural areas, local communities need to participate in:

- a) The management of natural resources;
- b) The resolution of conflicts;
- c) The process of obtaining title as established in No. 3, of Article 13 of the Land Law; and
- d) In the identification and definition of the boundaries of the land they occupy.

In the first two activities (a and b), local communities rely on, among others, customary practices.

The Land Law also defines that the right to use land may be acquired through occupation by Mozambican individuals who have been using the land in good faith for at least ten years. The law therefore recognises and protects the rights of individuals to land acquired through inheritance or occupation (customary tenure and good faith rights), except in legally defined reserves or areas where land has been legally transferred to another person or body. All citizens have equal rights and duties according to the law.

Existing rights to use land may be terminated through revocation of such rights for reasons of public interest, after the payment of fair compensation, in which case the non-removable improvements will revert to the state.

Foreign individuals or corporate persons may be holders of a right to land-use and benefit, provided they have an investment project that is approved under the investment legislation and they are established or registered under the GoM (Article 11). Total and partial protection zones are part of the public domain, and no right of land-use or benefit can be obtained in these areas (Articles 7 and 9). Total protection zones include those areas specifically intended for conservation or preservation activities, whilst partial protection zones require special licenses, which may be issued for specified activities.

For the purposes of economic activities, the right of land-use and benefit is subject to a maximum period of 50 years, which can be renewed for an additional 50 years (Article 17). The approval of an application for the right of land-use and benefit for economic activities does not preclude the need for licensing and authorisation required by:

- a) The legislation relevant to the intended economic activity (e.g. tourism); and
- b) Directives of land-use plans (Article 20).

Right to land-use and benefit applications are authorised by provincial governors for areas up to 1,000ha, by the Minister of Agriculture and Rural Development for areas between 1,000-10,000ha, and by the Council of Ministers for areas exceeding 10,000ha (Article 22).

Provisional authorisation is granted after the submission of application for land-use and benefit. This provisional authorisation is valid for a maximum of five years in the case of nationals, and two years in the case of foreigners (Article 25). Upon fulfilment of the exploitation plan within the provisional period, final authorisation will be given and the relevant title issued (Article 26).

2.1.7 Land Law Regulations (2003)

The Land Law Regulations (Decree 66/1998 of 8 December) apply to all areas outside of municipal jurisdiction. According to the regulations, the construction of any type of structure within the partial protection zone shall be licensed by the entities responsible for the management of inland and maritime waters (Article 8).

In accordance with Article 18, the right of land-use and benefit obtained for the fulfilment of an investment project shall have a maximum term of 50 years, renewable in accordance with the provisions of the Land Law and the terms of renewal of the authorisation. A titleholder is required to apply for renewal 12 months before the end of the term fixed in the title, demonstrating that the economic activity which the title was applied for is still being carried out.

Relevant aspects of the regulations include:

- a) Where there is joint title, such title belongs to all the titleholders equally. When one of the titleholders dies, the other holders continue as the rightful titleholders;
- b) Consultations between the applicants for land and the local community are mandatory before a decision to grant title use is made by the provincial governor or higher authority;
- c) Good faith occupiers and local communities may apply for demarcation and title; and
- d) Titleholders are required to pay a tax for authorisation of the right to use land, plus an annual tax. Family businesses and local communities are exempt from such taxes.

Article 24 states that, in order to acquire a right of land-use and benefit, an application under authorisation must be submitted including the following information:

- a) Articles of association (in the case of a corporate person);
- b) A sketch of the location of the land;
- c) The descriptive report of the project;
- d) An approximation of the nature and size (footprint) of the development the applicant proposes to undertake;
- e) The opinion of the district administrator, after consultation with the local community;

- A public notice, and verification that such a notice has been displayed in the headquarters of the relevant district and at the location itself, for a period of 30 days; and
- g) A receipt of proof of payment of the provisional authorisation fee.

Additionally, where land is intended for economic activity, the application must also contain an exploitation plan and technical opinion thereof. In the case of private investment projects, the land is subject to prior identification, which must involve the Cadastre Services, the local administrative authorities, and the local community, and must be documented in the sketch and descriptive report (Article 25).

According to Article 28, in cases where the governor of the province is the competent authority, once the application process is complete, the Cadastre Services will submit the proposal to the governor of the province for a decision. In all other cases the application form will be sent to the central Cadastre Services after review by the governor of the province, who will submit it to the competent authority for decision. The authorisation granted here will be temporary, valid for five years in the case of Mozambican nationals, and two years in the case of foreigners.

Once the term of the provisional authorisation has expired, or at the request of the applicant, an inspection will be conducted to ascertain whether the proposed activity is in agreement with the approved schedule. Once this has been established, a definitive authorisation and accompanying title of the use and benefit of land will be issued (Article 31).

Lastly, Article 3 of the Technical Annex to the Land Law Regulations states that the delineation of areas occupied by local communities will not prevent economic or other activities from being conducted, provided that consent is obtained from the communities. It is essential that the local community be actively involved and consulted in the demarcation process. The Technical Annex also provides forms to be completed and submitted as part of this participatory demarcation process.

2.1.8 Decree 31/2012 - Regulations of Resettlement Process resulting from Economic Activities

Establishes the basic rules and principles governing the process of resettlement in Mozambique.

Creates a Technical Commission for the review of Resettlement Action Plans (RAP) triggered by projects causing resettlement, and defines the Commission's responsibilities and procedures for the approval of the RAP as well as the follow-up to its implementation. This responsibility falls under the District Government.

Introduces specific procedures for the design and the implementation of the RAP. It defines the contents of the RAP and the Resettlement Implementation Action Plan, the rights of PAPs, the responsibilities of the project proponent and the implementation of the public consultation process. Introduces specific procedures for the design and the implementation of the RAP: it defines the contents of the RAP and the Resettlement Implementation Action Plan, the rights of PAPs, the responsibilities of the RAP and the Resettlement Implementation Action Plan, the rights of PAPs, the responsibilities of the project proponent and the implementation of the public consultation process.

Mozambique's Regulations on the Resettlement Process resulting from Economic Activities were passed in 2012. The regulations consist of 28 Articles which basically formulate the procedures for any resettlement in Mozambique, and especially articulate the assistance required from government during a resettlement process. These regulations require that a

Resettlement Action Plan, compliant with all 28 Articles, be prepared. A RAP, focusing on the following Articles has been prepared as Part 6:

> Articles 6 and 7: A Technical Committee

Any resettlement project in Mozambique needs to be enacted and driven through an established government resettlement committee which comprises of various representatives from a selection of government bodies.

> Articles 10 and 14: The Rights of the Affected Population and Right of Information Article 10 lays down some basic, fundamental human rights as these pertain specifically to resettlement. These rights are elaborated upon under Article 14. Some of the most important rights include people's rights to:

- "Have re-established their income level, to equal or higher than that before the resettlement;
- Have restored their living standard to equal or higher than before the resettlement;
- Have space to perform their subsistence activities; and
- Give opinion in the whole resettlement process" (2012:p.5).

Article 12: Responsibilities of Central and Local Levels of Government

Article 12 delineates the responsibilities of central and local government. Some of these responsibilities include the Land-Use Planning Sector's responsibility to provide technical assistance to the implementation in matters related to land-use planning, as well as to monitor the resettlement process.

Articles 13 and 22: Public Participation and Consultation

Public participation is central to the success of a resettlement project. Both these articles articulate specific requirements which a RAP should adhere to.

2.1.9 The Fisheries Law No 3 of 1990

As the local population use the local river streams for subsistence and commercial fishing purposes, the Fisheries Law of 1990 is also relevant to the project. As the proposed mine may affect local fish populations and the water quality of the rivers and local streams, it triggers the regulations under this law.

2.1.10 National Heritage Protection Law of 1988

The project might affect and/or disturb areas of cultural significance, as well as gravesites and tombs. Therefore, the National Heritage Law of 1988 is applicable. The Regulations on the Protection of Archaeological Heritage Property (1994) state that the ministry must be consulted in the event where archaeological material is found.

2.1.11 Forest and Wildlife Act No 10 of 1999

One of the main objectives of the law is to assist in conserving and utilising the forests and wildlife resources for the social, ecological and economic benefits of the future generations (Development Bank of Southern Africa, 2007). The law also identifies protected areas, including cultural and heritage sites.

The law is divided into nine chapters. Of relevance to this SIA are the following chapters:

- > Chapter 2 on the Protection of Forest and Wildlife Resources; and
- Chapter 3 on Sustainable Forest Resources, Exploitation Regimes and Sustainable Wildlife Conservation Regimes.

2.1.12 Land Planning Law (Law 19/2007 of 18 July)

Implemented Decree No. 23/2008 approving the Regulation on Land Use Management. The law to establish the legal framework for implementing the Government's land planning policy, its aims include promoting rational and sustainable use of natural resources, preserving a balanced environment and improving living standards and housing conditions. It introduces a land management system, sets out land planning powers at different levels and establishes citizens' rights, duties and guarantees in the land planning process.

This Law, consisting of 6 Chapters, aims at regulating the territorial planning of Mozambique, in order to guarantee the organization and sustainable use of the environment. It establishes regulations for the following sectors: General provisions (Chap. I), Territorial Management System (Chap. II), Territorial Planning Tools (Chap. III), Citizen Rights and Obligations (Chap. IV), Evaluation, Monitoring and Inspections (Chap. V).

2.1.13 Decree n.º 61/2006 of 26 December - technical Regulation on Safety and Health in Mining Activities Geologic

This decree supplies detailed rules on matters such as mine safety, worker health standards and first aid, transportation of people and ore, ventilation standards, use of electrical equipment underground, use of explosives, protection against fire and safety equipment. It also provides for inspection and fines and fines and penalties in the event of noncompliance. The Regulation on Mine Work Safety covers activity in both the exploration and (in greater detail) mining stages, covering a broad variety of circumstances.

2.1.14 Decree no 67/2010, dated December 31 (amendments to Appendix V to Decree no. 18/2004, dated June 2)

This decree amends the Standards for Receiving Entities (sea, ocean), now including Table 1 relative to potentially hazardous chemicals substances and Table 1A, relative to potentially harmful chemical substances (pesticides).

This Decree amends articles 23 and 24 and Annexes I and V of the Regulation on Environmental Quality and Effluents' Emissions, related to taxes for special authorizations and new fines and sanctions for illegal activities. Annexes IA and IB deals new standards of air quality, atmosphere polluting agents and parameters for carcinogenic Inorganic and Organic agents. Annex V lists potentially harmful chemical substances.

2.1.15 International Environmental Conventions to which Mozambique is signatory

Mozambique is a signatory to a number of international environmental conventions which are applicable to this project. Some of the more important conventions are listed in

Table 2.1 below. Note that a Protocol of Signature is an instrument subsidiary to a treaty, and drawn up by the same parties. Such a Protocol deals with ancillary matters such as the interpretation of particular clauses of the treaty, those formal clauses not inserted in the treaty, or the regulation of technical matters. Ratification of the treaty will normally *ipso facto* involve ratification of such a Protocol.

When Countries become signatory to Conventions, Protocols, Treaties and Agreements; they accede to incorporate the conventions principles and standards into their legislation. Either new laws are developed or as in most cases regulations are drawn up or amended.

This is done to ensure compliance by the countries citizens and to provide measures to be able to enforce the protocols. Thus the table provides details on the conventions, however, it is noted that compliance to Mozambique legislation would ensure compliance to the conventions.

Table 2.1: International Environmental Conventions to which Mozambique is a signatory

INTERNATIONAL CONVENTIONS	
Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal	1989
African Convention on the Conservation of Nature and Natural Resources	1968
(Amended)-Revised African Convention on the Conservation of Nature and Natural Resources (Amended Version) Not yet in force. Mozambique is a party and would be bound upon entry into force	2003
Constitutive Act of the African Union	2000
Bamako Convention on the Ban of the Import into Africa and the Control of Trans boundary Movement and Management of Hazardous Wastes within Africa	1991
Convention on Biological Diversity	1992
Convention on International Trade in Endangered Species of Wild Fauna and Flora (Cites)	1973
UN Convention Concerning the Protection of World Cultural and Natural Heritage	1972
Kyoto Protocol to the UN Framework Convention on Climate Change	1998
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR)	1971
Stockholm Convention on Persistent Organic Pollutants	2001
UN Framework Convention on Climate Change (read with Kyoto Protocol)	1992
International Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1994
African Charter on Human and Peoples' Rights	1981
Agenda 21	1997
UNESCO	1972

2.2 International Legislation and Guiding Principles

2.2.1 IFC Performance Standards and requirements

The IFC is a member of the World Bank Group, and one of the largest development institutions that focuses exclusively on the private sector in developing countries (IFC, 2012)¹. The IFC was established in 1956 and works in developing countries to create job opportunities, generate tax revenue, improve corporate governance and, perhaps the most important of all, ensuring that project contribute to the upliftment of its countries' local communities. In respect of the latter, it is also the IFC's vision for people to be presented with the opportunity to escape poverty and improve their lives.

The IFC published its Performance Standards (PS) on Environmental and Social Sustainability in April 2006, and published comprehensive Guidance Notes in April 2007.

¹ IFC. 2012. About IFC. [Online]. Available:

http://www1.ifc.org/wps/wcm/connect/115482804a0255db96fbffd1a5d13d27/PS_English_2012_Full-Document.pdf?MOD=AJPERES [2012, October 26].

The PSs were revised in 2012 (cf. IFC, 2012).

The IFC's PSs are exclusively tailored for managing projects and general project requirements for IFC support. In addition to these standards, the IFC also published supporting Guidance Notes on each standard, which provides guidance to clients and the IFC staff in order for projects to effectively meet the PS.

The objectives of each of the performance standards are set out in Table 2.2 below:

 Table 2.2: The International Finance Corporation Performance Standards (January 2012)

PERFORMANCE STANDARD	KEY OBJECTIVES
PS 1: Assessment and management of environmental and social risks and impacts	 Identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence; Avoid, or where avoidance is not possible, minimise, mitigate or compensate for adverse impacts on workers, PACs and the environment; Ensure that PACs are appropriately engaged on issues that could potentially affect them; and Promote improved social and environmental performance of companies through the effective use of management systems.
PS 2: Labour and Working Conditions	 Establish, maintain, and improve the worker/management relationship; Promote the fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws; Protect the workforce by addressing child labour and forced labour; Promote safe and healthy working conditions; and Protect and promote the health of workers.
PS 3: Resource efficiency and pollution prevention	 Avoiding or minimising adverse impacts on human health and the environment by avoiding or minimising pollution from project activities; and Promoting the reduction of emissions that contribute to climate change.
PS 4: Community Health, Safety and Security	 Avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities; and Promote the reduction of emissions that contribute to climate change.
PS 5: Land Acquisition and Involuntary Resettlement	 Avoid or at least minimise involuntary resettlement wherever feasible by exploring alternative project designs and layouts; Mitigate adverse social and economic impacts from land requisition or restrictions on affected persons' use of land by: (i) Providing compensation for loss of assets at replacement cost; and (ii) Ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected; Improve or at least restore the livelihoods and standards of living of displaced persons; and Improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	 Protect and conserve biodiversity; and Promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.

PERFORMANCE STANDARD	KEY OBJECTIVES
PS 7: Indigenous Peoples	 Ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples; Avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not feasible, to minimise, mitigate, or compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner; Establish and maintain an on-going relationship with the Indigenous Peoples affected by a project throughout the life of the project; Foster good faith negotiation with and informed participation of Indigenous Peoples when projects are to be located on traditional or customary lands under use by the Indigenous Peoples; and Respect and preserve the culture, knowledge and practices of Indigenous Peoples.
PS 8: Cultural Heritage	 Protect cultural heritage from adverse impacts of project activities and support its preservation; and Promote the equitable sharing of benefits from the use of cultural heritage in business activities.

2.2.2 IFC / World Bank Group Environmental, Health & Safety Guidelines

The overarching IFC / WBG EH&S General Guidelines is arranged under the general headings Environmental, Occupational Health & Safety, Community Health & Safety, and Construction & Decommissioning. This will be the primary source of information on Good International Industry Practice (GIIP) for the review, but the sector-specific EHS Guidelines on Mining (December 2007) and Cement and Lime Manufacturing (April 2007) will also be consulted during the review.

The IFC requires that certain issues are addressed in the ESHIA. Table 2. summarises these requirements and details where they can be found in this ESIR.

ISSUE	REQUIREMENT	RELEVANT SECTION OF ESHIR
Non-technical Executive Summary	Concisely discuss significant findings and recommended actions in lay language.	Executive Summary
Policy, Legal and Administrative Framework	Discuss the policy, legal, and administrative framework within which the assessment is carried out, including host country regulations, including obligations implementing relevant international social and environmental treaties, agreements, and conventions, IFC Performance Standards, as well as any additional priorities and objectives for social or environmental performance identified by the client. Explain the environmental requirements of any co-financiers.	Chapter 2
Project Description	Concisely describe the proposed project and its geographic, ecological, social, and temporal context, including any related facilities that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Include facilities and activities by third parties that are essential for the successful operation of the project. Include maps showing the project site and the project's area of influence.	Chapter 3

Table 2.3: IFC requirements for Environmental,	Social and Health Impact Assessment
Reports	-

ISSUE	REQUIREMENT	RELEVANT SECTION OF ESHIR
Baseline Data	Assess the dimensions of the study area and describe relevant physical, biological, socio-economic, and labour conditions, including any changes anticipated before the project commences. Take into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigation measures. The section should indicate the accuracy, reliability, and sources of the data.	Chapter 4 Chapter 5
Social and Environmental Impacts	Predict and assess the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explore opportunities for enhancement. Identify and estimate the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specify topics that do not require further attention. Evaluate impacts and risks from associated facilities and other third party activities. Examine global, trans-boundary, and cumulative impacts as appropriate.	Chapter 6 Chapter 7 Chapter 8 Chapter 9
Analysis of Alternatives	Compare reasonable alternatives to the proposed project site, technology, design, and operation in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. State the basis for selecting the particular project design proposed and justify recommended emission levels and approaches to pollution prevention and abatement.	Chapter 10
Management Program	Should consist of the set of mitigation and management measures to be taken during implementation of the project to avoid, reduce, mitigate, or compensate for adverse social and environmental impacts, in the order of priority, and their timelines. May include multiple policies, procedures, practices, and management plans and actions. Describe the desired outcomes as measurable events to the extent possible, such as performance indicators, targets or acceptance criteria that can be tracked over defined time periods, and indicates the resources, including budget, and responsibilities required for implementation. Where the client identifies measures and actions necessary for the project to comply with applicable laws and regulations and to meet the Performance Standards, the management program will include an Action Plan, which is subject to disclosure to the affected communities and on-going reporting and updating.	Volume 3

In addition, the IFC have produced Environmental, Health and Safety (EHS) General Guidelines as well as industry sector EHS guidelines. These guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).

Box 2.1: Environmental,	Health and Safety	(EHS) Guidelines:
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The fo	The following general EHS guidelines are relevant:			
1.	Environmental	3.	Community Health and Safety	
1.1	Air Emissions and Ambient Air Quality	3.1	Water Quality and Availability	
1.2	Energy Conservation	3.2	Structural Safety of Project Infrastructure	
1.4	Water Conservation	3.3	Life and Fire Safety (L&FS)	
1.6	Waste Management	3.4	Traffic Safety	
		3.6	Disease Prevention	
2.	Occupational Health and Safety	3.7	Emergency Preparedness and Response	
2.1	General Facility Design and Operation			
2.2	Communication and Training	4.	Construction and Decommissioning	
2.3	Physical Hazards	4.1	Environment	
2.4	Chemical Hazards	4.2	Occupational Health & Safety	
2.7	Personal Protective Equipment (PPE)	4.3	Community Health & Safety	
2.9	Monitoring			

2.2.3 The Equator Principles

The Equator Principles (Box 2.2) are a financial industry benchmark for determining, assessing and managing social and environmental risks to projects. There is close alignment between the Equator Principles and the IFC Performance Standards and Environmental, Health and Safety (EHS) Guidelines, and many financial institutions have committed themselves to the Equator Principles. The Principles represent a voluntary set of environmental and social guidelines for project finance lending. These principles are outlined below and are adhered to in this report.

Box 2.2: The Equator Principles

Statement of Principles

The EPFI will only provide Project Finance and Project-Related Corporate Loans to Projects that meet the requirements of Principles 1-10.

Principle 1: Review and Categorisation

When a Project is proposed for financing the EPFI will, as part of its internal environmental and social review and due diligence, categorise it based on the magnitude of its potential environmental and social risks and impacts. Such screening is based on the environmental and social categorisation process of the International Finance Corporation (IFC).

Using categorisation the EPFI's environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts.

The categories are:

Category A – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented;

Category B – Projects with potential limited adverse environmental and social risks and/or 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 adverse environmental and social risks and/or impacts.

Principle 2: Environmental and Social Assessment

For all Category A and Category B Projects the EPFI will require the client to conduct an Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of the proposed Project (which may include the illustrative list of issues found in Exhibit II^[1]). The Assessment Documentation should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project.

The Assessment Documentation will be an adequate, accurate and objective evaluation and presentation of the environmental and social risks and impacts, whether prepared by the client, consultants or external experts. For Category A, and as appropriate, Category B Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA). One or more specialised studies may also need to be undertaken. Furthermore, in limited high risk circumstances it may be appropriate for the client to complement its Assessment Documentation with specific human rights due diligence. For other Projects, a limited or focused environmental or social assessment (e.g. audit), or straightforward application of environmental siting, pollution standards, design criteria, or construction standards may be carried out.

For all Projects, in all locations, when combined Scope 1 and Scope 2 Emissions are expected to be more than

100 000 tonnes of CO₂ equivalent annually, an Alternatives Analysis will be conducted to evaluate less Greenhouse Gas (GHG) intensive alternatives. Refer to Annex A for alternatives analysis requirements

Principle 3: Applicable Environmental and Social Standards

The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.

EPFIs operate in diverse markets: some with robust environmental and social governance, legislation systems and institutional capacity designed to protect the people and the natural environment; and some with evolving technical and institutional capacity to manage environmental and social issues.

The EPFI will require that the Assessment process evaluates compliance with the applicable standards as follows:

- For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the IFC / World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) (Exhibit III ^[2]).
- For Projects located in Designated Countries, the Assessment process evaluates compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. Host country laws meet the requirements of environmental and/or social assessments (Principle 2), management systems and plans (Principle 4), Stakeholder Engagement (Principle 5) and, grievance mechanisms (Principle 6).

The Assessment process will establish to the EPFI's satisfaction the Project's overall compliance with, or justified deviation from, the applicable standards. The applicable standards (as described above) represent the minimum standards adopted by the EPFI. The EPFI may, at their sole discretion, apply additional requirements.

Principle 4: Environmental and Social Management System and Equator Principles Action Plan

For all Category A and Category B Projects the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS).

Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree an Equator Principles Action Plan (AP). The Equator Principles AP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.

Principle 5: Stakeholder Engagement

For all Category A and Category B Projects the EPFI will require the client to demonstrate effective Stakeholder Engagement as an on-going process in a structured and culturally appropriate manner with Affected Communities and, where relevant, other stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to: the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; the decision-making processes; and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation.

To facilitate Stakeholder Engagement the client will, commensurate to the Project's risks and impacts, make the appropriate Assessment Documentation readily available to the Affected Communities, and where relevant other stakeholders, in the local language and in a culturally appropriate manner.

The client will take account of and document the results of the Stakeholder Engagement process, including any actions agreed resulting from such process. For Projects with environmental or social risks and adverse impacts disclosure should occur early in the Assessment process, in any event before the Project construction commences, and on an on-going basis.

EPFIs recognise that indigenous peoples may represent vulnerable segments of project-affected communities. Projects affecting indigenous peoples will be subject to a process of Informed Consultation and Participation, and will need to comply with the rights and protections for indigenous peoples contained in relevant national law, including those laws implementing host country obligations under international law. Consistent with the special circumstances described in with adverse impacts on indigenous people will require their Free, Prior and Informed Consent (FPIC).

Principle 6: Grievance Mechanism

For all Category A and, as appropriate, Category B Projects, the EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the Stakeholder Engagement process.

Principle 7: Independent Review

Project Finance

For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence and assess Equator Principles compliance.

The Independent Environmental and Social Consultant will also propose or opine on a suitable Equator Principles AP capable of bringing the Project into compliance with the Equator Principles, or indicate when compliance is not possible.

Project-Related Corporate Loans

An Independent Review by an Independent Environmental and Social Consultant is required for Projects with potential high risk impacts including, but not limited to, any of the following:

- Adverse impacts on indigenous peoples
- Critical habitat impacts
- Significant cultural heritage impacts
- Large-scale resettlement

In other Category A, and as appropriate Category B, Project-Related Corporate Loans, the EPFI may determine whether an Independent Review is appropriate or if internal review by the EPFI is sufficient. This may take into account the due diligence performed by a multilateral or bilateral financial institution or an OECD Export Credit Agency, if relevant.

Principle 8: Covenants

An important strength of the Equator Principles is the incorporation of covenants linked to compliance.

For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects.

Furthermore for all Category A and Category B Projects the client will covenant the financial documentation:

- a) To comply with the ESMPs and Equator Principles AP (where applicable) during the construction and operation of the Project in all material respects; and
- b) To provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by inhouse staff or third party experts that (i) document compliance with the ESMPs and Equator Principles AP (where applicable), and (ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and
- c) To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.

Where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the Project back into compliance to the extent feasible. If the client fails to reestablish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, as considered appropriate.

Principle 9: Independent Monitoring and Reporting

Project Finance

To assess Project compliance with the Equator Principles and ensure on-going monitoring and reporting after Financial Close and over the life of the loan the EPFI will, for all Category A and, as appropriate, Category B Projects, require the appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information, which would be shared with the EPFI.

Project-Related Corporate Loans

For Projects where an Independent Review is required under Principle 7 the EPFI will require the appointment of an Independent Environmental and Social Consultant after Financial Close, or require that the client retain qualified and experienced external experts to verify its monitoring information which would be shared with the EPFI.

Principle 10: Reporting and Transparency

Client Reporting Requirements

The following client reporting requirements are in addition to the disclosure requirements in Principle 5. For all Category A and, as appropriate, Category B Projects:

- The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online.
- The client will publicly report GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO₂ equivalent annually. Refer to Annex A for detailed requirements on GHG emissions reporting.

EPFI Reporting Requirements

The EPFI will report publicly, at least annually, on transactions that have reached Financial Close and on its Equator Principles implementation processes and experience, taking into account appropriate confidentiality considerations. The EPFI will report according to the minimum reporting requirements detailed in Annex B.

2.3 Key Policy and Legal Institutions

2.3.1 Ministry for Co-ordination of Environmental Affairs (MICOA)

In 1995, Mozambique adopted a National Environmental Management Programme (NEMP) comprised of a National Environmental Policy, an Environmental Framework Law, and an Environmental Strategy. The Ministry for Co-ordination of Environmental Affairs (MICOA) has the mandate to co-ordinate, supervise and monitor environmental management. The Environmental Law gives more precision on the role and powers of this government institution, with a little more emphasis on the natural resources management.

In terms of natural resources management, MICOA has two directorates, namely the National Directorate for Natural Resources Management and the Directorate of Territorial Planning, with the latter also being linked to integrated land use planning. The National Directorate for Natural Resources Management oversees environmental impact assessment studies and monitors environmental sustainability. The Directorate of Planning manages the coastal strip and urban zones, sets standards for planning at district levels and promotes integrated development plans for regional, provincial and district levels.

The responsibility could well overlap with other institutions, such as the Regional Planning Directorate of the Institute of Rural Development (INDER) and the National Institute of Physical Planning (INPF).

2.4 Stakeholder engagement activities

2.4.1 Introduction and requirements

The Stakeholder Engagement process has been carried out to comply with the International Finance Corporation (IFC) requirements for projects of this nature and to satisfy the requirements as entrenched in Mozambican law.

According to International Guidelines the process of community engagement is an on-going process involving disclosure of information. The engagement process includes consultation with all parties that may be affected by risks or adverse impacts from a project. The relevant stakeholders are not limited to the local communities, but also include organisations (such as NGO's and NPO's), and other interested parties. The purpose of community engagement is to build and maintain, over time, a constructive relationship with these communities, and consultation should begin at an early stage in the EIA process, be based on the prior disclosure of relevant and adequate information, including draft documents and plans, and focus on the social and environmental risks and adverse impacts, and the proposed measures and actions to address these. In essence the consultation process must ensure free, prior, and informed consultation with stakeholders and facilitate their informed participation (IFC, 2007).

Both the Mozambican Constitution and Environment Law establish the rights of citizens to have information concerning a project, and to participate in decision-making about activities which may affect them and the environment. A Public Participation Process identifies and consults with interested and affected parties (Partes Interessadas e Affectadas – PI&As), and is a compulsory activity for all Category A projects. A Stakeholder Engagement Process² must also be carried out whenever the proposed activity implies the permanent or

² A Public Participation Process (PPP) and a Stakeholder Engagement Process (SEP) are the same, except that the term PPP is used in Mozambique and the term SEP is the preferred international term.

temporary relocation of people or communities, and the relocation of goods or assets or restrictions on the use of or access to natural resources. Article 14 of the EIA Regulations defines the Public Participation Process as an activity that involves public hearings and consultation. For detailed information on the requirements and contents of a Public Participation process the reader should refer to MICOA's Directive for the Public Participation Process published as Ministerial Diploma 130/2006 of 19 July.

The Public Participation Process implies:

- Delivery of information regarding projects to all directly and indirectly affected and interested parties;
- Responding to public requests for explanations on the project; and
- The formulation of suggestions for the project.

The process of public participation includes public consultation and a public enquiry which must be carried out in compliance with directives issued by MICOA. In Mozambique the PPP is divided into two phases, the first one running between the application for pre-assessment of the activity and the submission of the EIA report to MICOA, and the second running between the review of the EIA by MICOA and the issuing of the environmental license. The first phase is the responsibility of the applicant and the second is MICOA's responsibility. However, to comply with international requirements the ESHIR will be disclosed for public review for one month (30 days).

Public participation provides the opportunity for stakeholders to learn more about the proposed project and provide their opinions. These need to be incorporated into the ESHIA process and should be used to guide further phases and help mitigate potential conflict situations early on in the planning process. It must be noted that effective stakeholder engagement is an on-going process and it is not the intention of the ESHIA Stakeholder Engagement Process to achieve the above objectives in their entirety (IFC, 2007c).

2.4.2 Stakeholder Engagement activities to date

Stakeholder engagement is an integral part of socio-economic impact assessment, as the socio-economic impacts of a proposed project are directly linked to the society in which the proposed project exists. Issues and concerns of the potential project-affected population must be considered. Table 2.4 below summarises the stakeholder activities conducted to date. A comprehensive and detailed Public Participation Report is available as Volume IV.

PERIOD	ACTION	PURPOSE	STATUS
Issues gathering	Stakeholder Identification	Identify all interested and affected parties	Complete
pnase	A A A A A		
Issues	Stakeholder	Introduction of the various stakeholders	Complete
gathering	Consultation	and identification of primary issues	
phase			
EPDA phase	Stakeholder Public	Discussion and presentation of project and	Complete
	Meetings	its potential impacts, as presented in the	
		Draft EPDA.	
EPDA phase	Stakeholder	Disclosure of EPDA	Complete
	Consultations		
EIA Phase	Stakeholder Public	Presentation of the Draft ESHIA and	In Progress
	Meetings	discussion of positive and negative	-
		impacts.	
MICOA Phase	Stakeholder Public	Presentation of the EIA by MICOA and	Pending
	Meetings/Hearings (if	discussions on the issuing of the	-
	required)	environmental license.	

 Table 2.4: Stakeholder Engagement Planned Activities

STAKEHOLDERS	TIME	DATE	LOCATION	PARTICIPANTS
	LOCAL C	OMMUNITIES	6	
Ncuide Community	10:00	04/03/2013	Nquide	150
Ntete Community	14:00	04/03/2013	Ntete	100
Maputo Community	10:00	05/03/2012	Maputo	80
Pirira Community	14:00	05/03/2012	Pirira	40
	FOCU	S GROUPS		
Ncuide Youth	16:00	06/03/2013	Nquide	40
Maputo Women	10:00	11/03/2013	Maputo	40
Pirira Women	14:00	11/03/2013	Pirira	30
Maputo Youth	10:00	12/03/2013	Maputo	60
Pirira Youth	14:00	12/03/2013	Pirira	30
Ncuide school teacher	10:00	13/03/2013	Nquide Primary	4
Traditional healers	14:00	13/03/2013	Nquide	5

Table 2.5: Summary of Stakeholder Engagement Activities for the Scoping Phase of the Project

2.5 Deliverables and specialist scope of work

The EIA requires the preparation of the volume documents:

- Part 1: Executive Summary
- Part 2: Environmental Impact Assessment Report
- Part 3: Environmental & Social Management and Monitoring Programme
- Part 4: Public Participation Document
- Part 5: Specialist Studies Volume
- Part 6: Resettlement Action Plan

The section below defines the terms of reference for all the specialist studies conducted for the Balama Graphite ESHIA in response to the risks identified in the EPDA. A list of specialist studies conducted is presented below:

- 1. Vegetation Assessment
- 2. Terrestrial Fauna Assessment
- 3. Land, Natural Resource Use and Agriculture Assessment
- 4. Surface Water and Aquatic Assessment
- 5. Socio-Economic Impact Assessment
- 6. Waste Management Assessment
- 7. Traffic, Transport and Visual Assessment
- 8. Health Impact Assessment
- 9. Air Quality Assessment
- 10. Hydrogeology
- 11. Noise Impact Assessment
- 12. Closure and Rehabilitation Plan

Wet and dry season surveys are:

- Vegetation Assessment
- Terrestrial Fauna Assessment
- Surface Water and Aquatic Assessment
- Initial baseline socio-economic survey
- Air Quality (dust) Assessment
- Hydrogeology

Dry season surveys are:

• Land, Natural Resource Use and Agriculture Assessment

- Traffic, Transport and Visual Assessment
- Health Impact Assessment
- Noise Impact Assessment

In addition to the specific Terms of Reference (ToR) for each specialist study presented below in Table 2.6, all the studies also include the following:

- 1. Address all issues and concerns raised by IAPs during the scoping phase.
- 2. Identify and assess the significance of the impacts of the construction and operation and closure of the mine.
- 3. Provide practical and realistic recommendations to mitigate impacts.
- 4. Work in consultation with other specialists to ensure that the linkages between the various systems are understood.

Table 2.6: Terms of Reference for the Specialist Studies undertaken in the EIA Phase of the Balama Graphite Mine Project

SPECIALIST STUDY	TERMS OF REFERENCE		
Vegetation Assessment	 Describe and map different vegetation units and ecosystems (e.g. grassland, savannah, riverine etc.) in the mining area. Describe the floral biodiversity and record the plant species that occur in each vegetation type. Determine habitat units that perform critical ecosystem functions (e.g. erosion control, hydrological service etc.). Utilise stratified random approach for plot based botanical surveys in order to describe biodiversity and ecological state of each vegetation unit. Describe and map rare, endangered or threatened ecosystems. Define and delineate any wetlands in the study area. Establish and map sensitive vegetation areas and species of special concern (IUCN Red Data list). Identify alien plant species, assess the invasive potential and recommend management procedures. Identify and assess the impacts of the mining and associated infrastructure on the natural vegetation in terms of habitat loss and fragmentation and degradation of key ecosystems. 		
Terrestrial Faunal Assessment	 Start of wet season and dry season: seasonal, breeding and migration trends. Identify and list all species of terrestrial vertebrates and selected indicator groups of invertebrates occurring in the mining area, based on the literature, published specimens or site records, and likely occurrences. Record species of fauna identified in the mining area list by: active searching, opportunistic siting and specimen collection. Describe any new species or occurrences. Assess the habitat preference of fauna and use these habitat preferences to assess the presence and abundance of faunal species. Identify species of Special Concern using reference to the IUCN Red Data List. Define and map faunal habitats that are sensitive and require conservation. These may need to be defined as No-Go or Restricted Development areas. Describe current land use impacts on faunal groups. Identify and assess the impact that mining will have on the different faunal groups and specific species would be significantly affected by the mining proposal. 		
Land & Natural Resource Use and Agricultural Assessment	 The terms of reference for the soil assessment: Characterise the soil and distribution of soil types. Characterise land use and capability (including in the new settlement areas). Develop recommendations for soil management and mitigation measures for soil degradation. Estimate soil potential linked to current land use. 		

SPECIALIST STUDY	TERMS OF REFERENCE		
	Identify appropriate crops types and yields, extrapolated from soil and climatic		
	conditions.		
	 I erms of reference for the Natural Resource Use and Agriculture Assessments: To provide a report on the status guo with reference to land use and 		
	agricultural activity.		
	 Determine GIS locations of important agricultural areas in proposed mine infrastructure and mine prospect locations. 		
	 Develop a land use management plan for mining closure, incorporating conservation and agricultural objectives. 		
	 To find ways and means to help the local people to improve their agriculture in mitigation against the loss of the soils resource. 		
	 Evaluate the land capability of the area based on the broad soil and climatic analysis and comment on the potential of the area for agriculture and other land uses 		
	 Determine mechanisms of restoring the potential of the mined surface area or previously cropped areas affected by the mine path or footprint 		
	 Engage with the social scientists to ensure that questions related to land use 		
	are asked during the social impact assessment, to clarify the complexities associated with current land use and natural resource utilisation.		
	 Identify the most widely used natural resources in the project area and 		
	determine whether any of these are spatially limited to certain locations where proposed mining areas will be located		
	 Identify the main fuel wood trees and assess their abundance and replace chilty. 		
	 Determine whether any grazing land falls within proposed mine infrastructure 		
	and mining areas and map these areas.		
	 Identify and assess the significance of impacts on soils, land and natural resource use that could result from the mining operation. 		
Surface Water	Establish the baseline status of the ecological state and general health of the Chinamba Dam in terms of:		
Assessment	 Invertebrate indicator species; 		
	\circ Water and sediment chemistry (metals, nutrients, physical parameters and field		
	o Fish species:		
	 Riparian Vegetation. 		
	Determine the ecological importance of the dam and any river systems and set		
	 Identify upstream and downstream water users. 		
	 Identify risks of surface water pollution from mining activities. 		
Socio- economic	 Describe the local social environment, with particular reference to the communities that will be directly affected by the project 		
Impact	 Determine the number of households (and people) that will need to be resettled 		
Assessment	 as a result of the project. Determine the current land use of the development area and the areas outside 		
	of the development boundary that are likely to be affected.		
	 Assess the significance of potential environmental and social impacts on the local populace and the district 		
	Evaluate how the project could contribute to community upliftment		
	programmes.		
	sources, education levels and food security.		
	 Investigate possible effects on livelihoods, income levels, education levels, food security and other factors relevant to the affected communities. 		
	 Describe and investigate possible effects on traditional structures and cultural 		
	and religious customs.		

SPECIALIST STUDY	TERMS OF REFERENCE					
	 Consultation with stakeholders should be done in such a way as to contribute to the formulation of a Resettlement Action Plan (RAP). Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures. 					
Waste Management Study	 Compile an inventory (identify, describe and, where possible, quantify) of the various waste streams to be generated by sources. This will not require the analysis of solid waste samples. Briefly describe the processes giving rise to the waste streams and the anticipated volumes and tonnages of waste streams. Identify and describe the possible impacts of any solid and liquid wastes on the quality of surface and groundwater. Assess the risks to the health and safety of workers on the mine and processing plants, and residents within the project's area of influence. Provide recommendations on the most feasible options for the disposal of solid and liquid wastes. Describe the levels of hazardous waste on-site, paying particular attention to any material that might be regarded as radioactive, and make recommendations for the disposal and/or recycling of these materials. Relate levels of any potentially toxic waste to recognised international standards, and ensure that any waste management strategy is in line with these standards. 					
Traffic, Transport and Visual Assessment	 The terms of reference for the traffic and transport study: Describe the mining process with particular reference to traffic and transport issues including a quantification of traffic expected to be generated. Describe the road route from the mine site to Pemba and Nacala and identify sensitive areas such as bridges, intersections, villages close to the road and potential bottleneck or hazardous areas. The road condition will also be described. Describe the port with details on: current activities, infrastructure and layout, and ability of the port to accommodate product export. Review Mozambican legislation pertaining to traffic and transport issues. The terms of reference for the visual assessment: Identify visually sensitive areas (VSAs) within a pre-selected radius or distance from mining activities and associated infrastructure. Conduct a site reconnaissance visit and photographic survey of the proposed project to survey natural and cultural features, protected areas, view-sheds and landscape, view sites, and scenic routes. Conduct a desktop mapping exercise and develop a Digital Elevation Model to establish visual sensitivity. Produce photomontage images from VSAs in order to provide a description of the potential visual impact. Determine from the VSAs, the significance of potential visual impacts. 					
Health Impact Assessment	 Desktop literature review in order to: Outline the country and community health profile from a desktop perspective including a literature review. A field visit in order to: Collect primary participatory data in the form of semi-structured focus group discussions with men and women in the different project affected communities. Gather additional information that was not available in the public domain during the desktop review. This includes collection of information from health facilities, from the national health information management system as well as from unpublished. 					

SPECIALIST STUDY	TERMS OF REFERENCE						
STUDY	 reports and documents. Identify key informants and conduct interviews using a semi- structured questionnaire; View the standards of the local health facilities and functionality of the health management information system. Visualise the project and location of communities in relation to planned project activities. Impact assessment process which will: Consider the potential future health impacts that the proposed project will have on the health of these respective communities. Determine the existing health needs of the community based on health strategies, infrastructure, programmes, service priorities, delivery plans and challenges. Based on the existing evidence rank the likelihood and consequence of difference health impacts to outline their significance and prioritisation for mitigation. A confidence ranking will be applied based on the available evidence. Develop evidence-based recommendations to avoid/mitigate negative and enhance positive impacts resulting from the project at the relevant project stage. 						
Air Quality Assessment	Compilation of a baseline assessment based on a desktop study of available climatic data modelled data and published reports (weather station was						
	 Emissioned in November of 2012) at the site; Emissions Inventory based on the mining, processing and ancillary activities at the mine; Development of a dispersion model based on atmospheric conditions, the emission inventory and measured data; and 						
Hydrogeology	 The terms of reference for the ground water assessment: The aquifer characteristics and potential sustainable yield. Potential changes in groundwater levels and quality in the surrounding area. Potential surface water-groundwater interaction. Groundwater inflow volumes into the mining area over time. Predict contaminant migration through the area. The terms of reference for the geochemical assessment: Geochemically characterise the waste rock, ore, tailings and the exposed material on the walls of the proposed pit; Predict the potential risk of acid, metal and salt precipitation and the quality of leachate from the waste rock dump(s) (WRD), ore stockpile(s), tailings storage facility (TSF), and pit walls over time; Advise on project design optimisation and assist in the development of mitigation and management measures to avoid or reduce degradation of water quality downstream of the project during construction, operation and post closure; and Assess the need for, and suitability of, waste materials to be used as an acid neutralising resource; as construction materials, and as WRD covers and a suitability for the properties. 						
Noise Impact Assessment	 Determine ambient/baseline noise levels at all potential noise sensitive areas (NSAs) such as potential villages close to the mining site and transport routes. Predict, using models, the impact of noise on NSAs and assess whether the noise levels will be acceptable in terms of relevant national and international threshold limits. 						
	• Where possible and practical, recommend mitigation measures that may reduce the negative impacts.						
Conceptual Closure and	 The framework closure plan includes the following: A description of the closure objectives and how these relate to the mine 						

SPECIALIST STUDY	TERMS OF REFERENCE					
Rehabilitation Study	 operation and its environmental and social setting. A plan showing the land or area considered for closure. A summary of the regulatory requirements and conditions for closure. A summary of the results of the environmental risk report and details of identified residual and latent impacts. A summary of the results of progressive rehabilitation undertaken. A description of the methods to decommission each mining component and the mitigation or management strategy proposed to avoid, minimize and manage residual or latent impacts. Details of any long-term management and maintenance expected. Details of a proposed closure cost and financial provision for monitoring, maintenance and post closure management. A plan drawn on an appropriate scale describing the final and future land use proposal and arrangements for the site. Technical appendices. 					
	 The rehabilitation plan includes: Specific actions to be undertaken during construction, operation, decommissioning and closure phases of the mining operation. Soil and overburden materials handling, to ensure that materials favourable to plant establishment, as well as potential problem materials (such as high metal level, saline soils or potentially dispersive material), are placed in the correct sequence. Topsoil and subsoil handling procedures, especially those designed to conserve plant, nutrients and soil biota. Soil amelioration techniques to create conditions favourable for growth, such as the application of lime or gypsum. Any techniques for conserving and reusing vegetation, including mulch, brush matting for erosion protection and introduction of seed and log piles for fauna habitat. Landscaping procedures, including the construction of erosion control and water management structures. Vegetation establishment techniques. Weed control measures prior to and following rehabilitation. Fertilizer application. 					

3. PROJECT DESCRIPTION

3.1 Introduction

This section provides a detailed project description for the proposed Balama Graphite Mine project in Mozambique.

Twigg Mining & Exploration Lda, a subsidiary of Syrah Resources Limited, has proposed the development of a graphite mine in northern Mozambique, approximately 7 km east from the small town of Balama. The Syrah Balama Project (SBP) is located on a 106 km² Prospecting Licence in northern Mozambique, within the District of Balama in the Cabo Delgado province. The project area is approximately 265 km by road (3.5 hours' drive) west of the port town of Pemba, and 515 km to the port town of Nacala, where deep water ports are strategically located (refer to Figure 3.1).

Balama is accessed by a good quality asphalt road from Pemba to Montepuez, a regional town, and then via a 45 km unsurfaced road which is in the process of being upgraded by the Government. An existing unsurfaced road currently links Nquide and Ntete with Balama via a circuitous northern route.

In December 2011, Syrah acquired 100% ownership of the Balama Graphite Project and has since conducted a large diamond drilling resource program to define a graphite resource with a very strong potential to be developed into a mining operation. Syrah aim to produce a high purity graphite concentrate (between 90-99% total graphite content - TGC), with a requirement to preserve flakes. Balama is anticipated to be a very large graphite deposit and excluding market considerations, has the potential to deliver a mine life of 100 years at a process rate of 2 million tpa. A mining license application for a period of 25 years will be submitted (an effective mine life of 23.5 years to allow for closure) with an option to extend for a further 25 years. The plant will operate 365 days per year.

Conventional open pit mining will be used to extract the ore with a base case scenario of 2 million tonnes per annum. Graphite extraction requires a conventional flotation process. The Chipembe dam, located approximately 13 km northwest of the project site, will be the primary source of water for this process.

Infrastructure required for the graphite mine includes:

- A pipeline (±13 km) from the Chipembe dam to the project site;
- Pump houses at the dam and project site;
- Water reservoirs, for process and waste water;
- Internal roads to enable access to various parts of the development and for transportation of materials, equipment, supplies and employees;
- An access road to regional road 242 at Balama, for product transport by road to Nacala port;
- A diesel powered electricity generation plant, inclusive of bunded storage areas for diesel fuel, lubricants and waste oil; and
- An ore processing plant.

The project will also require infrastructure related to auxiliary services including the following:

- Offices
- Accommodation at the project site for approximately 250 people;
- A lay-down area for construction materials and equipment. This area will continue to be used during the operational phase, although the actual area of land required may

be reduced;

- Workshops for repair of equipment and machinery;
- Stores and a lay-down area(s) for equipment, spares and consumables;
- Offices for site staff;
- Ablution facilities and associated sewage treatment plants;
- Security measures

3.2 Syrah Balama Pit and Waste Rock Dump

According to Syrah Resources (2012), the Balama graphite deposit comprises 3 small hills and a ridge that contain graphitic schists (**Error! Reference source not found.**). The apped strike distance of the graphitic schists is over 7 km. The highest grade of graphite is located in east and west target zones (**Error! Reference source not found.**) and it is nticipated that mining will commence in these two areas first.



Figure 3.1: Balama Graphite Deposit

(Source: Syrah Resources)

The mine will consist of two open pits, Balama East and Balama West. Balama East is located approximately 1 km east of the process plant, whereas Balama West is located approximately 2.5 km south west of the processing plant.

Both open pits are designed for a maximum depth from surface of less than 50 m. Geotechnical investigation has been completed and the mine pits are designed to have overall wall angles of 55 degrees.

Balama East has effectively no overburden to be stripped initially, but during the life of the

mine may have some in pit internal waste rock to be stripped. This will be stockpiled in a waste rock dump adjacent to and north of the Balama East open pit. The waste dumps are constructed by dumping waste rock in layers and once complete, pushing the rock down to result in final slopes of 30 degrees. They will have to be sloped to avoid runoff and surface drains will be designed around the dumps.

Lower grade ore present within the mine has been identified and it may be stockpiled between the open pit and the ROM pad for later processing.

Balama West has waste overburden to be stripped, and during the life of the mine may also have some in-pit internal waste rock. This will also be stockpiled in a waste rock dump adjacent to and north of the Balama West open pit.

Initial mining will be in weathered materials, which have low levels of sulphur. It is sulphur content that dictates, to a large extent, the potential for acid leachate developing and causing acid rock drainage, also called acid mine drainage. Thus, with low levels of sulphur the potential for formation of acid in the waste is reduced. Furthermore, the mined waste will contain carbonates that will neutralise sulphur minerals. The investigations to date have indicated that the resulting mined rock stockpiles will have a low potential for acid drainage, but further work will be completed to quantify this potential. If the potential for acid formation is identified then measures will be put in place to manage these waste rock dumps. This aspect has been investigated in the ESHIA and is reported on Chapter 4 (description) and 8 (impacts).

3.3 Mining Method

Conventional open pit mining techniques have been proposed for the project. Effectively, this will involve the removal of blocks of ore, dug from the open pit of the deposit, for further processing to extract the graphite contained in the ore. During the mining process, the surface of the land is excavated, forming a deeper and deeper pit until the mining operation terminates. The final shape of this open pit is determined before the mining operation begins.

The open pit area will be cleared and any topsoil which will be stockpiled for later rehabilitation. Mining is expected to be completed initially by ripping with dozers to loosen the ore. Drilling and blasting will not be required, as the mine plan indicates that "free dig" material will be mined for the first 25 years. Later in the mine life when mining proceeds below the zones of oxidised rock (about 50 m deep) it may necessary to drill and blast, but this aspect is not covered in this ESIA.

As a safety measure an abandonment bund will be constructed around the open pit to prevent inadvertent access by people into the open pit.

Mining equipment will commence initially with smaller 40t trucks loaded with 40 t excavators to provide suitable equipment for training of local operators. In later stages larger 100t capacity trucks loaded with 100t excavators may be used to load ore onto trucks and to haul it to the ROM pad. Ancillary equipment required to support the mining operation include graders and water trucks to maintain the mine road, and a service truck to provide fuels and lubricant top ups to the equipment.

Minor maintenance of equipment will be completed in the open pit and more major maintenance will be completed in a maintenance workshop located adjacent to the processing plant and offices.

Mobile equipment used is expected to be:

- Wheel loaders
- Excavators
- Dump trucks
- Crawler-tractors (bulldozers)
- Motor graders
- Water truck

The expected fuel usage and carbon emissions are shown in the table below:

Item	Equipment	Utilisation	Qty	Fuel	Usage	
		%		L/hr	L/shift	L/day
1.0	Light Vehicles	20	8	4	96	192
2.0	Excavator 100t	90	1	85	918.0	1,836
3.0	Dump Truck 777D	80	4	66	2,534.4	5,068.8
4.0	Service Truck	30	0	10		
5.0	Track Dozer D10T	30	1	68	244.8	489.6
6.0	Motor Grader 14H	30	1	17	61.2	122.4
7.0	Drill Rig CHA1100	50	0	20	-	-
8.0	Water Cart 777	50	1	66	396.0	792.0
9.0	Loader 988	90	1	48	518.4	1,036.8
10.0	LT Vehicles	30	10	10	360.0	720.0
11.0	Lighting Tower Generators	50	4	4	96.0	192.0
	- Cat C1.1					
	TOTAL					10,258
	Contingency 15%					1,539
	TOTAL WITH					11,796
	CONTINGENCY L/day					
	CO2 Generation t/a					11,366

3.4 Mining Method and Processing

The following process description is provided to give a general understanding of the present key operational components. Syrah reserves the right to alter components or process steps in the interests of optimising and simplifying the process.

The main stages in the operation are:

- 1. Run of mine handling
- 2. Crushing
- 3. Milling
- 4. Flotation
- 5. Regrinding
- 6. Thickening

- 7. Drying and graphite product handling
- 8. Reagent storage
- 9. Dust emissions and handling
- 10. Tailings disposal

These processes are explained more fully below, and the proposed process flow diagram is presented in Figure 3.2.

3.4.1 Run of Mine (ROM) Handling

The ROM pad will be an area of about 200 m x 200m and will be able to store sufficient ore to allow blending of ore of different grades and provide for times when mining is interrupted.

Multiple stockpiles on the ROM pad have been proposed to allow for blending of different ore grades. ROM ore with a top size of 600 mm will be delivered by haul truck from the open pit to the ROM pad stockpile, located close to the crusher.

The ore will be either direct dumped from haul trucks or extracted from the stockpile using front end loaders and fed to the ROM bin. The tipping area will be in close proximity to the stockpiles.

A rock breaker will be used to break oversize material that would otherwise be fed to the crusher.

3.4.2 Crushing

The ROM Ore will be extracted from the bin by a feeder and fed to a primary crusher. Product from the primary crusher is fed to a further screen and crusher. The final crushed and screened rock is conveyed to a coarse ore bin.

3.4.3 Milling

Crushed ore is fed from the coarse ore bin, by feeders, onto a conveyor which in turn feeds the primary mill. The feed rate is controlled by a weight-o-meter installed on the primary mill feed conveyor. The weight-o-meter is also used to measure total ore milled, for monthly accounting purposes.

The feed ore is conveyed to the crusher product screen. The coarse screen oversize material is conveyed to the secondary crusher to reduce the size of the ore. The secondary crusher discharge is returned to the primary mill feed screen. The primary mil feed screen undersize is conveyed to the primary classifier to which water is added. The primary mill operates in closed circuit with a primary classifier. The returning coarse stream from the classifier is fed to the primary mill.

Slurry exits the primary mill and gravitates to a hopper. The mill product is pumped from the hopper to join the primary mill feed screen undersize in the primary classifier. The primary classifier floatation feed product is passed over a trash screen for the removal of oversize, and the undersize discharged into the rougher conditioner tank.

Rods will be used as grinding media for the primary mill. A storage area for the rods will be located in close proximity to the mill.

The mill area will be contained in a sloped bunded concrete containment area to facilitate ease of removal of coarse settled solids by a small front end loader. The area will have a spillage sump and pump. Milling area spillage will be reintroduced to the mill product sump.

3.4.4 Flotation/Secondary Grinding

The primary mill circuit product will be fed into the rougher flotation circuit. A slurry sampling station will be located ahead of the rougher flotation cells. This sample will be used for metallurgical accounting purposes.

The flotation feed gravitates to the first of the rougher cells, and then flows from one cell to another until it reaches the last cell. Tailings are collected from the last cell of the roughers and fed to the secondary classifier in the secondary grinding circuit.

The rougher concentrate is fed to the first of the cleaning stages via a regrind step.

A secondary mill operates in closed circuit with a secondary classifier. The returning coarse stream from the classifier is fed to the secondary mill. The slurry exits the secondary mill and gravitates into a hopper. The mill product is pumped from the hopper to the secondary classifier. The secondary classifier product is fed to the first cell of the scavengers bank of flotation cells.

The scavenger bank consist of scavenger 1 cells and scavenger 2 cells. Scavenger 1 concentrate will be fed to the first of the cleaning stages. The scavenger 1 tails will feed the scavenger 2 flotation cells. The tailings from the scavenger 2 cells are discarded as final tailings, whilst scavenger 2 concentrate is recycled back to the first cell of scavenger 1 for further upgrading.

Tailings from the first cleaning stage are recycled back to the secondary milling circuit, whilst concentrate is fed to the second cleaning stage, via the second regrind step. Tailings from the second cleaning stage are recycled back to the first regrinding circuit whilst concentrate is fed to the third cleaning stage, via the third regrind step.

Tailings from the third stage cleaning step are recycled back to the second stage regrinding circuit whilst concentrate is fed to the fourth stage cleaner. Tailings from the fourth stage cleaning step are recycled back to the third stage whilst final concentrate is taken through a dewatering step.

3.4.5 Regrinding

Concentrate regrind stages in the circuit will be incorporated to provide further size reduction. The regrind stages are arranged in closed circuit. The regrind mill discharge is fed to the classifier, where the coarse stream is fed to a regrind mill, and the ground product feeds into the next cleaning step.

3.4.6 Thickening

Scavenger 2 tailings are transferred to the tailings dam where it will settle and separate from the process water. A return water pump at the tailings dam will collect water and return it to the process pond for reuse. A standby tailings pump will be installed, to ensure sufficient capacity to discard tails. Process water will be recycled to the mill for reuse.

3.4.7 Drying and Graphite Product Handling

Graphite concentrate from the last cleaning stage is pumped to screens ahead of the final concentrate holding tanks. A two stage sample cutter will be installed ahead of the storage tanks for accounting purposes.

Filters are proposed to produce a filter cake of different size fractions at around 10% moisture. The filter cake is then fed to a drier. The drier further serves to reduce the moisture of the cake to less than 1% moisture. The drier will be heated by a diesel or gas boiler. Waste heat recovery from the power station may also be used for drying.

The dry graphite product will then be classified into various size classes before being bagged and dispatched. Dried product will be stored in a warehouse on site. Product will be bagged in 1 tonne bulk bags and loaded into containers for transport.

3.4.8 Reagent Storage

The reagent storage facility will be contained in a sloped, bunded concrete containment area. The area will have a spillage sump and pump. The spillage will be pumped to the tailings dam.

Sodium silicate can be delivered as a liquid of solid. Bulk liquid delivery or solis sodium silicate will be in bulk containers or bags supplied by the manufacturer. Bulk liquid sodium silicate will be dosed directly from the bulk tank to the respective process areas via an appropriately sized pump. Solid sodium silicate will be mixed with water using a vendor supplied mixing facility.

The liquid reagents, collector (kerosene and paraffin) and frother (Dowfroth200 or pine oil) will be delivered in containers supplied by the manufacturers. These will be dosed directly from the bulk tanks to the respective process areas via an appropriately sized pump.

The off-loading area will be clearly demarcated and sufficient provision will be made to contain the entire contents of the bigger of the containers plus 10%, in case of an accident event.

If necessary electrical equipment will be rated for operation in hazardous areas which may arise from the storage and dosing of reagents.

Flocculant will be delivered in bags. Mixing will be conducted using a vendor supplied mixing facility. The bags will be lifted into a hopper/bin, and the bag contents then fed through a screw feeder.

The hopper will be fitted on loads cells, and only the required mass will be transferred into the mixing tank. The reagent mixing area must be properly ventilated and equipped with fume extraction, if required

3.4.9 Dust Emissions and Handling

There are two main sources of dust in the plant, namely crushing and drying, and dust minimisation has been provided for both.

In the crushing section, dust suppression will be provided through water spray. The plant's process water will be used for this purpose. Only a thin mist of water will be supplied in order to minimize the water significantly affecting the ore moisture.

The drying and product handling section will be equipped with a dust extraction system, complete with ducting; extraction fan; a cyclone to remove the dust from the stream; and a bag filter for collection of particulate material. Water vapour will be released to the atmosphere.

3.4.10 Plant Area Containment

A plant area containment pond will collect any water from around the immediate plant area and the water will be pumped to the plant process water pond. This pond and its drainage will provide a second level of containment to that provided by the bunding immediately around the plant.

By using this double containment system the chances of errant water releases from the site have a very low probability, thereby ensuring minimal chances of any downstream runoff.

3.4.11 Tailings Disposal

The TSF will comprise paddock type storage in a 3 cell arrangement with Cell 1 constructed first and cells 2 and 3 later in the mine life. Each cell will be formed by a multi-zoned perimeter earth-fill embankments, comprising a total footprint area (including the basin area) of approximately 62 ha for the Cell 1 TSF (initial cell only) increasing to 265 ha for the final TSF. The three TSF cells are designed to accommodate a total of 72 Mt of tailings and a life of 40 years.

Preliminary water balance modelling indicates the TSF has sufficient storm water storage capacity for all design storm events and rainfall sequences.

The TSF embankments will be constructed in annual raises to suit storage requirements. It has been assumed that upstream raise construction methods will be utilised after the second stage of embankment construction.

The TSF basin area will be cleared, grubbed and topsoil stripped, and a 300 mm thick low permeability soil liner, constructed over the entire TSF basin area, should geotechnical and permeability tests indicate that the TSF must be lined.

Tailings Material

Typically tailings from a graphite ore deposit will be reddish-orange in colour (due to the natural oxidation of the iron in the ore body) and have the texture of coarse sand. The tailings are expected to be benign, as toxic chemicals are not used in the process of extracting graphite from the ore reserve.

The assumed density of the tailings is 1.38 t/m³, due to the presence of mica in the ore body.

Tailings Deposition

Only one cell of the TSF will be operated at any given time.

The deposition of tailings into the TSF will be sub-aerially from the perimeter embankment to locate the supernatant pond centrally within the facility. The tailings distribution line will run along the deposition areas.

Deposition will occur from multiple spigots inserted along the tailings distribution line. The deposition location(s) will be moved progressively along the distribution line as required to control the location of the supernatant pond. After initial establishment of the tailings beaches, a suitable cycle time will be determined in order to evenly deposit the tailings around the TSF, thereby maintaining the supernatant pond at a suitable location and maintaining the formation of the tailings beach. Supernatant water will be recovered from the TSF and returned to the process facility.

Tailings Management

The sub-aerial technique for tailings deposition allows for the maximum amount of water removal from the facility by the formation of a large beach for drying and draining. Together with keeping the pond size down, sub-aerial deposition should increase the settled density of the tailings, and hence improve the storage potential and efficiency of the facility. During the early stages of operation the deposition plan will be modified to improve the return water efficiency. This will be achieved by using relatively thick tailings layers on the beach to reduce the evaporation. Whilst this will result in lower settled densities initially it should help to reduce water loss from the beaches during the early stages of operation.

The tailings will generally be deposited from along the distribution pipeline in such a way as to encourage the formation of beaches over which the slurry will flow in a laminar non-turbulent manner. The solids will settle as deposition continues and water will be released to form a thin film on the surface of the tailings. This water will flow to the supernatant pond from where it will be removed from the facility by means of decant pumps and returned to the process facility for reuse.

The tailings will initially be deposited in the TSF (cell 1) from the western embankment at the low point of the TSF basin in such a way as to encourage the formation of beaches over which the slurry will flow in a laminar non-turbulent manner, and allow the supernatant pond to migrate up the valley. The solids will settle as deposition continues and water will be released to form a thin film on the surface of the tailings. A degree of segregation of the tailings will occur against the embankment, promoting de-watering of the tailings through the toe drain and thus enhancing stability, consolidation and reducing basin drainage. Tailings deposition will then be moved either side of this initial point to line the basin area whilst controlling the location of the supernatant pond.

Deposition of tailings will be carried out on a cyclic basis with the tailings being deposited over one area of the storage until the required layer thickness has been built up. Deposition will then be moved to an adjacent part of the storage to allow the deposition layer to dry and consolidate. This will facilitate optimum storage to be achieved over the whole area.

After deposition on a particular area of beach ceases and settling of the tailings has been completed, further de-watering will take place due partly to drainage into the underdrainage system but mainly due to evaporation. As water evaporates and the moisture content drops, the volume of tailings will reduce to maintain a condition of full saturation within the tailings. This process will continue until interaction between the tailings particles hinders volume reduction.

During construction and operation, exposed loose soil will be prone to erosion due to wind or water. This will be controlled by localised structures and by management procedures to minimise sediment creation.

Typical management practices will include:

- Minimising exposed areas and maintaining vegetation cover where practically possible.
- Construction during the dry season and using of water sprays to minimise dust.
- Installation of water management structures and erosion protection before commencement of the wet season.
- Continuous rehabilitation.

Tailings Return Water

The TSF design incorporates an underdrainage system to reduce pressure head acting on the soil liner, reduce seepage, increase tailings densities, and improve the geotechnical stability of the embankments. The underdrainage system drains by gravity to a collection tower located at the lowest point in the TSF basin of each cell. In addition, a groundwater collection system will be installed beneath the low permeability soil liner.

Supernatant water will be removed from the TSF via submersible pumps and solution recovered from the decant system will be pumped back to the plant for re-use in the process circuit.

An operational emergency spillway will be available at all times during TSF operation, constructed in the embankment abutment in order to protect the integrity of the constructed embankments in the event of emergency overflow. The preliminary water balance modelling indicates that the TSF design has sufficient freeboard to cater for all design storm events and rainfall sequences thus the operational emergency spillway will not be utilised in these events.

The closure spillway will be constructed to ensure all rainfall runoff from the TSF will safely discharge after operation ceases.


Figure 3.2: Proposed process flowsheet for the Balama Graphite Plant

(Source: Metallicon, 2013)

3.5 Infrastructure

3.5.1 Raw and Potable Water

Chipembe Dam is located approximately 12km from the project site. Completed in 1985 the dam covers approximately 7.1km² and has a capacity of close to 24 million m³. The primary water use was intended to be irrigation, but the planned irrigation scheme has largely failed. This will be the primary source of water during the operational phase of the project. It is estimated that 1 m³ of water will be required per tonne of ore processed, thus resulting in the minimum water requirements of 2 million m³ per annum, which is less than 8.5% of the dams volume at full supply level. This requirement of water has been discussed between Twigg (Syrah) representatives and ARA-Norte and the availability has been confirmed (Licence no 07/2012 valid till October 2018). Water will be pumped to site with a pump station located adjacent to the dam via a 13km above-ground pipeline where it will be stored in a raw water storage pond to provide local storage in the event of pipeline maintenance.

Water will be pumped from this pond to a 300 m³ tank at the offices and a second 300 m³ tank located at the accommodation village, to be used in the process plant. These tanks will provide water for general use and for fire water storage for fire fighting. Water will be distributed via a pump and piped reticulation system for general use and to a potable water treatment facility that will make potable water to be stored in a potable water tank, and reticulated for use in the office complex, change houses and tea room.

Process water

Tailings return water is pumped to the process water tank. This is to be used for a variety of process applications. Storm water and a portion of the water used for general washing applications will be collected in process water ponds from where it will be pumped to the process water tank.

Process water will be circulated through the plant in a ring main. Each required take off will be fitted with an isolation valve. The mill discharge, flotation feed, scavenger tails and tailings pumps will have flushing water connected to the suction line. The flushing points will be manually operated.

Reagent mixing water, fire water, sample cutter rinse water and gland service water will be supplied from a raw water tank.

Mine dewatering

The mine is not expected to generate large quantities of water. Water in the mine will be collected in sumps and either pumped into water trucks for dust suppression on the mine haul roads or pumped to the process water pond to be used for processing.

3.5.2 Power

A 33 kV, three phase, single circuit power supply, connected to the national grid, runs near to the mine site. The capacity and reliability of this supply is not confirmed, and it may not have the capacity to provide the entire mine site power requirement. Additionally, as a single circuit supply, the reliability of supply may be unacceptable for the mine sites base load supply. Consequently a back-up, diesel powered supply will be provided. This back-up will be capable of providing 100% of mine site requirements on a continuous basis. High voltage power will be reticulated around the mine with the reticulation voltage to be determined from the results of final power studies.

Usage Area	Connected Load kW	Maximum Demand	Average Drawn Power		
		MVA	kW		
Process Plant	7,813	7.4	5,332		
Mine Infrastructure	100	0.12	103		
Administration &	850	1.05	876		
Village					
Total	8,763	8.54	6,311		

The power supply requirements for the proposed mine site are as follows:

From the above it is proposed to install seven (7) (six in duty and one in standby) 1,200 kW (continuous electrical) rated diesel fuelled generator sets. The following tabulation sets out the expected fuel burn rate and CO_2 generated for the proposed installation. Where practical the available grid power will be used, supplemented by diesel generated power.

Amount of Grid Power Used kW	Amount of diesel generated power used kW	Diesel fuel burn L/h	Diesel fuel burn kL/a	CO ₂ Generated t/a
0	6,311	1,650	13,042	34,430
500	5,811	1,497	11,832	31,236
1,000	5,311	1,370	10,828	28,586
2,000	4,311	1,113	8,797	23,224

A 400 kL diesel storage facility is proposed, made up of 4 x 100,000 l self bunded tanks providing fuel for 7 days operation.

3.5.3 Roads

Mine site roads will consist of the following:

- A partial upgrade of 3km of the road meeting the main road at Piriri and running to Ntete village;
- A new road approximately 2.5 km from the provincial road (No. 242) the mine office, workshop and processing area;
- A new road approximately 2.5 km from the mine office, workshop and processing area to the accommodation village;
- Mine haul road from the Balama East open pit to the ROM pad;
- Mine haul road from the Balama West open pit to the ROM pad;

3.6 Ancillary Infrastructure

3.6.1 Construction and Operation Accommodation

A permanent rural village has been proposed by Syrah Resources, as part of the Balama Graphite mining operations. This village will become an important contributor to the local economy and an opportunity to enhance the welfare and opportunities of many of the local residents. The village will be located on existing rural land in close proximity to the existing Ntete and Nquide villages as well as the proposed Balama Graphite mine. The village will be situated at the base of a 100 m high granite ridgeline. The location and design of the village has been selected based on areas with the least visual impacts and most suitable land in terms of environmental parameters to showcase the best global practices in mine workers' accommodation. Currently an existing gravel road links the Nquide and Ntete Villages with Balama. A new road network is planned to connect the mine to the existing villages as well as the proposed agricultural and rural village. Accommodation at the village

will accommodate approximately 250 people, mainly workers, and will not include families or children. The local production of food will be integrated to supply the local food requirement with the possibility of export.

The village will be structured to include the following:

- A residential area consisting of clusters of living pods;
- A recreational building, gym and barbeque courtyard (serving as an outdoor cinema as well);
- A mess hall, senior staff accommodation and visitor accommodation buildings;
- An administration building (office space, storage space);
- A medical clinic with a small pharmacy;
- A housekeeping area (e.g. laundry, linen stores, cleaning stores and parking house);
- A village hub (e.g. service area, barber shop, hairdresser, stationary store, small grocer, clothing store and guesthouse);
- A soccer field and basketball court adjacent to the hub;
- Bicycle paths running parallel to the main road; and

The construction of the following infrastructure will be required:

- Roads and paths for access (bitumen paved/spray sealed);
- Substation and generating plant;
- Electricity supply;
- Sewerage system;
- Water supply will be via a branch line from the main pipeline from the Chipembe reservoir to the raw water distribution system;
- Small water treatment plant;

Locally sourced materials and labour will be used where possible.

Proposed Balama Graphite Mine in the Cabo Delgado Province, Mozambique



Figure 3.3: Proposed village Masterplan (Source: Equinox, 2013)

3.6.2 Sewage System

The construction and operational phases' workforce of approximately 250 individuals (at peak period) will generate sewage and wash water that will need to be managed.

Table 3.1 shows the summary of the anticipated general sewage and domestic wash water effluent streams associated with the construction and operational phases of the Syrah Balama Graphite project.

Table 3.1:	Anticipated	Wastewater	Streams	Associated	with	the	Construction	and
Operationa	I Phases of t	he Syrah Bal	lama Grap	hite Project				

Phase	Waste Type	Estimated Quantity	Management & Disposal
Construction/ Operational	Sewage / domestic wash water	~5m ³ /day (conservative scenario) and ~40m ³ /day (worst case scenario)	A packaged sewage treatment plant will be utilised for the treatment of sewage and domestic wash water and the treated effluent discharged into the environment during the construction phase. During the operational phase, the treated effluent would be channelled to the process water dam for recycling. Lined Ventilated Improved Pit (VIP) latrines would need to be considered for field
			operations, particularly near the mine pit.

Packaged sewage plant specification

Based on the calculated estimate of generated sewage and domestic wash water during the construction and operational phases of the project, a packaged sewage treatment plant with the capacity of treating $\sim 40 \text{m}^3$ of domestic effluent per day is required for installation.

3.6.3 Landfill Site

The design and construction of the Syrah Balama Graphite general waste landfill site should be in accordance with international best practice as described in EPA (2000), details of which have been provided in the Minimum Requirements for Waste Disposal by Landfill, 3rd ed. (DWAF, 2005).

Mozambique has no specific requirement for the siting, design and construction of a general waste landfill site. According to Article 7(I) of Decree No. 13/2006, of 15 June (Regulations on Waste Management) "All public or private entities carrying out activities related to solid waste management should prepare their waste management plan, prior to entering into business, which should contain at least, information required in Annex I and/or Annex II, in case it is, respectively, a landfill or another waste management operation".

The size of the landfill site depends on the daily rate of waste deposition. To take time and growth into account, disposal sites are classified using the 'Maximum Rate of Deposition' or 'MRD'. This is simply the projected maximum average annual rate of waste deposition, expressed in tonnes³ per day, during the expected life of the site. To calculate the MRD:

³ 1 ton = 1.016tonne. NEMA WA refers to "Ton" while the DWAF 2005b refers to Tonnes. For the purpose of this report 1tonne has been equated to 1ton.

- Establish the 'Initial Rate of Deposition' or 'IRD'. This is the measurement of the existing waste stream in tonnes per day.
- Then, escalate the IRD at a rate that is usually based on the projected population growth for the estimated or design life of the disposal site.
- The maximum average daily rate of deposition, which usually occurs in the final years of the operation, then represents the MRD.

The calculated IRD for the Syrah project is based on the following assumptions:

Construction solid waste = 100kg (0.1 tonnes) / day

Operational solid waste = 100kg (0.1 tonnes) / day

Using the formula MRD = $(IRD) (1 + d)^{t}$

Where

d = the expected (constant) annual increase in the rate of deposition and would usually be based on the anticipated population growth rate. In this case the anticipated population growth will be 1% since the number of employees will not increase throughout the life of the mine.

t = the period or planned life of the site expressed in years. 51 years (including the 8 - 12 months construction phase).

The MRD = $(0.1) (1 + 1\%)^{51}$ = $(0.1) (1 + 0.01)^{51}$ = 0.1×1.66

= <u>0.166 tonne per day</u>

The disposal site size classification according to DWAF 2005, based on the above calculation, is a Communal Landfill Site C with a MRD of <25 tonnes/day.

The estimated total waste disposal to landfill per year = 0.166 tonne/day x 260 d = 43.16 tonnes/yr, and the total waste disposal to landfill during the life of mine = 43.16 tonnes x 51 yrs = 2201.16 tonnes. As such, the total capacity of the proposed landfill should be in excess of 2201.16 tonnes but not exceeding 25000 tonnes.

As ambient climate is the major uncontrollable cause of significant leachate generation at a landfill, a Climatic Water Balance is used as the first step in determining the potential for significant leachate generation. In essence, storm water generation would be expected to be high during the wet season (November to March) and highest in December each year and the site would be expected to generate leachate during this time of year. It is recommended that the proposed landfill site be rated as having potential for sporadic leachate generation and as such the engineering design should include a suitably designed leachate management system. This will include the installation of under-liners, drains and removal system to avert the potential contamination of water resource and in particular, ground water.

A disposal site selection must be undertaken to ensure that:

- The site to be developed is environmentally acceptable and that it provides for simple, cost-effective design, which in turn provides for good operation.
- The site is also socially acceptable.

4. DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

4.1 Introduction

This chapter provides a description of the natural environment that could potentially be impacted by the proposed development. The descriptions are based on the assessments presented by the various specialists who undertook baseline studies for this project. These specialist studies are presented as a separate volume, entitled Part IV: Specialist Volume.

4.2 Physical Environment

4.2.1 Climate

Mozambique experiences predominantly a maritime climate, largely determined by offshore warm waters of the Agulhas current and tropical cyclones which typically pass from the north to the south. Maritime climates generally are fairly humid, accompanied by considerable amounts of precipitation, since the main moisture source is from the ocean.

Annual rainfall follows a strong seasonal pattern, as well as geographical position. Regions north of the Zambezi River are influenced by the equatorial low pressure zone with a north-east (NE) monsoon in the warm season. Regions south of the Zambezi River receive the influence of the subtropical anti-cyclonic zone. Hence, the winds in the northern part of Mozambique are influenced by the monsoon system. Regions of central and southern Mozambique experience the south-east (SE) trade winds.

<u>Rainfall</u>

As shown in Table 4.1 below, the three year (2010-2012) annual total rainfall maximum and average for the Balama site are 1 342 mm and 746 mm respectively. The highest total monthly precipitation (392 mm) was observed in January. The rate decreases down to 6 mm in June. The maximum total rainfall and averages observed for each month over the three year period under survey are depicted in Figure 4.1 below.

Table 4.1: Average monthly precipitation

(Source: Digby Wells Air Quality Assessment, 2013)

Precipitation (mm)	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annul Total
Total Monthly Rainfall (Max).	392	140	232	38	16	6	23	8	103	96	84	203	1342
Average Total Monthly	196	100	121	26	14	5	11	5	52	37	52	127	746



Figure 4.1: Average monthly precipitation

(Source: Digby Wells Air Quality Assessment, 2013)

<u>Temperature</u>

Annual mean temperatures for Balama area are given as 20.1°C. The average daily maximum temperatures ranges from 17.5°C in July to 24.9°C in December, with daily minima ranging from 16.6°C in July to 23.1°C in January (refer to Table 4.2 and Figure 4.2).

Table 4.2: Average monthly temperature

(Source: Digby Wells Air Quality Assessment, 2013)

Temperature (deg °C)	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Monthly Max.	24.2	24.6	21.5	20.6	18.6	18.1	17.5	18.9	20.4	21.5	22.9	24.9	21.1
Monthly Min.	23.1	21.5	21.1	20.2	17.4	17.4	16.6	17.8	18.4	20.4	21.1	20.6	19.6
Monthly Mean	23.6	22.8	18.0	20.4	18.2	17.7	17.0	18.3	19.5	21.0	21.8	23.0	20.1



Figure 4.2: Average monthly temperature (Source: Digby Wells Air Quality Assessment, 2013)

Wind

The spatial and annual variability in the wind field for the Balama site is clearly evident in Figure 4.3. The predominant winds come from the northeast (12.13%), south southeast (12.27) with the strongest and most frequent from the south (13.37). Calm conditions (wind speeds < 0.5 m/s) occurred for 3.9 % of the period.



Figure 4.3: Wind Rose

(Source: Digby Wells Air Quality Assessment, 2013)

Relative Humidity

The annual maximum, minimum and mean relative humidity values are given as 79%, 77% and 79%, respectively. The daily maximum relative humidity remains above 70 % for most of the year (with the months from April to September above 80%, reaching 87% in June and July). The daily minimum on the other hand was 68% (January), with the highest value of 85% observed in the months of June and July. The monthly values observed in relative humidity for the three year period (2010-2012) are depicted in Figure 4.4 below.



Figure 4.4: Average monthly relative humidity (Source: Digby Wells Air Quality Assessment, 2013)

4.2.2 Topography

Mozambique's topography consists of coastal plains, mountains, and plateaus. About 44% of the country are coastal lowlands, and the terrain rises toward the west to a highland that ranges from 150 to 610 metres above mean sea level. In some sections elevations the highlands reach 550 to 910 m, with mountains reaching a height of nearly 2 440 m. Regional topography of the wider Balama project area shows elevations of 200 m above mean sea level, up to 1 440 m.

The local topography of the Study Area is dominated by ground surface elevation which ranges from about 540 m to 678 m above mean sea level, with a NE-SW trending ridge. Elevation declines gradually to the northwest and southeast of the ridge (Figure 4.5).



Figure 4.5: Contour map for the proposed Syrah Balama Graphite Project (the project site is demarcated in red)

4.2.3 Geology and Soils

<u>Regional Geology</u>

Metamorphic rocks of the Neoproterozoic Lurio Group that is included within the Xixano Complex (735 Ma), dominates the project area. These rocks are characterized by ultra metamorphites of granulite to upper amphibolite facies (paragneisses) intruded by high grade orthogneisses while the Xixano Complex is characterized by Neoproterozoic lithologies formed between 820 and 740 Ma. In a western shear zone the Marrupa Complex and the Xixano Complex connect, where the Marrupa Complex overlies the Xixano Complex. In the east the Montepuez Complex is strongly folded, where the Xixano Complex and the Nairoto Complex is separated by a major shear zone. Predominant rock types within the Xixano Complex include calcic, mafic gabbro and diorite and low-K tonalite.

<u>Local Geology</u>

Graphitic, pelitic and psammite schists with a large granitic intrusion in the northeast occur in the proposed Balama site. Other minerals such as vanadium and pegmatites have been found by local artisanal miners. The graphite layer is comprised of a sequence of metamorphosed carbonaceous pelitic and psammitic sediments within the Proterozoic Mozambique Belt (Brice, 2012). The sediments have been metamorphosed to graphitic schists (pelites) and graphitic sandstones (psammites) (Figure 4.6).

Metamorphosed carbonaceous and, in parts, calcareous pelitic and psammitic sediments makes up the graphitic zone. Granite outcrops are evident in the north east of the western portion of the project area. Within these outcrops associated pegmatites occur which together with the granites appear to be intrusive into the schists. It is believed that the metasomatism between these rocks have resulted in the introduction of vanadium and chrome into the mineral assemblage. The foliation and bedding strike and dip appear to be one and the same (i.e. N 50° strike and dip 50° – 60°N).



Figure 4.6: Detailed geological map of the area (Source: Land Natural Resources and Agricultural Assessment, 2013)

Local Soils

Loose graphitic brown soils (with no outcrop) cover flat areas, north and south of a range of hills, where the soil horizon can reach a maximum depth of 7 m. Most of the mining concession is underlain by red loam and sandy loam soils with high clay contents around the Mehucua River. The area where the mining activities will take place varies between medium textured soils in the west to sandy loam soils that are easily eroded located centrally and eastwards (Figure 4.7).

Three exposed soil profiles were assessed as part of the Land, Natural Resource and Agricultural Assessment (CES, 2013). This assessment identified two soil types at the proposed Balama graphite mine site. The first is Red Arenosols, found on the plains and occurring in approximately 80% of the mining concession area. This soil group has a thin brown ochric surface horizon over deep subsoil and consists of sandy soils developed after *in situ* weathering of old, quartz-rich soil material or rock. These soils are highly erodible with low water containing capacity.

The second soil type identified is Leptosols which occur on steep sloped inselbergs. These soil types accommodate very shallow soils over hard rocks. They are found in strongly eroded areas (like steep slopes). The A horizon is thin and has rich organic matter. For this reason, they have haplic characteristics. The pH is expected to be slightly acid.

Soils found on the flat plain areas had an average pH of 6.1 compared to soils on the sloped area which were more acidic, with a pH of 5.1. This is to be expected as the outcrop is of a granitic origin and is considered a more acidic parent rock for soils on these slopes.

Organic matter concentrations were found to differ when comparing soils on the sloped areas to soils on the plains. The low organic humus percentage found in the latter may be due to a high erosion potential combined with traditional agricultural methods (slash-and-burn clearing, incorrect cropping etc.) practiced on the plains.



Figure 4.7: General soil types found within the mining concession area (Source: Land Natural Resources and Agricultural assessment, 2013)

4.2.4 Air Quality

Adequate ambient air quality monitoring data is not available to evaluate the baseline air quality situation. However, dust fallout monitoring results from May 2013 were available for evaluation, and is shown in Table 4.3 below.

Based on the various activities in the study area, the main sources identified as possibly impacting on air quality in the region included, but are not limited to:

- Vehicle tailpipe (exhaust) emissions;
- Domestic fuel combustion;
- Biomass burning;
- Informal refuse burning;
- Charcoal production;
- Slash and burn practices for agriculture
- Fugitive dust emissions from vehicles on roads; and
- Wind erosion of open areas.

For the dust monitoring programme, it was observed that the exposure periods were not consistent, as buckets were exposed for 31 day, 57 days, 34 days and 62 days respectively. This approach did not comply with the American Society for Testing and Methods (ASTM) D1739 – 98 (Reapproved 2010) Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter). As such, the results should be viewed with caution. The dust deposition rates observed for the different monitoring locations are displayed below in Table 4.3. Dust deposition rate is reported for site "*Plant*" for April only, as results for the other months were missing. The reason for the latter is still unclear and presumed to be due to loss of a unit – usually as a result of theft.

Table 4.3: Dust fallout results for the proposed Balama Project Site (2013)

(Source: Digby Wells Air Quality Assessment, 2013)

	DUST LEVELS MEASURED IN MG/M ² /DAY										
Site ID	April (31 days)	May/June (57 days)	July to August (62 days)	September (34 days)							
Camp	70	264	559	588							
Phirira	96	31	349	850							
Nquide	60	26	938	1061							
Ntete	84	363	486	504							
Maputo	65	156	765	685							
Plant	50										

*Exposure period in bracket

PM₁₀, PM_{2.5} and Gaseous pollutants baseline

PM10 Concentration

The Balama Graphite Mine will be an open pit operation employing heavy equipment (i.e. front end loaders, haul trucks and bulldozers). The subsequent crushing and grinding processes will have an effect on ambient air pollution with the release of fine airborne particulates both within and outside the mine project area. Currently, monitors are not in place to establish ambient PM_{10} levels prior to mining in the Balama project area. Once such a monitoring unit is commissioned, data collected will be compared against the WHO guidelines which the IFC subscribes to.

However, in the Air Quality Impact Assessment, emission rates have been calculated and used in the absence of real-time measurement to establish likely PM_{10} level once the mine is operational.

PM2.5 Concentrations

The same discussion as above applies to the monitoring of $PM_{2.5}$ in the proposed Balama graphite project area. The IFC-EHS Guidelines on Environmental Air Emissions and Ambient Air Quality states that – "... impacts should be estimated through qualitative or quantitative assessments by the use of baseline air quality assessments and atmospheric dispersion models to assess potential ground level concentrations".

Since $PM_{2.5}$ baseline data is not available, the Air Quality Impact Assessment was conducted with a dispersion model to assess contributions from the operational phase of the mine. This is crucial for management purposes to ameliorate potential impacts.

Gaseous pollutants

There was no real-time measurement or passive monitoring of gaseous pollutant levels in the proposed Balama mining area. Background levels of gaseous pollutants, such as SO_2 , Ozone, NO_2 , Benzene, and CO will always be critical to determine if the environment is already under stress.

4.2.5 Noise

Based on the daytime results measured at the rural receivers, the general existing ambient noise levels are mostly below the IFC's guideline rating limits (55 dBA) for the maximum allowable outdoor daytime limit for ambient noise in residential districts. Overall the ambient noise levels at the rural receivers are at the level of what is expected of rural villages according to IFC guidelines, the only exception being the Ntete Village during the morning and afternoon, due to the operation of a maize milling machine, near the measurement location at Ntete which caused the average to increase to 69 dBA. The average noise levels, not taking the maize milling machine into account, is 52 dBA. The baseline level at Ntete is set at the lower level of 52 dBA because of the fact that the maize milling machine is not always in operation and thus also falls within the IFC acceptable limits.

The night time noise levels indicate that the ambient night time levels are mostly below the IFC's residential guideline limit (45 dBA). The only exception was at Piriri, however this was due to a Cicada that set itself on top of the windscreen covered microphone and the noise it produced caused the baseline level to measure at 77 dBA, which distorts the more representative baseline level. The more representative level, excluding the Cicada's noise contribution, is 43 dBA which falls within the IFC acceptable limits.

The noise sources that were audible during the baseline measurements at the time of the noise survey and that were responsible for the day/night time levels are summarised in Table 4.4.

(000.000.000.000.000.000.000.000.000.00	,,									
Noise source description										
Day	Duration	Night	Duration							
Maize milling machine at Ntete	Intermittent	<i>Gryllidae</i> (crickets)	Continuous							
Socializing activities	Intermittent	Cicadidae Cicada	Continuous							
Vehicular activities on gravel roads passing through the villages as well as main road passing through Maputo	Intermittent	Vehicular activities on main road passing through Maputo	Intermittent							

Table 4.4: General noise sources during baseline measurements (Source: Diaby Wells Noise Assessment, 2013)

4.2.6 Radiation

To manage naturally occurring radioactive material (NORM) it is recommended that Syrah adopt the NORM guidelines as published by the Government of Western Australia, Department of Mines and Petroleum. As stated in the guideline NORM 1 the purpose of this set of guidelines is to summarise the system of radiation protection as recommended by the International Commission on Radiological Protection (ICRP), International Atomic Energy Agency (IAEA) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The guidelines illustrate how the system of radiation protection may be practically applied in the mining and mineral processing industry and in particular:

- implementing best practicable technology to reduce exposure and contamination levels. For example, ensuring suitable engineering controls are used to the extent feasible;
- classifying employees, work conditions and workplaces on the basis of measured or predicted radiation levels. For example the classification of designated employees, restricted areas, controlled areas and supervised areas; and
- the establishment of contamination levels that trigger radiation protection responses. For example, defining special exposures and setting investigation and reporting levels.

Measurements taken (sampling points shown in Figure 4.8 and Figure 4.9), indicated the levels of radioactivity naturally occurring in radioactive materials. The readings were in the order of 3 to 10 times the background level and generally across the field locations where measurements were taken. One test at location number 35 exhibited a value about 30 times background. Measurements on core samples at the core shed also followed the same trend although one specific piece of core from drill hole BMDD0123 at a depth of 18m exhibited a value about 30 times background.

Calculations based on the field measurements indicate the dosage level encountered by personnel working in these areas will be less than 5mSv per year. The NORM guidelines provide classifications of work conditions and at dosage levels less than 5mSv the work area would be classified as a supervised area. The ARPANSA definition of a supervised area is "an area in which working conditions are kept under review but in which special procedures to control exposure to radiation are not normally necessary". As the project progresses to production, ongoing monitoring will be conducted and any actions and mitigation measures required will be determined by the NORM guidelines.

During a field survey in November 2014 in the region of the proposed camp site, the gamma activity results showed that the maximum radiation level was 291 nSv/h for the entire site. If an occupational exposure of 2000 hours per annum is considered, the workers on the site

will receive a maximum dose of 0.582 mSv/a, which is significantly less than the limit of 20 mSv/a for workers as well as the 1 mSv/a level for the public. Thus the results indicate that the radiological impact in the vicinity of the camp site is negligible taking into consideration the South African safety standards and international regulatory practices for exclusion and exemption.

It should be noted that the higher levels in proximity to the pits have not yet been refuted and thus ongoing monitoring in these regions are still recommended.



Figure 4.8: Radiation sampling points east pit



Figure 4.9: Radiation sampling points west pit

4.2.7 Surface water

The project area lies south of the Ruvuma River in the upper reaches of the Montepuez/Megaruma River catchment area. This area is dominated by seasonal rivers such as the Messalo, Montepuez, Megaruma, Lurio, Mocuburi and Monapo Rivers. Most of these rivers are lined with swamps, with the lower courses of several expanding into long narrow lakes, such as Lake Biribizi on the Montepuez River.

The Mehucua River flows through the southern section of the project site in a south-west to north-east direction. At this point it joins the Montepuez River 25 km downstream of the project site. The Mehucua River has three major tributaries; two of which - the Namiticu and the Naconha rivers - are upstream of the project area, both of which were sampled as part of the aquatic survey. The third tributary joins the Mehucua some distance downstream of the project area. The Namiticu and Naconha Rivers flow parallel to each other, and are both approximately 20 km long from their sources to their confluence, where they join to form the Mehucua River at a point on the southern boundary of the project site (Figure 4.10).

A few small wetlands occur in the project area, the most notable being swampland located approximately 2 km south west of the proposed site and a wetland located approximately 7 km east south-east. The largest water body in the area, but outside of the project area, is the Chipembe Dam which is located 13 km northwest of the site. Completed in 1985 the dam covers approximately 7.1 km² and has a capacity of close to 24 million m³. The primary water use is intended to be irrigation, but the planned irrigation scheme has largely failed (FAO, 2005a). The Mozambique Water Authority is responsible for the management of Chipembe Dam and has confirmed that there is suitable available capacity and allocation for Syrah to obtain over 2 000 000m³ annually for use in the processing of graphite (EBS, 2012).

In situ and ex situ water quality indicated that in general the water quality was good when compared to the various relevant water quality guidelines, specifically the MICOA standard for Category (a) human consumption (Ministerial Diploma of 18/2004).

Aquatic macroinvertebrates were collected using the standard South African Scoring System (SASS5) protocol. The number of aquatic macroinvertebrate taxa ranged from 16 at the Chipembe Dam site to 10 at the Mehucua River site.

The United States Environmental Protection Agency (USEPA) approach to the qualitative assessment of the biotic integrity of a stream was applied to the sample sites. The objective of the Ephemeroptera, Plecoptera and Trichoptera (EPT) Taxa Richness Metric is to provide a baseline for future rapid bioassessments. The percentage contribution of EPT taxa per site showed a range from 2 at the Namiticu River site and at Chipembe Dam, to 5 at the Namiticu River confluence site. and contributed a third of the overall invertebrate assemblage at the Namiticu River Confluence site. The high percentage contribution (> 30%) of EPT taxa to the overall invertebrate assemblage at the Namiticu integrity remains high at this site despite the impacts of riparian zone clearing and associated sedimentation of the river. Also, at the time of sampling, far more habitat structure was available for sampling, potentially accentuating the result unevenly.

Further evidence of the good quality of the catchment in general, was the presence of a number of taxa with lower tolerance to pollution.

In terms of the SASS methodology, three principal indices are calculated, namely the SASS Score, the Number of taxa, and the Average Score per Taxon (ASPT). By dividing the SASS Score by the Number of taxa identified, the ASPT index is calculated. This index provides a reliable measure of the health of a river. Table 4.5 shows the calculated ASPT for each of the sites sampled. The Mehucua River has the highest ASPT and SASS score, largely due to the category taxon (Oligoneuridae), while the Chipembe Dam site had a higher number of taxa and the lowest ASPT, as most taxa found at this site were in the lower, more pollution tolerant, ranges.

	Namiticu River	Naconha River	Namiticu River Confluence	Mehucua River	Chipembe Dam
SASS Score	70	63	89	75	76
No. of Taxa	13	11	15	10	16
ASPT	5.4	5.7	5.9	7.5	4.8

 Table 4.5: Number of taxa, SASS and ASPT scores at the five sample sites

The following conclusions were reached based on the March 2013 survey of aquatic ecosystems:

• In situ water quality indicated that in general the water quality was good. The dissolved oxygen content was slightly lower than expected, but this is in all likelihood due to the turbidity of the water due to the sediment loads present from the recent seasonal rains. The high air temperatures would also reduce the DO concentration in the upper water column, where the in situ measurement probe would rest.

- The moderate/high percentage contribution (25 30%) of Ephemeroptera, Trichoptera and Plecoptera (EPT taxa) to the overall invertebrate assemblage in the general area indicates that biotic integrity remains high despite the impacts of riparian zone clearance and sediment load increases due to local farming practices;
- The relatively low levels of taxon richness measured at all sites can be attributed to the relatively poor habitat availability. This was due to various reasons related to seasonality, including high flow levels and flood damage to marginal vegetation. It is anticipated that the dry season taxon richness may be higher.

Although guidelines for freshwater quality from other jurisdictions may provide some criteria appropriate to Mozambican, it is recommended that Syrah initiate a long-term water quality monitoring programme. This will allow for the development of a site-specific baseline water quality database. This database can then be used to provide a target water quality guideline specific to the Syrah site. Water quality monitoring subsequent to the initiation of mining operations can then be compared to the guideline developed from the baseline monitoring programme. As it is probable that there will always be natural fluctuation in ambient water quality, it is important to establish a mechanism to identify when a parameter is abnormally high rather than slightly elevated. It is recommended that the median values and associated percentiles of exceedance (as recommended in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality – ANZEEC) be used.



Figure 4.10: River systems in and around the project area (Source: Aquatic Impact Assessment, 2014)

4.2.8 Groundwater

The groundwater system of the Mt Nassilala range of hills plays a major role in the regional surface water system as groundwater discharging from the hillside supports perennial flows in streams originating from the mountains.

Groundwater levels in the project area range between 2 meters below ground level (mbgl) at Pirrira BH3 (Balama west) to 33 mbgl in BH8 (Balama east), (Sample sites are shown in Figure 4.11). A plot of all available groundwater level data against borehole surface elevation depicts that the inclusion of BBH2, BBH7 and BBH8 distorts a 99 % correlation to an 81 % correlation. This is indicative of two sets of aquifer systems in the project area: a weathered aquifer and a fractured aquifer system.

Thus groundwater occurrence in the project area is associated with weathered and fractured graphitic schist, granites and pegmatites. The aquifer associated with the weathered bedrock varies in thickness throughout the area, but it can extend to depths of about 40 mbgl. The weathered aquifer is fairly permeable as only minor seepages were recorded in the

weathered material during drilling. The pockets of deeper weathering may allow seepage migrating to the fractured zone aquifer.

Graphitic schist, granites and pegmatites, when not weathered, are impermeable and have no storage capacity. The permeability and the storativity of these rocks are solely dependent on secondary structural features like fissures and fractures. In general fractures close when the lithostatic pressure increases with depth. However, important groundwater flow may occur in fractures accompanying fault zones. The weathered aquifer also appears to be perched on the mountains.

Exploration geology data indicates that 51 per cent of the fractures in the study area occur in the upper 60 m of the geological succession. Up to 27 % of the fractures occur between 140 and 180 mbgl. However a majority of the deeper fractures are unweathered. The fractures in the upper 60 m are mostly moderate to highly weathered. Therefore fracturing is relatively common in the upper 20 m of the fractured aquifer and groundwater flow is well interconnected. At greater depth groundwater flows may be associated with individual disconnected water bearing fractures.

All major water strikes intercepted during drilling were between 40 and 60 mbgl. The major water strikes had blow yields between 0.78 and 9 L/s. Besides the fault gouge at Balama East, all major water strikes were associated with fractured intrusives formations at contact zones.

Eleven boreholes were sampled for baseline assessment and compared against the WHO drinking water guidelines. The results indicated the following:

- Groundwater from water supply boreholes Pirira BH2 and Pirira BH3 are not of pristine quality due to elevated Calcium (153 mg/L) and subsequently TDS (1100 mg/L) values;
- Acid mine drainage (AMD) processes have potentially taken place at boreholes BMRC 005 and BBH7 – low pH and high metal concentrations were recored;
- The only common heavy metals that have been significantly mobilised are iron, manganese, nickel and zinc;
- Although all major and minor ions in BBH1 are within guideline values, its alkalinity has been depleted.
- BBH6, BBH8, Camp BH1, and Pirira BH1 have clean water (based on measured concentrations) with acceptable calcium-magnesium-bicarbonate signatures; and
- The chloride enrichment in Pirira BH2 is associated with seepage from the sewage disposal at Pirira village.



Figure 4.11: Groundwater sampling site

4.2.9 Geochemistry

A geochemical baseline study was undertaken to investigate the potential formation of acid rock drainage and metal leaching from different types of bedrock found in the mineralized areas of the Balama Graphite ore body. Nine (9) rock samples (selected and provided by the client) were submitted for geochemical evaluations to determine the acid mine drainage (AMD) potential and risk of contaminants leaching into solution from both the graphite and the waste rock. These 9 samples were taken from 3 boreholes (3 samples per borehole) representing the pit areas that will be mined based on the pit layouts and mining plan at the time of sampling. The overburden and underburden from each borehole was tested to represent the mineralogy and constituents of the waste rock material. The third sample in each borehole was taken from the graphite zone. Samples were tested using the XRD method (measurement of the crystal structures to determine the mineralogical composition). the XRF method (determination of the elemental composition of a material), the ABA method (measuring the acid- and alkaline producing potential of undisturbed soil and rock overburden) in order to determine if, after disturbance, the waste material will produce acid and subsequently leach metals. NAG tests, which evaluate the Net Acid Generation and neutralising potential of the material, and Synthetic Precipitation Leachate Procedure (SPLP) tests were also done to simulate the heavy metal and anion leachate potential of soils and waste material left in-situ under normal conditions with only rain water allowing leaching to occur.

The geology of the sampled material is extremely rich in metals and various other elements. The XRD and XRF tests revealed that the waste rock and graphite material are not homogenous in nature and that a combination of a wide range of oxides and metals form the rich mineralogy of the deposit. These tests identified the main oxides present as SiO_2 , Al_2O_3 and Fe_2O_3 with smaller amounts of MgO, CaO, K_2O and MnO. Clay minerals, with high concentrations of K, Mg, Al, Fe and Mn, were found to dominate the waste rock mineralogy. Other major silicate minerals such as microcline and plagioclase were also present in the waste rock. The high pyrrhotite content in the waste rock can lead to oxidation reactions and the formation of AMD. The mineralogy of the Graphite ore body is dominated by a quartz based metamorphic sequence with traces of clay minerals. The high concentrations of Mn, Mg, Fe, SO4, K, Zn, Al and Ca elements in the samples could potentially leach from the material.

The test analyses have revealed that almost all common metal concentrations found in the samples (Au, Ag, As, Ba, Fe, Cu, Cr, Zn, U, Co,Cs, Mo, Ni, V, W, Y and Pb) are above the global average crustal concentrations (Table 4.6). Even though these metals are much higher than normal most of them do not pose a significant health risk and are not mobile under normal aquatic and atmospheric conditions. The current pH of the groundwater system at Balama is close to neutral, with some boreholes close to pits and trenches having a more acidic pH due to oxidation processes. As pH affects the rate of metal dissolution and their mobility in groundwater it is important to note that once the graphite is mined and exposed to oxygen, AMD formation is a possibility because of the high Sulphur content observed in the ABA results. A drop in pH will result in the mobility of most metals which can lead to environmental risks. The main elements to highlight are Zn, Pb, Ni, U, As, Fe and Cu.

The ABA and NAG results revealed that the Sulphur (S) content for all the tested samples were above the margin concentration of 0.3% S with the exception of BMD009HW and BMD012HW being below 0.01%. This means that the tendency for acid generation in the samples that were above 0.3% is higher than in the other samples, if the Net Neutralising Potential (NNP) is below 0. All the samples are classed as rock type 1 (potentially acid forming) with the exception of boreholes BMD009HW and BMD012HW, which has a low

Sulphur content and a high neutralising potential. The paste pH values of the waste rock material (overburden and underburden) are all above 8 with the exception of borehole BMD022HW, which has a slightly acidic paste pH of 5.3. The mineralised material were found to have a neutral paste pH, with only BMD009MZ showing an acidic formation.

The SPLP test results were classed against the South African drinking water standards to quantify the quality of any leachate produced from the test samples (waste rock and Ore material). The SPLP tests are a leachate procedure in which the contaminants that can potentially seep into the groundwater and surface water reserves from waste facilities and stockpiles can be determined. The bio-availability of the elements is thus evaluated.

The total elemental analysis indicated the total amount of metals present in the samples available for dissolution and seepage, the SPLP results will however show the amount that will leach from the solid state into fluids as water recharges through stockpiles and waste facilities. When the concentrated seepage does reach the receiving environment (groundwater or surface water) the concentrations will however be diluted to levels most probably below any levels potentially posing risks.

The quality of the leachate was classed against the SANS 241:2005 drinking water guidelines, as well as WHO drinking water guidelines to evaluate its suitability for human consumption and the potential for contamination; should leachate reach and mix with local water resources. WHO guideline values were only used where the SANS guideline do not give criteria for that specific parameter. SANS 241:2005 identifies 3 classes namely Class 1 (recommended operational limit), Class 2 (maximum allowable concentration for limited duration) and Class 3 (Not recommended for human consumption).

The metals found to be above the recommended drinking water guidelines, but within the maximum allowable limits were Ca, Co, Cr, Mn, Se and Zn. However AI, Cd, Fe, Cu, Ni, V and U were found to have concentrations well above the allowable drinking water limits and are cause for concern as these pose both a human health risk and environmental impact risk. All other metal concentrations that were identified were found to be within the limits and will thus have no environmental or health risk.

Based on the results of the Geochemistry assessment discussed above, it is evident that material representing the waste rock as well as the ore body has samples that could potentially generate acid drainage. The waster rock dumps and tailings storage facility has a moderate potential for AMD due to the high Sulphur content and acid generation potential in the samples that were tested. The high concentrations of U, Sr, Se and Rb in the graphite zone were also found to be potentially radioactive posing a health risk. Potential trace element contamination is also possible from the waste rock dump due to the high concentrations of Mn, Fe, Ni and U identified in the waste rock samples. The ore material has a high potential for AMD formation due to the high Sulphur concentrations and low paste pH levels, which could result in leachate water with a low pH and high metal content. Trace element contamination risk from stock piles and exposed ore zones with a high potential of metal contamination with concentrations of Al, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U entering the receiving environment were identified and the high concentrations of U, Sr, Se and Rb in the graphite zone were also found to be potentially radioactive posing a health risk.

 Table 4.6: Whole rock chemistry results summary (concentration in ppm)

 (Source: Digby Wells Geochemistry Assessment)

		Hanging wall				Footwall		Mineralised zone		
									1	
Element	Upper Crustal Averages	BMD009HW	BMD012HW	BMD022HW	BMD009FW	BMD012FW	BMD022FW	BMD009MZ	BMD012MZ	BMD022MZ
Ag	0.05	0.03	0.08	0.12	0.12	0.08	0.05	0.04	0.04	0.08
AI	80400	31955.5	41428.9	52506.0	58586.9	44302.7	39746.0	25001.3	21428.9	31124.6
As	1.5	5.35	2.66	1.10	1.06	0.86	0.74	0.79	1.05	0.84
Au	0.0018	0.02	0.01	0.02	0.09	0.02	0.02	0.02	0.01	0.03
В	15	5.3	2.0	6.1	8.1	3.6	6.9	0.1	0.1	54.0
Ва	550	631.0	1980.0	1010.0	1648.0	2437.0	2021.0	1224.0	104.0	758.0
Be	3	1.7	1.5	1.8	2.1	1.6	1.7	1.0	0.6	2.8
Bi	0.127	0.2	0.1	0.3	0.4	0.3	0.2	0.3	0.1	0.5
Ca	30000	472.5	532.5	5411.0	5039.3	3783.4	8670.5	1732.0	39914.2	58098.6
Cd	0.098	0.4	0.7	5.4	4.7	3.0	2.5	16.8	15.2	12.9
Ce	64	30.9	35.6	1.6	7.8	2.3	15.7	3.6	50.3	59.9
Co	17	37.1	33.3	28.5	100.9	62.7	59.3	72.0	77.8	44.2
Cr	85	475.0	133.0	497.0	417.0	415.0	337.0	188.0	221.0	326.0
Cs	4.8	3.8	3.9	14.1	11.1	7.3	21.8	2.0	0.5	6.6
Cu	25	238.0	127.0	242.0	167.0	147.0	156.0	224.0	115.0	191.0
Fe	35000	95640.0	43670.0	42380.0	46100.0	23320.0	23430.0	21920.0	9749.0	27040.0
Ga	17	10.3	9.5	9.5	12.4	9.0	7.3	6.0	4.2	6.3
Ge	1.6	0.8	0.4	0.5	1.1	1.0	0.8	1.2	1.6	0.8
Hf	5.8	2.1	4.5	4.5	7.3	4.6	3.2	2.2	1.6	2.9
Hg	0.09	0.14	0.14	0.28	0.38	0.27	0.33	0.70	0.55	0.78
Но	0.8	0.27	0.28	0.10	0.21	0.19	0.89	0.28	2.20	2.00
lr	0.00002	0.09	0.09	0.07	0.08	0.08	0.06	0.07	0.07	0.04
к	28000	3426.9	8305.6	17367.1	18546.5	14510.0	18164.5	1711.8	58.1	8218.4
La	30	10.6	14.0	1.7	4.5	1.9	5.6	3.3	28.1	25.2
Li	20	8.0	9.9	32.1	31.9	21.0	33.5	10.0	2.2	15.4
Mg	13300	546.4	1131.3	7680.7	10915.7	4030.1	4241.6	755.4	279.5	7241.0
Mn	600	313.5	143.7	134.3	249.1	169.4	98.7	74.2	94.8	198.8
Мо	1.5	122.4	90.3	39.9	45.5	28.1	36.2	100.8	252.9	114.1
Na	28900	251.9	539.6	4124.1	5710.7	3221.7	2519.7	195.1	36.8	1535.0
Nb	12.5	2.9	2.3	1.1	33.5	4.9	2.9	4.6	3.3	5.7
Nd	26	22.5	27.3	4.3	9.7	4.9	14.4	6.9	52.0	50.6
Ni	50	170.0	105.0	469.0	456.0	266.0	397.0	916.0	558.0	746.0
Pb	16	23.1	8.9	9.3	19.1	8.0	10.2	16.9	19.1	23.7
Rb	112	48.6	56.0	120.8	139.5	62.5	87.3	9.8	6.5	92.3
Sb	0.2	0.6	0.4	2.3	0.2	0.1	0.5	0.2	0.1	0.6
Sc	13	23.2	14.2	10.4	14.2	10.3	11.6	13.0	9.9	5.7

			Hanging wall			Footwall			Mineralised zone	9
Element	Upper Crustal Averages	BMD009HW	BMD012HW	BMD022HW	BMD009FW	BMD012FW	BMD022FW	BMD009MZ	BMD012MZ	BMD022MZ
Se	50	0.2	0.9	1.7	1.9	1.1	1.0	0.8	1.2	1.3
Si	308000	272931.3	288592.8	268864.0	251192.1	309864.4	312529.2	253015.4	234174.8	210144.9
Sn	5.5	3.0	2.1	3.6	2.2	4.1	2.2	2.7	1.6	15.7
Sr	350	51.3	89.0	82.6	140.0	109.6	139.4	61.1	61.5	299.5
Та	1.1	0.4	0.4	0.2	6.6	0.8	0.5	0.5	0.4	1.2
Th	10.7	13.2	4.9	0.5	6.2	0.6	2.3	0.6	3.1	5.2
Ti	3900	1733.5	2911.4	3846.7	4917.4	2669.5	2574.9	1666.5	1162.9	1571.9
ТІ	0.75	1.5	2.8	7.4	5.2	2.5	9.1	1.5	2.2	3.5
U	2.8	21.6	14.1	14.4	28.2	9.6	13.6	36.2	85.4	46.9
V	110	2094.0	1072.0	942.0	1001.0	459.0	667.0	3050.0	2982.0	2634.0
W	2	199.4	226.2	184.9	527.1	452.7	424.0	200.0	388.8	278.2
Υ	22	5.9	7.4	2.0	5.4	4.8	14.0	8.5	93.9	74.7
Zn	71	380.0	332.0	1247.0	773.0	690.0	505.0	4917.0	546.0	2962.0
Zr	190	113.4	172.5	160.2	248.8	172.2	140.7	119.1	81.1	121.0

4.3 Biological Environment

4.3.1 Vegetation

Vegetation Types in Mozambique

The vegetation of Mozambique and the Cabo Delago Province specifically has very little detailed and published information available. Descriptions by Wild and Barbosa (1967) and a biogeographical survey by White (1983) are currently the most reliable sources of vegetation information. The above literature largely describes plant formations on a broad landscape level, but provides very little information on the communities found within the major vegetation types.

Eight broad vegetation types have been described and mapped for Mozambique (MICOA, 2009). Miombo Woodland is the most widespread, dominating in the north and centre of the country followed by Mopane Woodland which occurs in the southern and northern parts of the country. The third most widespread vegetation type is Undifferentiated Woodland which covers extensive parts of the south, central and northern portions of the country. The remaining vegetation types include Afromontane Elements, Coastal Mosaics, Halophytic Vegetation, Mangroves and Swamp Vegetation. According to the Broad Vegetation map of Mozambique (After White, 1983 in MICOA, 2009), the vegetation of the proposed project site is classified as Miombo Woodland.

Miombo Woodland covers almost three million square kilometres in southern, central and east Africa (Smith 2000). Despite this broad and extensive range, the World Wildlife Fund (WWF) has listed this vegetation type as Vulnerable. Miombo woodlands range from completely deciduous to almost evergreen vegetation but are mostly semi-deciduous in nature (White, 1983). Miombo tends to show resistance to fire, but cannot survive repeated fire events (White 1983). Natural stress and drought are important factors in the growth of Miombo (Chidumayo 1991) as well as its fruiting potential (Chidumayo, 1997). This vegetation type is characterized by nineteen (19) dominant species of *Brachystegia* and three (3) other species namely *Julberbernadia globiflora, Julbernadia paniculata* and *Isoberlinia angloensis* (White, 1983). The following species occur within this vegetation type and reach canopy height: *Afzelia quanzensis, Anisophyllea pomifera, Erythrophleum africanum, Faurea saligna, Marquesia macroura, Parinari curatellifolia, Pericopsis angolensis* and *Pterocarpus angolensis*. Included are a few species of *Uapaca* and *Monotes*, which tend to be about 10m tall (White, 1983).

Miombo Woodland can further be divided into two classes; namely Wet Miombo and Dry Miombo, generally separated by the 1100 mm mean rainfall isohyet (Chidumayo 1987). The vegetation assessment suggests that the project area occurs within the drier Miombo type which can be defined by the following characteristics:

- Rainfall is less than 1000mm.
- Canopy height usually less than 15m.
- Floristically poor.
- Brachystegia floribunda absent or very localized.
- Brachystegia spiciformis, Brachystegia boehmii and Julbernardia globiflora are often the only dominants present.
- Associates in rocky places include many species which otherwise occur in deciduous forest and thicket or other dry types.
- Associated vegetation includes dry deciduous forest and thicket, deciduous riparian forest, and dry dambos.

Site specific vegetation types

A fine scale assessment of the site identified two main vegetation types namely Miombo Woodland and Riparian Woodland (Figure 4.12). The Miombo Woodland is further split into three types based on their species composition - Miombo Wodland Graphite, Miombo Woodland Granite and Miombo Woodland Plains (disturbed / intact). For the purpose of the site specific vegetation assessment the definition of woodlands, as described by Palgrave et al. (2007), has been adopted: "Woodlands are open stands of trees at least 5 m tall with crowns that cover at least 20% of the surface and are not interlocking. Grass cover is usually present".

Riparian Woodland

The Riparian Woodland is entirely restricted to a narrow band of a few metres, adjacent to the rivers and streams, throughout the Balama Graphite project area. In most cases, the riparian woodland is absent or highly degraded (Figure 4.12; Plate 4.1). The narrow strips of riparian trees were difficult to detect on the aerial imagery, limiting accurate mapping of this vegetation type. The dominant species in the intact areas are *Brachystegia boehmii*, *Albizia adianthifolia, Grewia forbsii, Combretum sp., Tabernaemontana elegans* and *Xylotheca kraussiana* (Plate 4.2) (see Vegetation Assessment for all species found in this habitat).



Plate 4.1: Riparian Woodland



Figure 4.12: Vegetation map of the project site



Plate 4.2: Dominant species found in the Riparian Woodland *A) Brachystegia boehmii. B) Grewia forbsii, C) Albizia adianthifolia D) Xylotheca kraussiana* flower and *D) Xylotheca kraussiana* fruit.

Miombo Woodland

Miombo Woodland is found throughout the project site in varying states of degradation and transformation. Further analysis of the survey data indicates that this vegetation type can be

further divided into three distinct vegetation types based on their species composition. These are described in detail below and their distribution is illustrated in Figure 4.12.

Miombo Woodland: Graphite

This vegetation type is found on the slopes of the inselberg Mount Nassilala and is strongly associated with the underlying graphite. It is characterised by a closed canopy with a distinct grass layer beneath (Plate 4.3). It is interspersed with fairly large patches of bamboo (*Oxytenanthera abyssinica*) which appear to be invasive and may become a problem if left unchecked. Dominant species include *Securidaca longipedunculata, Bauhinia galpinii, Milletia stuhlmannii* and *Cussonia arborea,* with a notable absence of *Brachystegia* species. *Diplorhynchus condylocarpon* was dominant in areas that had been recently disturbed by harvesting. During the dry season it was noted that large trees were being harvested on Mount Nassilala for construction materials. The vegetation on this inselberg therefore provides an important ecosystem service to the surrounding villages.



Plate 4.3: Miombo Woodland (on the hill slopes) associated with the graphite deposit

Miombo Woodland: Granite

This vegetation type predominates on the granite intrusion Mount Coronge (Plate 4.4). The dominant species include *Cussonia cf arborea*, *Sterculia appendiculata* and *Milletia stuhlmannii*. Other species include *Combretum molle* and *Steganotaenia araliaceae*.



Plate 4.4: Miombo Woodland (on the hill slopes) associated with the granite intrusions

Miombo Woodland: Plains

This vegetation type predominates in the flat areas surrounding the inselbergs. It is largely secondary woodland, having been transformed by agricultural practices. Patches of degraded woodland occur along the road from Pirira village to Chipembe dam and within the project site.

However, a significant patch of intact woodland was found to occur east of Nguide village (Plate 4.5). It is unclear why this woodland has not been transformed and planted by the local community but it is highly probable that this is a sacred site.

Dominant species in the intact areas include Gardenia resiniflua, Ficus sp. Antidesma vernosum, Brachystegia boehmii, Brachystegia bussei and Strychnos madagascariensis.

Dominant species in the degraded areas include Securidaca longipedunculata, Bauhinia galpinni, cf Dovyalis sp., Pseudolachnostylis maprouneifolia, Milletia stuhlmannii and Antidesma vernosum.

80


Plate 4.5: Intact woodland found in the flat plains near the Nquide village



Plate 4.6: Example of typical agricultural fields with a single Baobab tree

Agricultural Land

Large sections of the plains have been cleared for the cultivation of crops such as maize, cassava, beans and cotton. Despite the majority of tree species being cleared it was noted that there were numerous Baobab trees (*Adansonia digitata*) and Tall Star Chestnut trees (*Sterculia appendiculata*) that had not been removed (Plate 4.6). These trees are either too large to remove or they serve a functional purpose such as a source of shade or in the case of the baobab trees, as a source of food. They could also have spiritual significance to the local communities.

Vegetation Distribution

Twenty percent of the project site is comprised of degraded *Miombo Woodlands: Plains* (Table 6-1 and Figure 6-3). *Agricultural areas* and *Settlements* make up a further 65.8% of the project area. The Miombo Woodlands associated with the granite intrusions and graphite deposits (i.e. the vegetation that occurs on Mount Coronge and Mount Nassilala) collectively make up 12.4 percent of the vegetation in the project area.

Figure 6-3 illustrates the distribution of each vegetation type throughout the project area. The *Miombo: Graphite* vegetation is found on Mount Nassilala and the eastern portion of Mount Coronge. The *Miombo: Granite* vegetation can be found on the western portion of Mount Coronge. The *degraded Miombo Woodlands: Plains* is found in patches throughout the flat, low-lying areas and is surrounded by agricultural land. There was only one small patch of *intact Miombo Woodlands: Plains*. This occurs to the east of Nquide village.

The vegetation type that will be most heavily impacted by the proposed mining infrastructure (excluding roads) is the *Miombo Woodland: Graphite.* 7.8% of the total area of this vegetation type will be lost during the mining process. The second most impacted vegetation type is the degraded *Miombo Woodlands: Plains* with a loss of 1.4% of this vegetation type. 1% of the *Miombo Woodlands: Granite* will be lost. The intact *Miombo Woodlands: Plains* will not be directly impacted by the mining operation. Although not included here, riparian vegetation will be impacted by infrastructure such as roads. Although not a "vegetation type" it is worth noting that 13.0% of agricultural land will be directly impacted.

Vegetation Type	Total Area (Ha)	% of Project	% of veg type	
		Area	Impacted	
Riparian Woodland	56	0.7	0	
Miombo Woodland: Graphite	824	10.5	7.8	
Miombo Woodland: Granite	149	1.9	1.0	
Miombo Woodland: Plains –	1561	10.0	1 /	
degraded	1501	19.9	1.4	
Miombo Woodland: Plains - intact	91	1.2	0	
Agriculture	4840	61.6	13.0	
Settlements	332	4.2	0	
TOTAL	7 853	100	0 1	
	(Mapped Area)	100	J. I	

Table 4.7: Total Area of Each vegetation type and the area that will be di	rectly
impacted	-

Floristic Diversity

Historically, vegetation surveys in Mozambique have been limited. However, there has been an increase in the last 20 years with specific areas of interest being targeted. These include protected areas (such as national parks and reserves), centres of endemism and suspected biological hotspots. From these surveys, it is estimated that over 5 500 plant species have been recorded in Mozambique although the actual number of species is likely to be much higher (MICOA, 1997 and 2009). Of these 5 500 species, 177 species are endemic and 300 occur on the Mozambique Red Data List (MICOA, 2002).

Based on habitat distribution it is possible that nine vulnerable species listed on the Mozambique Red Data List could occur in the project site. These are listed in Table 4.8 below.

Species	Status	Endemism
Adenia mossambicensis	Vulnerable	Endemic
Cassipourea obovata	Vulnerable	Endemic
Combretum stocksii	Vulnerable	Endemic
Dichapetalum zambesianum	Vulnerable	Endemic
Grevea eggelingii	Vulnerable	Near-Endemic
Hexabolus mossambicensis	Vulnerable	Possible Endemic
Homalium mossambicensis	Vulnerable	Endemic
Maerua andradae	Vulnerable	Endemic
Viscum littoreum	Vulnerable	Endemic

 Table 4.8: Vulnerable Plant Species that could occur in the project site

Many of the identified endemic species and rare and threatened habitats are associated with isolated inselberg's such as the Chiperone and Namule hills, Mecula and Gorongosa Mountains and Chimanimani massive. While these areas are recognised as areas of floristic endemism, many more inselberg's are yet to be documented in the country (MICOA, 2007). Two inselbergs were identified on the project site, both being relatively intact compared to the surrounding vegetation. However neither of these can be described as critical habitats, as defined by the IFC Performance Standard 6, from a floral perspective since they do not contain critically endangered and/or endangered species, and neither of them are habitats of significant importance to endemic and/or restricted range species. Neither of these inselbergs can be classified as highly threatened or unique ecosystems and they are not associated with key evolutionary processes. While these habitats are not classified as critical habitats they have been classified as natural habitats using the IFC definition *"areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition."* (IFC, 2012).

Based on the species identified on site (Total number of 111 species identified) the following was concluded:

- No species of special concern appear on the IUCN (2012) list.
- One exotic species is listed as data deficient and 25 species are likely to be classified as Least Concern since no species within their family occur on the list. There is no information available for the remaining 46 species.
- According to the Mozambique Red Data List (2002), one species (*Sterculia appendiculata*) is considered "vulnerable" as a result of over exploitation for firewood, timber and local construction
- One CITES species, from the Orchidaceae family, appears in Appendix II. This species is not necessarily threatened, but is controlled in terms of international trade whereby CITES controls international trade of certain species i.e. all import, export and re-export of CITES species has to be authorised through a licensing system

- No species appear on the Tanzanian, Zimbabwean, Zambian or Malawian Red Data Lists
- No Alien species were identified on site. However, mango trees were prevalent in the flat plains near the villages, in amongst the cultivated lands. Bamboo (*Oxytenanthera abyssinica*) was also noted to occur in the woodlands, particularly the degraded woodlands at the foot and on the slopes of Mount Nassilala. Although this bamboo is indigenous to the region, it could become invasive, especially in disturbed areas where they regenerate and disperse rapidly from seeds and form impenetrable stands that prevent other species from establishing. It was noted that local communities avoided planting in areas previously covered by bamboo, possibly due to the extensive root system which is difficult to remove without machinery.

In terms of ecological sensitivity (Figure 4.13), a large portion of the project area had been cleared for agricultural crops such as cotton, maize and cassava, resulting in these areas having a low sensitivity as they have been transformed through anthropogenic activities and are highly degraded. Areas of natural vegetation, such as the degraded Miombo Woodland: Plains, were assigned a medium ecological sensitivity as they still have a relatively high species richness and form important ecological process areas for small mammals and birds in the area. These areas can withstand a limited loss of, or disturbance to, natural areas.

Areas of high sensitivity were assigned to the Miombo Woodland: Granite and Miombo Woodland: Graphite, the intact Miombo Woodland: Plains and the Riparian Woodland. These vegetation types were assigned a high sensitivity score as these areas are all relatively intact and have high species diversity. They also contain species of special concern such as *Sterculia appendiculata* (listed as Vulnerable on the Mozambique red Data Lists). A number of these species were noted to occur on the slopes of the Granite Inselberg (Mount Coronge). Although highly degraded in most parts, the Riparian zone was assigned a high sensitivity score as it is an important process area for ecosystem functioning. It also scored a high biodiversity value.



Figure 4.13: Ecological Sensitivity map of the Project area (Source: Vegetation assessment, 2013). Note: SP – Stock pile; LG – Low Grade.

4.3.2 Fauna

<u>Amphibians</u>

Although the faunal surveys did not occur at the beginning of the amphibian breeding season, many amphibians were still breeding and a good sample of the known and possible amphibians occurring the region was obtained. Only two problematic amphibians were obtained. One small reed frog was assigned to *Hypeolius acuticeps* of the *Hyperolius nasutus* complex (Channing *et al.* 2013), although this is based on geographical location and was not confirmed by vocalisation of genetic analysis. The other was a small puddle frog, provisionally assigned to the *Prhynobtrachus* cf. *perpalmatus* complex.

Most of the observed amphibian fauna are characteristic species of wetlands in the lowlands of northern Mozambique, from which 25 species are recorded and a further 13 species are possible. Two amphibians collected in the region, *Hyperolius acuticeps* (previously *H. nasutus*) and *Ameitia quecketti* (previously *A. angolensis*) remain of problematic status as both belong to groups that have recently undergone taxonomic revision (Channing et al. 2013 and Channing & Baptista 2013, respectively), and assignment of material from northern Mozambique is only provisional. No amphibians in the Balama region are endemic or of conservation concern. No amphibians are endemic to northern Mozambique.

There is no evidence of significant direct utilization of amphibians in the region, either for international trade or for food consumption. Amphibian threats are thus indirect, of which the most significant is habitat loss due to existing agricultural practises. This may be exacerbated by future industrial developments in the region, of which the proposed mine forms part. Increasing habitat fragmentation from land clearance or degradation resulting from agriculture or industry, can lead to secondary impacts, including road mortalities and exposure to predators as amphibians move to and from wetland breeding sites.



Plate 4.7: An array of amphibians which were recorded during the site visit (Top: *Arthroleptis stenodactylus, Chiromantis xerampelina.* Bottom: *Amietophrynus gutturalis, Amietophrynus maculatus*)

<u>Reptiles</u>

Of the potential 87 reptiles that may occur in the Balama region, only 20 were recorded during the survey. A further eight large or conspicuous species, namely Southern Rock Python *(Python natalensis)*, Spotted bush snake *(Philothamnus semivariegatus)*, Mozambique spitting cobra *(Naja mossambica)*, black mamba *(Dendroaspis polylepis)*, green mamba *(Dendroaspis angusticeps)*, tree agama *(Acanthocercus branchi)*, and Eastern hinged tortoise *(Kinixys zombensis)*, were reported by mine personnel and local villagers to be present. Most reptiles documented on site were conspicuous diurnal lizards, with relatively few snakes observed or captured. Although snakes form the dominant component of reptile diversity in the region (48, 52%), they are mainly small, cryptic and nocturnal and therefore easily overlooked. Although only six snakes were collected during the survey, numerous additional snakes (15-20) are likely to be present in the various habitats on site. Two of the snakes collected (Puff adder and southern burrowing asp) are venomous and are commonly responsible for snake bites in East and Southern Africa.

One lizard of scientific interest was collected during the survey. A series of small, snakeeyed skinks (*Panaspis* cf *wahlbergii*) were collected beneath cashew trees near Nquide village. Molecular analysis of similar material collected near Lishinga indicates that a new species occurs in northern Mozambique. It is unlikely that this new species, which already appears to have a relatively wide distribution, will be of conservation concern although it may be endemic to Mozambique.

Five Mozambican reptiles are listed as threatened in the IUCN Red List (2012); all are sea turtles found at the coast. These will not be impacted in any way due to the development. No other formally recognized threatened (IUCN 2012) reptiles were recorded in the region. Only one Mozambique reptile (the Zambezi soft-shelled terrapin, *Cycloderma frenatum*) is listed in the `Near Threatened' category of the Red List (2012), but no suitable habitat for the species occurs in region, although it is common in Lake Niassa and the Rovuma River. A number of non-threatened species in the region (e.g. the Flap-necked Chameleon, *Chamaeleo dilepis*), monitor lizards (*Varanus niloticus* and *V. albigularis*), a girdled lizard (*Cordylus tropidosternum*), tortoises (*Kinixys spekii, K. zombensis* and *Stigomochelys pardalis*) and Nile crocodile (*Crocodylus niloticus*), are involved in international trade and are listed on CITES Appendix 2 that controls and documents their numbers in international commerce.

Endemicity in Mozambique reptiles is surprisingly low, with only approximately 14 taxa endemic to the country, most being associated with isolated populations on the various offshore islands of the Bazaruto Archipelago. Two new species have also recently been described from isolated montane habitats in northern Mozambique (Branch & Bayliss 2009, Branch & Tolley 2010), with additional new species being described (Branch *et al.* in press). Although these taxonomic novelties are associated with montane isolates, a new burrowing skink has also been discovered north of Pemba in the coastal region of northern Mozambique (Verburgt & Broadley in press). The unusual snake-eyed skink recorded during the faunal surveys indicates that additional new species may even occur in the Balama region.

As with amphibians, there is no evidence of significant direct utilization of reptiles in the region, either for international trade or for food consumption. However, all snakes are treated as dangerous and are usually killed when discovered by local inhabitants; this despite the majority of snakes in the region being non-venomous and thus harmless. Interviews with local inhabitants and mine personnel confirmed that snakebites in the region were rare, and usually non-fatal (albeit with pain and occasional morbidity). No tortoises were observed in the wild during the survey, although an adult leopard tortoise (*Stigmochelys pardalis*) was offered for sale by local villagers. It was refused, but was not released as it was retained by

its captors for eating. Tortoises are known to be readily collected for food by local communities (Lindsey & Bento 2010), and their numbers may be very low or even locally extirpated due to local consumption.

The most significant threats to reptiles are indirect, and result mainly from habitat loss due to existing agricultural practises. Proposed industrial developments in the region will compound this threat, especially from the resulting habitat fragmentation that leads to elevated mortality from road traffic and exposure to predators as reptiles (particularly tortoises, snakes and monitors) move over the landscape.

Adult Nile crocodiles (*C. niloticus*) are the most important dangerous reptiles in the region. Crocodile encounters in the dam on the Chipembe River pose a serious threat, with three attacks (two fatal) reported in 2012 (pers. comm. Christian Nyaundi, Digby Wells).

There are numerous venomous snakes in the region, including black mamba (*Dendroaspis polylepis*), green mamba (*D. angusticeps*), several cobras (Mozambique spitting cobra, *Naja mossambica* and the forest cobra, *N. melanoleuca*), the Puff adder (*Bitis arietans*), the snouted night adder (*Causus rhombeatus*), the boomslang (*Dispholidus typus*), the twig snake (*Thelotornis mossambicanus*), and the southern burrowing asp (*Atractaspis bibroni*). All, except the latter and the snouted night adder have venoms capable of causing death and therefore represent important clinical concerns. Despite this, only a few (about 3 a year) snakebites were reported locally, with no recent fatalities (pers. comm. Christian Nyaundi, Digby Wells).



Plate 4.8: An array of reptiles recorded during the site visit (Top: *Trachylepis varia*, *Panaspis wahlbergii*. Bottom: *Trachylepis margaritifer, Hemidactylus platychephalus*)

<u>Birds</u>

Of the possible 300+ bird species which may occur in the study area, 133 were observed during the wet season survey. The number of birds recorded is to be expected for a short-term survey, especially as it is likely that many intra-African and Palaearctic migrant birds had already departed at the time of the field trip.

The majority of the recorded species were typical residents of Miombo woodland and secondary woodlands in agricultural landscapes, which are the dominant habitats on site. Typical species included: black-headed oriole, black-backed puffback, black-crowned tchagra, spotted flycatcher, neddicky, tawny-flanked prinia, flappet lark, and broad-tailed paradise-whydah. Other species well represented in secondary clearings and grassy areas near rivers, included: black-winged bishop, yellow bishop, white-winged widowbird and Red-collared widowbird.

A number of waterbirds, including white-faced whistling duck, pygmy goose, Hottentot teal, black crake, common moorhen, African jacana, grey, rufous-bellied and green-backed herons, white-breasted cormorant, pied and malachite kingfisher, etc., occurred in the open water and surrounding reedbeds of the Chipembe River and associated dam, and also along the small water impoundment on the Malipe Stream associated with the embankment on the road to Balama.

Typical bird species found within the Riparian corridors (including riparian forest) included: pied kingfisher, little bee-eater, Klaas's cuckoo, Senegal coucal, Meyer's parrot, African green-pigeon, tropical boubou, orange-breasted bush-shrike and the ubiquitous dark-capped bulbul.

The hydrophilic grasslands and reed beds associated with the streams and depressions were inhabited by hamerkop, rattling cisticola, African pied wagtail, golden weaver, village weaver, red-billed firefinch, blue waxbill, bronze mannikin as well as yellow-fronted canary.

Numerous guilds of birds, common in uninhabited regions, were absent or very rare in the study area. These included: bustards and cranes, plovers and lapwings, francolin and spur fowl, ibis, and thrushes. These are large to medium-sized birds that are often eaten by rural people, and their absence is best explained by a long history of subsistence hunting targeting larger birds for food. In addition, increased fire regimes in floodplain habitats occur during cane rat hunts or when grazing is prepared for cattle. These fires can also lead to local extinctions of bird roosting and breeding sites. Many secretive birds of dense wetland vegetation, e.g. crakes, rails and fluff tails, were probably present but overlooked.

Domesticated and introduced birds included: chickens (*Gallus gallus domesticus*), feral pigeon (*Columba livia*) and house sparrow (*Passer domesticus*), all of which occur in villages in the region.

No bird species which are considered threatened by the IUCN were recorded on site. However, several (11) CITES listed species were recorded, while a further 61 bird SSC may occur in very low numbers or as vagrants on site. The recorded SSC include mainly the Falconiformes species (e.g. eagles, buzzards, goshawks, sparrowhawks etc), and Strigiformes species (owls), of which 10 species were recorded in the area. Of the *Tauraco* (louries) species that also fall under CITES legislation, only the purple-crested turaco was observed on site.

Table 4.9 lists all possible and recorded bird SSC for the project area.

Species	Common Name	Category	CITES	Possible	Recorded
Balearica regulorum	Grey Crowned-crane	EN	11	1	
Necrosyrtes monachus	Hooded Vulture	EN	II	1	
Gyps africanus	White-backed Vulture	EN		1	
Bugeranus carunculatus	Wattled Crane	VU	II	1	
Torgos tracheliotos	Lappet-faced Vulture	VU	II	1	
Trigonoceps occipitalis	White-headed Vulture	VU	II	1	
Sagittarius serpentarius	Secretarybird	VU	II	1	
Bucorvus leadbeateri	Southern Ground-hornbill	VU		1	
Terathopius ecaudatus	Bateleur	NT	II	1	1
Circus macrourus	Pallid Harrier	NT	II	1	
Polemaetus bellicosus	Martial Eagle	NT	II	1	
Stephanoaetus coronatus	African Crowned Eagle	NT	II	1	
Falco vespertinus	Red-footed Falcon	NT	II	1	
Falco concolor	Sooty Falcon	NT	II	1	
Coracias garrulus	European Roller	NT		1	
Gallinago media	Great Snipe	NT		1	
Falco peregrinus	Peregrine Falcon	LC	I	1	
Tauraco porphyreolophus	Purple-crested Turaco	LC	II		1
Tyto alba	Barn Owl	LC	II	1	
Tyto capensis	African Grass-owl	LC	II	1	
Otus leucotis	White-faced Scops-owl	LC	II	1	
Bubo africanus	Spotted Eagle-owl	LC	I		1
Otus senegalensis	African Scops-owl	LC	II		1
Bubo lacteus	Giant Eagle-owl	LC	I	1	
Scotopelia peli	Pel's Fishing-owl	LC	II	1	
Strix woodfordii	African Wood-owl	LC	II	1	
Glaucidium perlatum	Pearl-spotted Owlet	LC	II	1	
Glaucidium capense	African Barred Owlet	LC	II	1	
Asio capensis	Marsh Owl	LC	II	1	
Eupodotis melanogaster	Black-bellied Bustard	LC	II	1	
Pandion haliaetus	Osprey	LC	II	1	
Aviceda cuculoides	African Cuckoo-hawk	LC	II	1	
Pernis apivorus	European Honey-buzzard	LC	II	1	
Macheiramphus alcinus	Bat Hawk	LC	II	1	
Buteo augur	Augur Buzzard	LC		1	
Elanus caeruleus	Black-shouldered Kite	LC	II		1
Buteo buteo	Common Buzzard	LC	II		
Haliaeetus vocifer	African Fish-eagle	LC			1

Table 4.9: All possible and recorded bird SSC for the project region

Species	Common Name	Categor	CITE	Possibl	Recorde
Milvus migrans	Black Kite	LC		1	~~~~
Milvus aegyptus	Yellow-billed Kite	LC		1	
Circaetus cinereus	Brown Snake-eagle	LC		1	
Circus aeruginosus	Western Marsh-harrier	LC		1	
Circaetus pectoralis	Black-chested Snake- eagle	LC	II	1	1
Circus ranivorus	African Marsh-harrier	LC	II	1	
Circaetus cinerascens	Banded Snake-eagle	LC	II		1
Polyboroides typus	African Harrier-hawk	LC	II	1	
Kaupifalco monogrammicus	Lizard Buzzard	LC	II		1
Melierax metabates	Dark Chanting-goshawk	LC	П		1
Melierax gabar	Gabar Goshawk	LC	II	1	
Accipiter tachiro	African Goshawk	LC	II	1	
Accipiter badius	Shikra	LC	II	1	
Accipiter minullus	Little Sparrowhawk	LC	II	1	
Accipiter ovampensis	Ovambo Sparrowhawk	LC	II	1	
Accipiter melanoleucus	Black Sparrowhawk	LC	II	1	
Aquila pomarina	Lesser Spotted Eagle	LC	II	1	
Aquila rapax	Tawny Eagle	LC	II	1	
Aquila wahlbergi	Wahlberg's Eagle	LC	II	1	
Aquila nipalensis	Steppe Eagle	LC	II	1	
Hieraaetus spilogaster	African Hawk-eagle	LC	II	1	
Hieraaetus pennatus	Booted Eagle	LC	II	1	
Hieraaetus ayresii	Ayres's Hawk-eagle	LC	II	1	
Lophaetus occipitalis	Long-crested Eagle	LC	II	1	
Falco naumanni	Lesser Kestrel	LC	II	1	
Falco rupicolus	Rock Kestrel	LC	II	1	
Falco dickinsoni	Dickinson's Kestrel	LC	II	1	
Falco amurensis	Amur Falcon	LC	II	1	
Falco subbuteo	Eurasian Hobby	LC	II	1	
Falco cuvierii	African Hobby	LC	II	1	
Falco biarmicus	Lanner Falcon	LC	II		1
Falco eleonorae	Eleonora's Falcon	LC	II	1	
Ciconia nigra	Black Stork	LC	II	1	
тот	ALS			61	11

The woodlands in the project area are under anthropogenic pressures from population expansion, the long history of subsistence farming, and recent developments such as logging, charcoal production and coal mining operations in the region. The proposed mining operation will cause direct habitat loss at the footprints of the mining and infrastructure, but may also lead to secondary habitat degradation by facilitating access to wooded areas by loggers and charcoaling groups along new road networks.

<u>Mammals</u>

Due to the brief faunal survey no detailed investigation of the mammal fauna could be undertaken. Of the possible 145 mammal species which may occur in the study area (including 13 large mammals now locally extinct), only 14 were recorded during the wet season survey. A further 21 species were reported to still occur in the region, although some are now acknowledged to be very rare. The reported species derived from two interviews undertaken with local people at Nquide Village aimed to supplement field observations and to record dependence of the community on faunal resources. The interview group included the village headman and elders and local hunters. The group were shown pictures of mammals illustrated in Kingdon (1999) and further mammal images on a laptop. They were asked a series of general questions relating to mammals within the region and people's attitudes to them, i.e.:

- Was the illustrated species still known in the region, and how common was it?
- If considered very rare, when was it last seen?
- Was it historically present before the onset of the civil war?
- If present was it hunted or used for any other purpose?
- If hunted, how commonly was it caught?
- What hunting techniques were used?

The results of the interviews are summarised in Table 4.10. Hunting was still common and it was reported that all large villages had 1-2 specialist hunters. Young boys would also hunt opportunistically. Despite this effort, few medium-sized animals were collected (1 per week or month, depending on species). As insufficient animals were caught, all meat was sold or consumed locally, with no bushmeat traded in adjacent urban areas.

Scrub Hare (*Lepus saxatilis*) was said to be present, relatively common and snared or hunted with dogs to eat. Although Smithers & Tello (1976) do not show the species to occur in northern Mozambique, it is recorded in the region by Kingdon (2004). A number of medium-sized to large mammals recorded by Smithers & Tello (1976) were considered locally extinct by villagers, although were all known and some recorded seeing them still occasionally. They include: Greater Kudu (*Tragelaphus strepsiceros*), Impala (*Aepyceros melampus*), Reedbuck (*Redunca arundinum*), Waterbuck (*Kobus ellipsiprymnus*), Sable (*Hippotragus niger*), and Roan (*Hippotragus equinus*).

SPECIES	SCIENTIFIC NAME	COMMENTS
Rock Hyrax	Procavia sp.	Present but restricted to mountains. Hunted, but difficult to
		snare
Pangolin	Smutsia temmincki	Very rarely found. Always killed as they had high
		commercial value for local good luck charms and,
		especially for sale to Chinese businessmen.
Fruit Bats	Eidolon, etc.	Seasonal, but not common and not eaten
Scrub Hare	Lepus saxatilis	Present and hunted with dogs
Porcupine	Hystrix africaeaustralis	Present, relatively rare, and snared or dug out of burrows to
		eat
Cane Rat	Thryonomys sp.	Present in dambos and hunted with dogs in the dry season
		after fires
Vervet monkey	Cercopithecus	Mainly found along rivers. Not eaten, but may be problem in
	pygerythrus	crops; hunted with dogs
Baboon	Papio cynocephalus	Mainly in hills. Not eaten, but a big problem in crop fields
		near hills; hunted with dogs, chased into trees and killed
		with bow and arrows (and probably guns).
Side-striped Jackal	Canis adustus	Still present, but restricted to less disturbed areas; no
		problem to livestock and not hunted
Slender Mongoose	Herpestres sanguinea	Common, seen almost daily

Table 4.10: Mammals present in the region and their use as a faunal resource

SPECIES	SCIENTIFIC NAME	COMMENTS					
Spotted-neck Otter	Lutra maculicollis	Reported in Chipembe River, where it damages fish nets and steal fish from traps. Not hunted.					
Honey Badger	Mellivora capensis	Very rare, not a problem (probably as few people collect honey in the region)					
African Civet	Civettictis civetta	Present, not considered a problem					
Genet	Genetta sp.	Present, not considered a problem					
Spotted Hyena	Hyaena hyaena	Uncommon. Attacks livestock, but few recent records.					
Lion	Panthera leo	No recent records.					
Leopard	Panthera pardus	Still present in mountains, but not a problem with livestock					
Hippopotamus	Hippopotamus amphibious	Recorded infrequently in Chipembe River					
Elephant	Loxodonta Africana	Common before war, now rare. A small group comes to the dam on the Chipembe River each year. Three came to the village region 3 years ago and were chased off as they were damaging crops, and two were shot by agricultural services and all the villages remembered the feast.					
Cape Buffalo	Syncerus caffer	Present before war, but no recent records					
Bushbuck	Tragelaphus scriptus	Very rare now, but present in areas of thicker vegetation in riparian and hilly areas; hunted with dogs and snares					
Suni & Common Duiker	Neotragus moschatus & Sylvicapra grimmia	Common in dambos; hunted with dogs and snares; one a month killed and sold in village (Sold at a cost of Me1800)					
Bush Pig	Potamochoerus larvatus	Still present and hunted for food with dogs, snares and guns.					

Domestic mammals observed on site included: cats (*Felis catus*), dogs (*Canis africanis*), zebu cattle (*Bos* sp.), pigs (*Sus scrofa*), and goats (*Capra aegagrus*).

A number of mammals not recorded during the survey are known by local people to still be present in the region. Hippo were reported to occur infrequently in the Chipembe River, and spotted hyaena were also reported to still occur in the region to the north of the study area. Yellow baboon, ground pangolin, civet, cane rats, porcupine, etc. (see Table 4.9) were also all reported to still occur in the region.

Of the large number (96) of small mammal species which could possibly occur in the study area, the majority are either rodents (Rodentia), bats (Chiroptera), or shrews (Eulipotyphla). These are all small mammals which can prove to be difficult to capture and identify: bat surveys require long-term trapping, using diverse arrays and in diverse habitats to achieve meaningful coverage of the species likely to be present. For bats these difficulties are increased by seasonal movements, usually associated with food availability.

The bat fauna of Mozambigue has until recently been poorly documented. The most recent synopsis is 35 years old (Smithers & Tello 1976), in which only a single site (Ilha de Mozambigue) had been surveyed north of the Zambezi River. Prior to 2000, a total of 56 bat species were known to occur in Mozambigue, and 28 (50%) of these were known from two or fewer sites (Smithers & Tello, 1976), and at least three of these 56 species were based on misidentifications. To rectify this, Monadjem et al. (2010b) conducted a series of bat inventories across the country (2005 and 2009), including the first detailed surveys in northern Mozambique. They collected 50 species, including seven species new for the country, and increased the country total to 67 species. Subsequently, Taylor et al. (2012) described two new species, both endemic to Mozambique, bringing the country list (as of 2012) to 69 species. Monadjem et al. (2010b) modelled the distribution of bats across the country and recorded 38 bat species for northern Mozambique. Much of this diversity was restricted to montane isolates in the west, and the eastern coastal region of northern Mozambique had the lowest bat species diversity in the country. Two sites in the Balama region were surveyed and both had low diversity; i.e. Namapa and Balama Coutada where only four and two bat species were collected, respectively. However, Taylor et al. (2012) revised horseshoe bats of the Rhinolophus hildebrandtii complex, describing four new

species of which two were endemic to Mozambique, including one species (*R. mossambicus*) from Namapa. The bat fauna for Mozambique thus includes 69 species, with 40 species recorded north of the Zambezi River.

Due to the cryptic nature and migratory movements, the conservation status of bats is generally poorly known. Of the 69 bats recorded from Mozambique (Monadjem *et al.* 2010b, Taylor et al. 2012), most were considered of Least Concern (54, 78.3%), six were Data Deficient (8.7%), six were Near Threatened (8.7%) and only three (4.3%) were considered Vulnerable (*Lissonycteris goliath* and *Myonycteris relicta*, Pteropodidae; *Cloeotis percivali*, Hipposideridae). None of these were recorded from the study site, and one of these (*Myonycteris relicta*) has only been recorded once for the country.

Many of the bat species which occur in the project area are wide-spread species of savannah and woodland. Many are associated with rivers and other water resources, and require either caves or buildings, or in some cases riparian forest, where they can roost during the day. While no large bat roosts in caves were observed or reported to occur in the study area, tall trees for fruit-eating bats do occur along the rivers systems in the region and can be expected to be used, at least seasonally.

Although many large grazing mammals once occurred in the region, most have been extirpated from accessible regions. The large carnivores associated with the megafauna, such as lion, leopard, cheetah, and wild dog, have either been hunted to local extinction (e.g. lion, cheetah, and wild dog), or have simply moved away from the area due to disturbance or food shortages.

Eight mammal SSC were identified for the study area: three of these occurred in the area during historical times, but local people report no recent records and they are highly unlikely to still occur locally; two mammal SSC (African Elephant and Hippopotamus) were reported by locals to still occur in the area (see Table 4.11).

Scientific Name	English Name	Red List status	Historic al	Possib le	Report ed	Record ed
Lycaon pictus	African Wild Dog	EN	1			
Acinonyx jubatus	Cheetah	VU	1			
Panthera leo	African Lion	VU	1			
Loxodonta africana	African Elephant	VU			1	
Hippopotamus amphibius	Common Hippopotamus	VU			1	
Hipposideros vittatus	Striped Leaf-nosed bat	NT		1		
Eidolon helvum	Straw-coloured Fruit Bat	NT		1		
Panthera pardus	Leopard	NT		1		
	Totals		3	3	2	

Table 4.11: Mammals SSC which are likely to occur or have occurred within the project area

Major threats to mammal biodiversity in the region is subsistence hunting and habitat destruction, as well as the impacts of uncontrolled burning, slash and burn agriculture, livestock overgrazing and uncontrolled settlements. With regards to larger mammals, many of the threatened species in Mozambique are either hunted for subsistence, are susceptible to habitat loss, or are key factors in human/wildlife conflict. Subsistence use and habitat degradation are key factors affecting the population dynamics of Red-Data small mammals in the region.

4.3.3 Aquatic environment

All rivers in the Study Area are considered to be seasonal and only flow in the wet summer months, considered to be from November to March or April. During the dry winter months when flow ceases, the rivers within the Study Area mostly consist of disconnected, shallow pools, barely able to support fish life. In addition, there are a few deeper pools with permanent surface water that provide refuge during the dry season.

The co-ordinates and a brief description of these sampling sites are described Table 4.12.

Table 4.12: The 6 sites sampled for fish within the Study Area at the Syrah Balama
Graphite mine (from north to south) during both the wet season (March) and/or dry
season (August) 2013.

Site (River)	Co-ord	dinates	Description & Comments					
	South	East						
Chipembe Dam	13 ⁰ 12' 8.3"	12' 8.3" 38° 3 7' In shallow marginal areas of the dam nea						
(Montepuez R)		19.6"	way and below the dam in flowing river. Sampled					
			6/03/13.					
Mehucua River	13 ⁰ 19' 5.8"	38 ⁰ 42' 34.2"	At track crossing river to the Chief Musa's					
(u/s)			homestead. Sampled 4/03/13 & 17/08/13.					
Malipe River	13 ⁰ 20' 15.6"	38 ⁰ 37' 51.3"	First bridge after turnoff from camp on road to					
			Balama Village. Sampled 5/03/13/ &19/08/13.					
Namiticu River	13 ⁰ 20' 40.3"	38 ⁰ 40' 36.8"	Below bridge over Namiticu R. at confluence with					
(confluence)			Naconha R. Sampled 4/03/13 & 17/08/13.					
Namiticu River	13 ⁰ 24' 28.8"	38 ⁰ 35' 12.8"	Drift on first tributary from Balama Village.					
			Sampled on 5/03/13 &19/08/13.					
Naconha River	13 ⁰ 25' 59.1"	38 ⁰ 36 ['] 41.2"	Bridge on second tributary after Balama Village.					
			Sampled on 5/03/13 & 19/08/13.					

Fish were captured using the following equipment:

- A 6m minnow seine (4 mm mesh).
- A series of gill nets of various mesh sizes (15m sections of 4, 8, and 10 cm mesh size).
- A fyke net (4 mm mesh, largest hoop of 60 cm).
- A 12 volt DC back-pack electro-fisher (Samus 725G), in combination with a variety of dip nets.
- Long line (15 hooks baited with fish).

The fishing gear used was determined by the aquatic habitats present at the various sites and the river flow conditions at the time of sampling.

A total of eleven fish species were observed and captured in the study area, with most of the species found at more than one site (Table 4.12). Most species appear to be common throughout the study area and have widespread distributions throughout Southern Africa. However, one species (the Mozambique tilapia, *Oreochromis mossambicus*) is near threatened and two species, the sand catlet (*Zaireichtys cf. monotapa*) and the orange finned killifish (*Nothobanchius sp. "orange fins*") appear to be previously un-described scientifically.

Local villagers carry out fishing activities in these seasonal rivers mainly during the summer months (wet season and beginning of the dry season). Fish fences using wooden stakes and reeds are constructed across the river channel to trap fish upstream and to position funnel traps to capture fish migrating downstream when the water levels drop. Hook and line fishing for barbel and tilapia, is also undertaken, mainly by young boys. In the Chipembe dam fishes are captured all year round by means of gill nets set in open water and small reed funnel traps which are placed among vegetation in shallow water along the dam shoreline using dugout canoes. The majority of fishes captured (*Oreochromis mossambicus*, *Clarias sp.* and *Barbus sp.*) are less than 30 cm in length.

All the streams sampled are located in the upper catchment of the Montepuez River system which under natural, undisturbed conditions drain well-vegetated catchments. Under pristine conditions, there should be dense riparian woodland along the seasonal rivers with a naturally high plant biodiversity. In most river reaches in the study area the riparian zone is seriously degraded due to the clearing of the riparian vegetation to create lands for planting crops such as sugarcane and maize on deep, fertile soils near the rivers. Apart from animal manures from domestic stock and soap from washing activities at specific sites, no sources of pollution were apparent and the water quality appeared suitable for aquatic life.

The main existing negative impacts on the aquatic habitats in the study area are associated with clearing of riparian vegetation to cultivate crops and the construction of roads and river crossings. These activities have resulted in localized river bank instability, soil erosion and elevated sediment input, the filling in of deeper refuge pools and also higher than normal turbidity in the rivers after rainfall events. Based on the baseline assessment of the aquatic environment it was found that the aquatic habitat integrity in the study area has been moderately modified based on the loss and modification of natural habitat and biota. These river reaches will thus fall into a Habitat Integrity of Category C after Kleynhans (1996) and Kemper (1999).

In the upper tributaries of the Mehucua River, where human population densities are low, environmental impacts on aquatic habitat quality, diversity, size and variability are present at a relatively low number of sites and are also limited in severity. In terms of significance, the modifications to habitat integrity in these upper catchment streams are considered small to moderate and would fall into a Category B after Kleynhans (1996) and Kemper (1999). In this category the habitat integrity is described as largely natural with few modifications and a small change in natural habitat and biota may have taken place, but the ecosystem functions are essentially unchanged.

Table 4.12: An annotated list of fish species (listed alphabetically) collected during the fish surveys in the Study Area at the Syrah Balama Graphite Mine Study Area in March 2013, in the Wet Season (W) and in August 3013 in the Dry Season (D). NE = Not evaluated in IUCN Red List; DD = data deficient; LC – Least Concern, NT – Near Threatened, as classified in the IUCN Red Data List (IUCN 2010). Meh = Mehucua; Nac = Naconha; Mal = Malipe; Nam = Namiticu. (Source: Baseline fish and Aquatic habitat study, 2013)

			Fish Sample sites						site	S				
Taxon (Genus, species	Common Name	Chip Dam		Me R	eh ₹.	Nac	Nac R.		Mal R		Nam R (confl.)		m R /s)	Comments: Conservation Status/food value
		W	D	W	D	W	D	W	D	W	D	W	D	
Barbus cf afrohamiltoni	Plump barb		ns	\checkmark		V		\checkmark	\checkmark					LC. Common in East Coast rivers from Zambezi to Phongolo. Attains 175 mm SL.
Barbus cf litamba	Tamba	V	ns				\checkmark					V		LC . Occurs in the Lake Malawi basin and northern Mozambique. Feeds on invertebrates and smaller fishes. Attains 440 mm in length.
Barbus paludinosus	Straightfin barb	V	ns	V		V		\checkmark	\checkmark			V	\checkmark	LC . Widespread in central and southern Africa. Attains 150 mm SL.
Barbus radiatus	Beira barb		ns	V		V				V				LC . Widespread in Central Africa and east coast rivers south to the Phongolo system. Attains 120 mm SL.
Barbus trimaculatus	Three-spot barb		ns			V						V		LC. Widespread in central and southern Africa. Attains 159 mm SL.
Barbus cf viviparus	Bowstrip barb		ns	V		V	\checkmark			V		V		LC. Widespread in east coastal rivers from Ramvuma to southern KwaZulu Natal. Attains 70 mm
Clarias gariepinus	Sharptooth catfish		ns		-			\checkmark	\checkmark	V	\checkmark		\checkmark	LC . Widely distributed throughout central and southern Africa
Nothobranchius cf macondorum	Annual killifish (Kapome)		ns			V		V	\checkmark	V	\checkmark	V	\checkmark	NE . A newly-described species. Distributed in SE Tanzania and NE Mozambique. There is currently no data on conservation status, but appears widespread
Nothobranchius sp 'orange fins'	Annual killifish		ns			V								NE. Probably a new species but have no data on distribution or conservation status
Oreochromis cf mossambicus	Mozambiqu e tilapia	V	ns	V	\checkmark			V		V				NT . Widespread in east coasts rivers of southern Africa, from the Zambezi to Bushmans rivers. Attains 400 mm SL.
Zaireichthys cf monotopa	Sand catlet		ns	V		\checkmark			\checkmark					NE . A newly described species with no data on distribution or conservation status

4.3.4 Spatial Planning Tools

Spatial planning tools are used to determine ecologically sensitive and ecologically important areas and thereby guide decision makers. Tools such as determining Critical Biodiversity Areas and biodiversity mapping are now available in many countries. However, since very few of these tools currently exist for Mozambique, the following international planning tools were consulted:

WWF Eco regions

The World Wildlife Fund (WWF) has defined global eco regions based on geographically distinct assemblages of species, natural communities and environmental conditions. Information on each eco region and its conservation status are provided to assist with the continued conservation of these areas.

The project area falls into the Central and Eastern Miombo Woodlands Eco region as defined by WWF (Figure 4.14). This is a widespread eco region covering much of central and southern Africa. It is characterised by high species diversity and is dominated by a woody component whose dynamics can be attributed to three interacting disturbances: people, fire and wildlife. Anthropogenic activities such as clearing for agriculture, harvesting and burning have resulted in the modification or transformation of this ecosystem in many areas. Population growth therefore poses a threat to this Eco Region and it has consequently been listed as Vulnerable.

Protected Areas

Current conservation legislation was drawn up by the colonial administration prior to 1977 and is in the process of being rewritten. The existing legislation makes provision for the creation of protected areas under six categories: National Park, Game Reserve, Partial Reserve, Faunal Reserve, Hunting and Photographic Safari Area and Forest Reserve. Management of protected areas petered out during the civil war. By 1992, all designated protected areas were unstaffed, without infrastructure and effectively unprotected.

However, rehabilitation of the protected areas is gradually being implemented. This is reflected in the statistic that between 1995 and 2008 protected area coverage increased from 11% to 16% with new conservation areas being created (MICOA, 2009).

Examination of these protected areas in relation to the project site revealed that no National Parks occur in close proximity to the project area (Figure 4.15). The closest protected area (Quirimbas), designated as a National Park, occurs 85 km north-east of the project site. The project site also occurs approximately 126 km north-west of a Hunting reserve, The Bloco C Luwiri, and between 92 km and 177 km from the three closest forest reserves, The Mecuburi Forest Reserve, The Mapalue Forest Reserve and the Ribaue Forest Reserve.



Figure 4.14: WWF Eco Regions surrounding the site

(Source: Vegetation Assessment, 2013)



Figure 4.15: The protected areas surrounding the project site (Source: Vegetation Assessment, 2013)

4.3.5 Land use

Mozambique has a relatively rich natural resource base including untransformed indigenous forests, savannah woodlands and coastal habitats. About 25% of the land has commercial forestry potential, 12.5% constitutes state-protected areas and a further 22% comprises potential wildlife habitat (GPZ, 2003).

Land use in the study area is primarily for subsistence agriculture (Plate 4.9). Crops such as maize, cotton and cassava are grown on the flat areas which are cleared using slash and burn techniques (Plate 4.10). Some small unit livestock is reared in the area, although these animals were only noted near the villages and are not abundant in the project site.

Almost all households are heavily reliant on the natural resources for their livelihoods. Natural resources are used for construction, medicinal consumption and to supplement their food. Charcoal production was also evident in the project site (Plate 4.11).



Plate 4.9: A) Ground nuts planted around a homestead; B) Maize intercropped with ground nuts; C) A maize food garden; D) Large machambas planted with maize in the background and to the right; and E) A small grain storage structure (Source: Social Impact Assessment, 2013)



Plate 4.10: Recently burned field at the Project site (Source: Vegetation Assessment, 2013)



Plate 4.11: Trees and shrubs are used for charcoal production in the study area

5. DESCRIPTION OF THE SOCIAL ENVIRONMENT

5.1 A Demographic overview of the Project-Affected Communities

The proposed project is encircled by four villages which are considered to be the direct Project-Affected Communities (PACs). These are Ntete, Nquide, Pirira and Mualia (formerly known as Maputo). The land and households of these communities seem to be privately controlled by individual families under the jurisdiction of the traditional Macua Tribe. Land is primarily held by the Government of Mozambique (GoM), which also legally recognises the role of customary tenure systems. In the rural areas, although land ultimately belongs to the state, the area is controlled by the chiefs and elders who regulate the land under the custodianship of the Macua Tribe. The tribe does not seem to have legal title to, or a certificate for, the land.

The villages are relatively large. The largest village is Ntete (with approximately 4 525 people), whilst the smallest one is Pirira (around 285 people). Considering the number of households, the village of Ntete has around 963 households, whereas few households have been recorded in Pirira (61). The average household size is approximately 4.4 members per household. The total population of all these villages combined is estimated at 11 048 people. The latest census of the Government of Mozambique (GoM, 2007) estimates the population of the Balama District at 124 100 people, which means that these four villages represent approximately 10% of the entire district's population. Females out-number males slightly in most villages, with the exception of Nquide where women represent just less than 50% of the village's gender make-up. Generally, with an average village male-to-female ratio of around 1:1, the data is similar to the male-to-female ratio for the district (*ibid*.).

Based upon data gathered by CES as part of a Socio-Economic Baseline Survey (SEBS) of these communities, undertaken in March 2013, the estimated population of each village, the number of households in each, as well as each village's male-to-female ratio was determined (Table 5.1).

Village	Estimated Population	Nr of Households	Male-to-Female Ratio
Ntete	4,525	963	1:1.73
Nquide	2,543	541	1:0.97
Pirira	285	61	1:1.01
Maputo (Mualia)	3,695	786	1:1.19
TOTAL	11,048	2351	1:1.0 (average)

Table 5.1: Direct Project-Affected Community Demographics

The largest majority (56.5%) of the four villages' members seem to be 18 years or younger. About 29.3% of the population are of school-going age (between seven and eighteen years old). As expected, very few members are above 90 years, while the largest number of people falling into the working-age bracket of 19 to 65 years (40.5%). This means that employment opportunities are needed to sustain a large working-age group, as well as a significant youth population. Table 5.2 below provides an age profile of the PAC members.

Age	SE	BS*	2007 Census		
Categories	Nr	%	Nr	%	
0-6	371	27.2	37278	30.0	
7-18	400	29.3	30597	24.7	
19-29	227	16.6	20439	16.5	

Table 5.2: Project-Affected Community Members' Age Profile

Age	SEI	BS*	2007 Census		
Categories	Nr	%	Nr	%	
30-65	326	23.9	32982	26.6	
66-90	31	2.3	2739	2.2	
91 +	10	0.7	65	0.1	
TOTAL	1365	100.0	124100	100.0	

* Data obtained by the SEBS conducted by CES in March 2013.

5.2 Socio-Economic Living Conditions

5.2.1 Village Social Amenities

All villages have a primary school and a dedicated graveyard. The only clinic in the project area is located in Ntete Village. Football is a sport enjoyed by most, and all villages, with the exception of Pirira, have access to a football field. Most of the villages have churches and mosques. Table 5.3 below indicates the presence of basic social amenities in the PACs.

Table 3.3. Project-Anected Community Social Amenities and Dasic initiastructure							
Village	Wells	School	Clinic	Graveyards	Football fields		
Ntete	1	Yes	Yes	7	Yes		
Nquide	1	Yes	No	4	Yes		
Pirira	2	Yes	No	2	No		
Maputo	4	Yes	No	9	Yes		

Table 5.3: Project-Affected Community Social Amenities and Basic Infrastructure

5.2.2 Education

The schooling system in Mozambique consists of primary and secondary school. Primary schools cover grades one to seven, and enrolment commences at the age of seven. Children are enrolled in secondary school (grades 8-12) at around 12 or 13 years of age.

In terms of educational status, 55.5% of villagers over 18 years of age have no education. Approximately 3.3% completed primary school, whilst a near similar 3.6% completed some secondary school. Yet, around 36.0% of the households indicated that their children will be sent to Balama for secondary schooling. Apart from Balama, a secondary school is also located in Montepuez. Figure 5.1 below provides the PAC members' educations status.



Figure 5.1: Project-Affected Community Members' Educational Status (% of those above 18 years of age)

5.2.3 Services

The GoM is in the process of installing 66kVA power lines in the area, although there is currently no grid provided electricity to any of the villages. The only form of electricity is from generators or solar panels, lanterns, wood or charcoal. Access to energy sources is indicated in Figure 5.2 below. The usage of wood as an energy source was listed by most households (57.7%). This means that wood and forested areas, provide an important ecosystem service to these rural villagers.



Figure 5.2: Project-Affected Community Access to Energy (%)

Wells with hand pumps have been constructed in all the villagers. In addition, all villages have several boreholes without hand pumps (Figure 5.3). All households make use of the wells with hand pumps, whilst tank water (7.0%), smaller river streams (3.9%) (used for bathing and washing of clothes) and the Chipembe Dam (0.3%) is used to a lesser extent. The Chipembe Dam is not used by the majority of the households as it is located relatively far from the villages (about 6 km from Ntete). Some households with agricultural land closer to the Chipembe Dam might use the water for their machambas and livestock.



Figure 5.3: Project-Affected Community Access to Water (%)

5.3 Livelihood Strategies

5.3.1 Employment

Using the data from the SEBS, the unemployment rate of the PACs can be calculated. This rate is expressed as a percentage of those members who are unemployed within the labour force. The labour force constitutes village members in the working-age group (internationally accepted as between the ages of 18 and 65) who are capable of working. The labour force excludes home-keepers and disabled members, but includes self-employed members (such as on-farm workers not earning a salary). The unemployment rate of the PAP can be calculated at 21.7%. This figure is slightly lower than the unemployment rate of Mozambique, estimated to be around 27.0% (GoM, 2007). The reason for this rate is the fact that around 87.3% of the labour force is involved in subsistence farming or fishing, which constitutes informal employment.

Local agricultural production is the mainstay of the local economy, as it employees the bulk of the labour force. The data from the SEBS confirmed these district statistics, illustrating that a significant 306 of the 311 households interviewed (i.e. 98.4%) practice agriculture. As already mentioned, very few households have employed members (only 12 employed people have been counted). This number might be slightly more, as informal piece-jobs, such as drivers or some construction-related work, might be under-reported. Those who are employed are either absorbed in local construction work (such as road upgrading projects in the area), or render their services to government-related sectors, such as the educational or health sectors.

The largest sources of income are from self-employed, agricultural-related work. This includes crop sales, livestock sales and income derived from a households' productive trees. The remaining income sources are from charcoal trading (sold next to the roads or in Balama and Montepeuz), as well as formal employment, donations, and very few lease incomes (when farmland is leased to households). Most households, however, are involved in subsistence farming, foraging and hunting. These livelihood strategies sustain many rural households. Table 5.4 below indicates the employment sectors of the Balama District.

Sector	n	% (of total <i>n</i>)
Agriculture, forestry and fishing	50091	95.4
Trade, finance	1000	1.9
Other services	486	0.9
Manufacturing industry	382	0.7
Administrative services	264	0.5
Construction	167	0.3
Unknown	58	0.1
Extraction of mines	28	0.1
Transport and communication	23	0.0
Energy	7	0.0
TOTAL	52506	100.0

Table 5.4: Balama District Employment Sectors*

*Source: Census 2007 (GoM, 2007)

5.3.2 Agriculture

Agriculture is an integral part of a villages' livelihoods, and forms the backbone of the area and country's economy. A significant number (98.4%) of the households in the area practice rain-fed, rotational crop (or 'slash-and-burn') agriculture for subsistence and commercial purposes. Of all the households studied, nearly all have agricultural fields (or locally called *machambas*), whilst most have smaller food gardens around their homesteads. Of those who have *machambas* and/or food gardens, the largest majority of them have between two and four *machambas*.

The following crops are planted either in *machambas* or smaller food gardens around homesteads:

- Cotton;
- Millet;
- Pumpkin;
- Cabbage;
- Peas;

- Cassava;
- Vegetables;
- Ground nuts;
- Tomatoes;
- Beans; and
- Maize.

It seems that November to April is the crop planting seasons, which coincides with the rainy months. For the most part, the majority of rural households in the area plant their maize and other crops in November and harvest it from April. The dry months are normally associated with harvesting and selling produce. No specific gender roles have been recorded, although a better understanding with regard to how gender mediates agricultural production in terms of roles and responsibility will be ascertained in the RAP.

Apart from agricultural produce, households are also reliant on productive trees, which many tend to grow in or around their homesteads. The largest categories of productive trees owned by households include banana (43.4%), pawpaw (32.5%), mango (22.8%) and orange trees (23.8%).

5.3.3 Animal Husbandry

Nearly two-thirds of households are engaged in livestock farming, and of these nearly all keep chickens and/or ducks. This is followed by a third of these households who own goats, followed by similar percentages for sheep and cattle. Some households also have doves, whilst one or two keep pigs and rabbits.

5.3.4 Natural Resource-Use

Most households are engaged in collecting firewood (97.1%), gathering grasses and reeds for house roofs (92.0%), collecting wild vegetables (74.3%) and using medicinal plants from the surrounding woodlands and forests (47.3%). Apart from this, nearly half of the households (47.3%) are engaged in making charcoal, which is normally sold at local shops or next to the roads. Slightly less than half of the households are engaged in hunting (44.4%), which is primarily a subsistence strategy. Animals hunted include antelopes, rabbits, bush goats and wild pigs, although some did mention larger species such as Hippopotamus (probably a rare and highly prized occurrence). In summary, such plant and animal resources provide a significant ecosystem service to these rural villagers, who are dependent on these resources.



Figure 5.4: Project-Affected Community Household Natural Resource-Use (%)

5.4 Health

5.4.1 General Health Profile of the Country

The Mozambican health system is characterized by insufficient resources and by increased demand due to demographic increases, the epidemiological transition, emergence of major public health problems, such as HIV/AIDS and re-emergence of diseases that in the past were easily treated with few financial resources, for example: the resurgence of chloroquine-resistant malarial strain.

The health indicators for Mozambique describe a challenging situation and some health data for the country are lower than the average for other sub-Saharan African countries. Mozambique has a population of nearly 23 million and an annual population growth of about 2.8%. Life expectancy at birth is 48.2 years for men and 50.4 years for women in 2009 compared with the 52 and 54 respectively for the WHO African Region (WHO, 2011c). The national infant and under-five mortality rates are 96 and 142 per 1 000 live births respectively compared with regional figures of 80 and 127 in 2009, respectively (WHO, 2011c, UNICEF, 2009). Similarly, in Mozambique the density of (i) physicians and (ii) nurses and midwives per 1 000 population is 0.027 and 0.322 compared to regional figures of 0.217 and 1.172 respectively. In contrast, immunization coverage among 1-years-olds (e.g. measles 77%, DPT3 72%) in Mozambique is above the mean of the other sub-Saharan African countries (66% for both) (WHO, 2006c).

Mozambique has an epidemiological profile that is typical of developing countries, with significant levels of infant malnutrition and predominance of infectious diseases such as malaria, tuberculosis, HIV/AIDS, etc. This profile is worsened by natural disasters such as droughts and floods, making the population vulnerable to diseases of epidemiological nature, with emphasis on cholera, dysentery and other diarrhoeal diseases (Ferrinho and Omar, 2007).

The disability-adjusted life year (DALY) is a measure of overall disease burden. It is designed to quantify the impact of premature death and disability on a population by combining them into a single, comparable measure. The DALY is an important indicator and it is a health gap measure that extends the concept of potential years of life lost due to premature death to include equivalent years of 'healthy' life lost by virtue of being in states of poor health or disability. According to the last estimate of disease burden by the WHO in 2004 the total DALY in Mozambique in 2004 was almost 10 million (WHO, 2004a), as seen in Table 5.5 below

Communicable diseases remain the main health problem in Mozambique. 73% were attributable to communicable diseases with the remainder divided between non-communicable diseases and injuries. Overall HIV/AIDS accounted for the most DALYs with 22.4%, followed by perinatal conditions (e.g. prematurity and low birth weight; neonatal infections) (10.6%), malaria (9.4%), respiratory infections (8.0%) and diarrhoeal diseases (6.3%). A quarter of the DALYs of the non-communicable diseases are due to neuro-psychiatric conditions and mental illness. Road traffic injuries contribute substantially to total injuries (WHO, 2009a).

Cause	High income countries		Sub-Saharan Africa		Mozambique	
Population (000)	949 8	18	749 2	69	20 078	
	(000)	(%)	(000)	(%)	(000)	(%)
TOTAL DALYs	117 841	100.0	390 800	100.0	9 656	100.0
I. Communicable diseases, maternal and peri-natal conditions and nutritional deficiencies	6 579	5.6	276 438	70.7	7 052	73.0
Infectious and parasitic diseases	2 513	2.1	165 196	42.3	4 588	47.5
Tuberculosis	156	0.1	11 431	2.9	316	3.3
STIs excluding HIV	190	0.2	3 488	0.9	70	0.7
HIV/AIDS	609	0.5	47 296	12.1	2 167	22.4
Diarrhoeal diseases	343	0.3	33 235	8.5	606	6.3
Childhood diseases	51	0.0	13 523	3.5	115	2.0
Meningitis	97	0.1	5 448	1.4	84	0.9
Hepatitis B (d)	77	0.1	379	0.1	3	0.0
Hepatitis C (d)	151	0.1	158	0.0	1	0.0
Malaria	4	0.0	32 172	8.2	905	9.4
Tropical diseases	2	0.0	6 412	1.6	142	1.5
Leprosy	0	0.0	25	0.0	0	0.0
Dengue	0	0.0	9	0.0	1	0.0
Japanese encephalitis	3	0.0	0	0.0	-	-
Trachoma	0	0.0	719	0.2	1	0.0
Intestinal nematode infections	23	0.0	1 581	0.4	26	0.3
Respiratory infections	1 263	1.1	44 514	11.4	769	8.0
Maternal conditions	577	0.5	15 365	3.9	320	3.3
Perinatal conditions	1 521	1.3	39 239	10.0	1 022	10.6
Nutritional deficiencies	704	0.6	12 125	3.1	354	3.7
II. Non-communicable conditions	100 843	85.6	81 448	20.8	1 953	20.2
Malignant neoplasms	17 618	15.0	6 179	1.6	142	1.5
Other neoplasms	358	0.3	339	0.1	7	0.1
Diabetes mellitus	3 496	3.0	2 165	0.6	47	0.5

Table 5.5: Estimated DALYs ('000) by cause, 2004

Cause	High income countries		Sub-Saharan Africa		Mozambique	
Population (000)	949 8	18	749 2	69	20 078	
	(000)	(%)	(000)	(%)	(000)	(%)
Nutritional/endocrine disorders	1 815	1.5	3 134	0.8	72	0.7
Neuropsychiatric disorders	30 796	26.1	19 736	5.1	484	5.0
Sense organ disorders	8 916	7.6	9 475	2.4	262	2.7
Cardiovascular diseases	17 307	14.7	14 971	3.8	341	3.5
Respiratory diseases	7 138	6.1	7 308	1.9	180	1.9
Digestive diseases	4 605	3.9	5 751	1.5	120	1.2
Diseases of the genitourinary system	1 198	1.0	2 272	0.6	49	0.5
Skin diseases	212	0.2	939	0.2	23	0.2
Musculoskeletal diseases	5 129	4.4	2 483	0.6	65	0.7
Congenital abnormalities	1 473	1.2	6 049	1.5	142	1.5
Oral diseases	784	0.7	649	0.2	17	0.2
III. Injuries	10 420	8.8	32 913	8.4	650	6.8
Unintentional injuries	6 926	5.9	21 647	5.5	480	5.0
Intentional injuries	3 494	3.0	11 265	2.9	170	1.8

Major cause of death in children under-5 years in Mozambique is malaria, accounting for 23% of all deaths in this age group (Figure 5.5). This is followed by pneumonia (16%) and diarrhoeal diseases (11%).



Figure 5.5: Ten major causes of death in children under 5 years, 2008

The mortality indicators for 2002 for the whole population of Mozambique are described in Table 5.6 (WHO, 2006b). Communicable diseases account for two thirds of deaths, whereas HIV/AIDS is by far the major cause of death, responsible for almost a third of all deaths in Mozambique (28%).

Cause of death	Total deaths ('000)	Percentage
HIV/AIDS	108	28
Malaria	34	9
Diarrhoeal diseases	30	8
Lower respiratory infections	28	7
Perinatal conditions	20	5
Measles	13	3
Tuberculosis	11	3
Cerebrovascular disease	8	2
Ischaemic heart disease	7	2
Protein-energy malnutrition	3	1

Table 5.6: Estimated total death ('000) by cause Mozambique

5.4.2 General Health Profile of Project Region

About 1.65 million people live in Cabo Delgado Province, which faces a more challenging health situation than other provinces in Mozambique. Balama District is a district of Cabo Delgado Province, and covers 5629km² with about 126 000 inhabitants. Health indicators in the province are usually below the national average and morbidity and mortality are higher. The under 5 year age group mortality rate in 2003 was 241 in 1 000 children, compared to the national average of 178 (World Bank, 2003b). Infant mortality was 178 in 1 000 children compare to the national average of 124.

Malnutrition rates were higher in this region than elsewhere, highlighting a precarious food security situation. The province had a chronic malnutrition rate of 56% in children under 5 years compared to 41% in the national average. However, acute malnutrition is within the national average of around 4%. HIV/AIDS prevalence is lower (7.5%) than country average (13.6%).

The main diseases of importance in Balama district are malaria, diarrhoea, HIV/AIDS and Sexually Transmitted Infections (STIs) that together account for almost all cases of diseases reported in the district. Social action in the district has been coordinated by Non-Governmental Organizations (NGOs) and the civil society, promoting the creation of equal opportunities and rights between men and women in all aspects of social and economic life, as well as integration in the labour market, income generation processes and school life.

Balama District has one level I health centre, and five level II & III health centres, with a total of 46 beds and 28 health professionals. The growth of the school and health system since 2000, and improving the care provided by personnel, have allowed an increase in people's access to National Education and Health services, which however still remain insufficient. There is one health facility for every 22 thousand people, one bed per 2900 inhabitants and one health professional for every 4800 residents in the district.

6. ASSESSMENT OF BIOPHYSICAL IMPACTS

6.1 Planning and Design Phase Impacts

Activities associated with the design and pre construction phase pertain mostly to exploration. As the project has a mining concession, impacts associated with exploration and the mitigation of these impacts were included in the Exploration EMP compiled to obtain this concession and will therefore not be repeated in this section. Other activities associated with the design and pre construction phase will not have impacts on the biophysical environment as this phase consists of planning and design of the proposed development, and is done at a desktop level. In some cases site visits need to take place but the impact of these visits is negligible, if any, e.g. photographs, borehole pump testing, botanical and other field surveys, etc.

6.2 Impacts resulting from the existing land use / no-go options

6.2.1 Impacts on topography and geology

Existing impacts on the topography of the area consist of relatively minor excavations for agricultural purposes and secondary and tertiary roads. These are considered to be negligible. No existing impacts on geology have been identified.

6.2.2 Impacts on soils and agriculture

Existing impacts on soils include erosion due to poor land use practices and reduced soil fertility due to infrequent crop rotation (insufficient rest periods and lack of mulching and/or fertilizer applications). However areas of erosion are limited. No impacts on agriculture have been identified. Impacts on the soil resources from agriculture are likely to be medium term across the study area. The environmental significance of this unmitigated impact is MODERATE NEGATIVE.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

6.2.3 Impacts on surface and groundwater resources

All the streams sampled are located in the upper catchment of the Montepuez River system which under natural, undisturbed conditions drain well-vegetated catchments. Under pristine conditions, there should be dense riparian woodland along the seasonal rivers with a naturally high plant biodiversity. In most river reaches in the study area the riparian zone is seriously degraded due to the clearing of the riparian vegetation to create lands for planting crops such as sugarcane and maize on deep, fertile soils near the rivers. Apart from animal manures from domestic stock and soap from washing activities at specific sites, no sources of pollution were apparent and the water quality appeared suitable for aquatic life.

6.2.4 Impacts on the aquatic environment

Cause and Comment:

In reference to the fish biota, the main existing negative impacts on the aquatic habitats in the Study Area are associated with existing clearing of riparian vegetation to cultivate crops and the construction of roads and river crossings. These activities have resulted in localized river bank instability, soil erosion and elevated sediment input, the filling in of deeper refuge pools and also higher than normal turbidity in the rivers after rainfall events.

Field observations indicated that the aquatic habitat integrity in the mine project area has been moderately modified. Here a loss and modification of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. These river reaches, which would fall into a Habitat Integrity of Category C after Kleynhans (1996) and Kemper (1999), are representative of most of the mine project area.

Significance Statement

The loss of the riparian vegetation and increased sedimentation is definitely occurring and is having a moderate, long term, negative impact on the aquatic environment. The environmental significance of this unmitigated impact is MODERATE NEGATIVE.

		Effect	Bisk or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Study Area	Moderate	Definite	MODERATE	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

6.2.5 Impacts on flora

To contextualise the potential impacts of the mining activities and associated infrastructure proposed by the developer, the existing impacts (or *status quo*), associated with current ecological conditions, need to be described in terms of vegetation patterns, structure and composition. This baseline or *status quo* should be used as the comparison against which project impacts are assessed. The main issues identified with the existing impacts are discussed below:

Issue 1: Loss of Vegetation communities

Natural plant communities are dynamic ecosystems that provide habitats that support all forms of life. Different types of plant communities (and habitats) exist in the project area, and these occur within and around the project area. The villages in the area are reliant on natural resources found within the different plant communities and actively clear tracts of land for agricultural purposes. The current vegetation conditions in the low lying regions of the project area can be described as mostly transformed by anthropogenic activities and are of low to moderate ecological sensitivity. The current impacts on each plant community are assessed below.

Impact 1.1: Loss of Riparian Woodland

Cause and comment:

This vegetation type occurs along the banks of the rivers and tributaries that occur in the project area. Direct impacts on this vegetation type include clearing of river banks by local

inhabitants to plant sugar cane and harvesting of plant materials for construction purposes.

Significance Statement:

The loss of the Riparian Woodland is definitely occurring and is having a severe, permanent, negative impact on the plant communities, the riparian system, and the rivers. The environmental significance of this unmitigated impact is HIGH NEGATIVE.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

Impact 1.2: Loss of Miombo Woodland: Graphite

Cause and comment:

This vegetation type occurs on Mount Nassilala and Mount Coronge. This vegetation type is relatively intact despite existing evidence of harvesting plant materials for construction purposes.

Significance Statement:

The loss of the *Miombo Woodland: Graphite* is definitely occurring and is having a moderate, medium term impact. The environmental significance of this impact in the absence of mitigation is MODERATE NEGATIVE.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

Impact 1.3: Loss of Miombo Woodland: Granite

Cause and comment:

This vegetation type occurs on Mount Coronge. This vegetation type has been cleared for agriculture on the lower slopes and there is evidence of large trees being harvested at higher altitudes. The areas that remain intact provide important refugia for indigenous and threatened plant species, which is under threat from the current clearing activities.

Significance Statement:

The loss of the *Miombo Woodland: Granite* is definitely occurring and is having a severe, long term impact. The environmental significance of this impact in the absence of any mitigation is HIGH NEGATIVE.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Study Area	Severe	Definite	HIGH	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

Impact 1.4: Loss of Intact Miombo Woodlands: Plains

Cause and comment:

This vegetation type occurs to the east of Nquide village and has been assigned a high sensitivity. Despite its proximity to Nquide village, this area has been left intact.

Significance Statement:

The loss of the *Intact Miombo Woodland: Plains* is unlikely to occur based on the current absence of exploitation. The severity of the impact is therefore rated as slight. The duration of the impact is predicted to be short term as the Miombo Woodland may be exploited at any time in the future. The environmental significance of this unmitigated impact is LOW NEGATIVE.

Impact	Effect			Dick or	Overall
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Slight	Unlikely	LOW
With Mitigation	N/A	N/A	N/A	N/A	N/A

Impact 1.5: Loss of Degraded Miombo Woodlands: Plains

Cause and comment:

This vegetation type occurs in the flat, low lying areas through much of the project site and is heavily harvested by villagers for construction timber, firewood and charcoal production. Consequently it has a low species diversity index.

Significance Statement:

The loss of the *Degraded Miombo Woodland: Plains* is definite and has resulted in a severe, Long Term impact. The environmental significance of this impact if left unmitigated is HIGH NEGATIVE.

		Effect	Biok or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area	Severe	Definite	HIGH
With Mitigation	N/A	N/A	N/A	N/A	N/A

Issue 2: Loss of Biodiversity

The Balama Graphite Mine concession area consists of a number of habitats which include inselbergs, the riparian zone, agricultural areas and surrounding natural vegetation, which has been described above.

Unique habitats on the site have been shown to contain a high biodiversity, especially the inselbergs that support the granite and graphite Miombo woodlands. The current land use is resulting in the destruction of these habitats, particularly in the low lying areas, reducing the areas potential to support biodiversity.

Impact 2.1: Loss of Biodiversity (general)

Cause and comment:

The clearing of land for agriculture and harvesting of plant materials for construction and charcoaling is resulting in the loss of biodiversity in the area.

Significance Statement:

The loss of biodiversity is definitely occurring and is having a moderate, long term impact. The environmental significance of this unmitigated impact is MODERATE NEGATIVE.

Impact	Effect			Dick or	Overall
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	N/A	N/A	N/A	N/A	N/A

Issue 3: Loss of Species of Special Concern

Three species of special concern (*Habenaria sp., Sterculia appediculata* and *Afzelia quanzensis*) were identified at the Balama Graphite Project site and are being impacted on by the current activities.

Impact 3.1: Loss of Species of Special Concern

Cause and comment:

Current land use activities, such as clearing, harvesting and charcoaling are resulting or have already resulted in the loss of species of special concern, as well as other species that are important to ecosystem functioning.

Significance Statement:

The loss of species of special concern is definitely occurring and is rated as a moderate, impact occurring over a medium term. The environmental significance of this unmitigated impact is MODERATE NEGATIVE.

	Effect			Dick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	N/A	N/A	N/A	N/A	N/A

Issue 4: Disruption of Ecosystem Function and Process

The habitats that exist in the project area, together with those of the surrounding area that are linked, form part of a functional ecosystem where biological and biophysical processes such as nutrient cycling, soil formation, reproduction, competition, predation, succession, evolution and migration take place. Destruction or modification of habitats causes disruption of ecosystem function, and threatens the interplay of processes that ensure environmental health and the survival of individual species. This issue deals with a collection of complex ecological impacts that are almost impossible to predict with certainty, but which are nonetheless important.
Impact 4.1: Fragmentation of vegetation and edge effects

Cause and comment:

Fragmentation is one of the most important impacts on vegetation communities, especially when this creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. In the context of the study area, this impact occurs when large areas are cleared for agriculture or burned to create green grass for grazing, or to establish crops. Fragmentation of vegetation communities may result in the fracturing of functional ecosystems, which could disrupt ecosystem functions such as nutrient cycling, soil formation, reproduction, competition, predation, succession, evolution and migration.

Significance Statement:

The fragmentation of vegetation is definitely occurring and is having a severe, permanent impact on ecosystem functions and processes. The environmental significance of this impact if left unmitigated is HIGH NEGATIVE.

Impact		Effect	Dick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH
With Mitigation	N/A	N/A	N/A	N/A	N/A

6.2.6 Impacts on fauna

Issue 1: Loss of faunal biodiversity

Historically, the Miombo woodlands of Mozambique supported a large diversity of animals as noted by early travellers (Smithers & Tello, 1976). A long list of small (e.g. bushbuck, duiker) and large ungulates (e.g. zebra, kudu, sable) as well as mega-herbivores (such as elephant, black rhinoceros and hippopotamus) and predators (e.g. lion, hyena) were found in the region. However, the density of animals, as well as the extent of seasonal fluctuations in their populations, prior to human settlement, particularly prior to the protracted civil war, is unknown. The disruption to rural life and agriculture during the civil war, as well as the wide-spread availability and uncontrolled use of firearms, put tremendous extra pressure on the surviving large mammal fauna.

Present land use is primarily focused on agriculture, with livestock grazing incidental and restricted to fallow and recently cleared land. Cultivation is also practiced along the major river courses, which have richer, better watered soils. Pastoralism is considered a major threat to the biodiversity of the region.

Impact 1.1: Land use impacts on fauna

Cause and comment:

While many of the larger mammals were extirpated in historical times, small herbivores such as Bushbuck (*Tragelaphus scriptus*), Suni (*Neotragus moschatus*) and Common Duiker (*Sylvicapra grimmia*), Bush Pig (*Potamochoerus larvatus*), Scrub Hare (*Lepus saxatilis*), Porcupine (*Hystrix africaeaustralis*) and Cane Rat (*Thryonomys* sp.) are all reported to be hunted, either by specialist hunters with snares or weapons, or opportunistically by young men and dog packs. The bushmeat forms a small, but significant addition to the diet of rural communities.

Another faunal impact comes from problem animal control, either from predation on livestock and chickens, and also on crops (e.g. Vervet monkey, *Cercopithecus pygerythrus*, and Baboon (*Papio cynocephalus*). Although side-striped jackal (*Canis adustus*) and leopard (*Panthera pardus*) are present, they occur in low numbers and are reported not to be serious predators on livestock. Spotted hyena (*Crocuta crocuta*) are uncommon, but are the major cause of predation. The use of poisoned carcasses by farmers to kill "problem" animals was considered rare, but this may occur when deemed necessary. Some large birds-of-prey, like the martial eagle (*Polemaetus bellicosus*), and Bateleur (*Terathopius ecaudatus*) were perceived to prey on domestic livestock and poultry, and therefore may be deliberately targeted. Due to the long history of subsistence hunting and habitat burning certain guilds of birds were also absent or very rare in the project area, including game birds (francolin, spurfowl, etc.), storks, plovers and ibis, etc. Despite the loss of these large, conspicuous mammals and birds, the smaller minority such as reptiles, amphibians and small mammals are still represented in the region.

Significance Statement:

Existing land use impacts on fauna in the project area has resulted in a moderate negative impact in the medium to long-term in the Study Area. The environmental significance of this impact is MODERATE.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Regional	Moderate	Definite	MODERATE
With Mitigation	N/A	N/A	N/A	N/A	N/A

Impact 1.2: Habitat loss, fragmentation and degradation

Cause and comment:

The study area is located within a mosaic of cleared, degraded and fragmented Miombo woodland. Fauna diversity remains high, however, except for large mammals and birds. The presence of species of concern is limited to those with nutritional, commercial and medicinal value to local communities. Unsustainable use of these resources has led to these species occurring on the IUCN Red List of threatened species.

Removal of natural vegetation for cultivation destroys the natural habitat of many animals. Where vegetation has been removed for cultivation, old fields take several years for the vegetation and thus faunal habitats to be restored. They may fail to revert to natural vegetation for several decades, long past the life spans of most faunal groups.

Significance Statement

Habitat loss through existing land use impacts in the project area has resulted in a severe negative impact in the long-term in the Study Area. The environmental significance of this impact is HIGH.

	Effect			Risk or Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Regional	Severe	Definite	HIGH	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

In conclusion, it is evident that the natural vegetation of the study area has been degraded as a result of current land use, resulting in reduced biodiversity and low faunal populations. Mining related impacts need to be viewed in this context.

6.3 Mining related impacts resulting from the construction phase

6.3.1 Impacts on topography and geology

Cause and Comment

The construction of the mining camp, pipeline, and other associated infrastructure will require bulk earthworks, levelling areas and excavations in order to lay adequate foundations. Furthermore, minor excavations will be required for the construction of the haul road and establishment of borrow pits.

Significance statement

Only minor topographical manipulation will be required during the construction phase of the development, and only within selected areas. In addition, large parts of the area are relatively flat, and therefore impacts associated with changes to the topography of the area are considered to be of a low negative significance. There are no mitigation measures for this impact.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long-term	Localised	May Occur	Slight	LOW -
With Mitigation	N/A	N/A	N/A	N/A	N/A

6.3.2 Impacts on soils and agriculture

Issue 1: Impacts on soils

Impact 1.1: Removal of topsoil and soil erosion

Cause and Comment:

The construction of the haul road, ancillary roads and other associated infrastructure requires bulk earth works and moving quantities of soil in order to build the roads and other infrastructure, such as the landfill site. A cut-to-fill method is mostly employed where some areas are excavated and others filled-up in order to achieve final levels. The excavation of areas require the removal of vegetation and the stripping of topsoil layers and, in many cases, also the sub-topsoil layers. The removal of topsoil and bulk earthworks can lead to soil erosion.

Mitigation Measures:

- All topsoil to be stockpiled and replaced as a final graded layer over the subsoil contouring;
- Contoured new haul road to assist in dispersing water run-off instead of concentrating it and increasing the risk of erosion;
- Rehabilitation of disturbed areas to be undertaken progressively during the construction phase.

- Divert water flow around cleared areas to minimise the amount of runoff crossing over exposed areas by using berms, with temporary or permanent drainage ditches.
- Design access roads to be no wider than necessary to accommodate the immediate anticipated use.
- Minimise the alteration to topography.
- Minimise the area of impervious surfaces.
- Grade impervious surfaces to drain into vegetated areas.
- Ensure fine materials being transported are covered with tarps or equivalent material.
- Construct sediment control dams and silt fences;

Significance Statement:

Without mitigation, the soil structure of the area will be damaged and possibly compromised over the short term. The severity of the impact will be severe, while the risk of such impact is probable.

Since the proponent is committed to implementing the mitigation measures listed above, the effects will be short term, local in scale and have a moderate impact. These impacts will only take place during the construction phase.

		Effect		Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Severe	Probable	MODERATE
With Mitigation	Short Term	Localised	Moderate	May Occur	LOW

Impact 1.2: Soil contamination

Cause and Comment

Leakages and spillages from storage areas and construction vehicles could have a negative effect on the pH and salinity of the soil.

Mitigation measures:

- Design and implement a Hydrocarbon Operating Procedure. Copies of this document to be made available at designated facilities where hydrocarbons are used or stored. The purpose of this procedure is to provide for the proper storage and handling of hydrocarbons, including waste hydrocarbons, on site and hence prevent any form of contamination;
- Soil contaminated with hydrocarbon will immediately be removed and disposed of at a soil bioremediation facility to be established on site;
- All staff will be trained on the correct management of bunded facilities, including the discharge of collected liquids;
- Spill kits will be readily available at strategic points throughout the site and staff to be trained on the correct use of these kits;
- Prevent spillage and seepage of contaminants at all times through the implementation of good housekeeping and management procedures.
- Define a monitoring program in the EMP.
- Implement remedial measures in the case of accidents.
- Storage facilities will be adequately bunded and inspected on a regular basis
- Workshops and fuelling areas to have drainage to a sump with a hydrocarbon separator;

Significance Statement:

The impact of contamination from storage infrastructure is considered short term and at a localised scale. The issue is considered moderate to severe and of MODERATE significance. It is probable that the impact will occur. Since the proponent is committed to implementing the mitigation measures listed above, the impact will be of LOW significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Probable	Moderate to Severe	MODERATE
With Mitigation	Short Term	Localised	May Occur	Slight	LOW

Issue 2: Impacts on Agriculture

Impact 2.1: Disturbance to the existing soil profile will result in a decrease in agricultural capability

Agricultural capability describes the potential for agriculture in a specific area as well as limitations or special management practices needed to improve soil, such as topography, stoniness, soil moisture deficiency, low fertility, etc. Good agricultural lands have ideal climate and soil to allow a farmer to grow the widest range of crops, while non-arable lands (including woodlands and bush) have low potential for soil bound agriculture. Because urbanisation (including industries like mining) change the agricultural landscape, the agricultural capability of that area is therefore also changed.

Levelling of the site and excavations for the construction and subsequent mining as well as associated mining infrastructure will disturb the existing soil profile. If topsoil becomes buried, or the subsoil and rock, that is less suitable for root growth, remains at the surface, the agricultural capability of the soil that will become available for agriculture after decommissioning of the mining activities will be reduced.

Mitigation Measures:

- Strip and stockpile top soil to be retained for re-spreading over disturbed surfaces during rehabilitation. The Environmental Control Officer (ECO) to determine topsoil depth prior to stripping.
- ECO to monitor all excavations to ensure excavations are backfilled with subsoil first and then spread with topsoil.
- ECO to monitor depth and cover of topsoil spreading during rehabilitation.

Significance Statement:

Without proper soil management the possibility of a decrease in agricultural capability is high and the resultant impact may be HIGH negative during the construction phase. Since the proponent is committed to implementing the mitigation measures listed above the impact will be MODERATE negative.

	Effect			Pick or	Ovorall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Probable	Moderate to Severe	HIGH
With Mitigation	Long Term	Localised	May Occur	Slight	MODERATE

Impact 2.2: Loss of agricultural land due to establishment of mining infrastructure

Cause and Comment:

Current agriculture within the concession area is based on subsistence level, hand-cultivated units (called a *mashamba*) averaging 1.2 hectares in size. One farmer may hold multiple *mashambas*, containing multiple crops consisting of traditional varieties that are rain-fed, with very low intensity fertiliser and pesticide control used and little or no mechanisation resulting in low productivity.

The occupation of the land by mining infrastructure will exclude agricultural use of that land for the duration of the project, starting in the construction phase.

Land use is largely limited by available water and current agricultural methods, requiring larger than normal parcels of land to obtain sufficient yields. Thus, under the current agricultural practice land is in short supply and the loss of parcels of agricultural land will have very little impact on the total agricultural potential of the region.

Mitigation Measures:

- Utilise the IFC PS 5 to develop a RAP to include a detailed agricultural valuation of all the affected farmlands and owners' possessions to outline appropriate compensation strategies and entitlement matrixes; and
- Develop livelihood restoration strategies aimed at assisting households with reestablishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options include supporting the cotton and maize production capacity of the area by investing in market access, seed provision and agricultural training programmes. A key focus of such programmes needs to be the empowerment of vulnerable children and youth, as well as women (especially female-headed households).

Significance Statement:

Without mitigation, the impact will be VERY HIGH during the construction phase and will be permanent in nature and very severe. After mitigation the impact will be MODERATE due to the reduction in the temporal scale and the severity.

This impact takes place during construction, it is a permanent impact. It should be noted that the proponent is committed to implementing the mitigation measures listed and the mitigation measures must be in place prior to the commencement of construction .

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Definite	Very Severe	VERY HIGH
With Mitigation	Long Term	Localised	Definite	Moderate	MODERATE

Impact 2.3: Loss of subsistence crops due to establishment of mining infrastructure

Cause and Comment:

The occupation of the land by mining infrastructure will result in the loss of various subsistence and cash crops currently grown on the land. This includes maize, beans, cassava, cotton and ground beans.

Mitigation Measures:

The same mitigation measures as presented above (for impact 2.2) apply to this impact.

Significance Statement:

Without mitigation the impact will be considered to be VERY HIGH as the loss of a single season of crops will severely compromise the local communities food security, however with the implementation of the strategies developed as part of the RAP, the impact is considered to be LOW.

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Definite	Very Severe	VERY HIGH
With Mitigation	Short Term	Localised	Definite	Moderate	LOW

6.3.3 Impacts on surface and groundwater resources

Issue 1: Water Quality

Impact 1.1: Sedimentation and elevated turbidity in rivers

Cause and Comment:

The negative impacts of sedimentation and elevated turbidity in rivers can be very significant and even lethal for aquatic biota, including fish. During the construction phase vegetation cover may be destroyed. Without measures to limit erosion and off-site transport of sediment during clearing for construction of infrastructure, and together with run-off from roads and construction of river crossings for vehicles, these actions may increase soil erosion and hence sediment-laden run-off into adjacent rivers. Mitigation measures are designed to prevent sediment-laden run-off from all cleared areas from entering drainage lines and adjacent rivers

Mitigation Measures:

- Locate the TSF and any out of pit dumps such as topsoil waste rock dump (WRD) in suitable areas away from drainage lines or rivers and develop practices in terms of design and operation to prevent sediment run-off, inclusive of cut-off drains.
- Detain mine-water and surface run-off from the mining areas in sedimentation ponds before the clear surface water (if uncontaminated) is allowed to flow into the adjacent drainage lines or streams.
- Store contaminated water from the process plant in the tailings storage facility (TSF) and the supernatant or decant water from the TSF fed back to the process water reticulation.

- Stipulate details of mitigation measures for full containment and treatment (if feasible) of contaminated waters in the EMP document.
- Minimise the spatial extent of the area cleared of vegetation and re-vegetate as soon as is practically possible.
- Wherever practically possible, maintain a well vegetated buffer at least 30 m wide adjacent to construction sites and all drainage lines and other wetland areas to trap sediment.
- Wherever practically possible, carry out most of the vegetation clearance during the dry season.
- Wherever practically possible, use Turf or Grass pavers that are "honeycomb" style pavers which allow grass to growi in the holes. They allow for the establishment of permeable pavements and parking areas. Use mitre drains to spread flows in roadside drains onto adjacent slopes.
- Protect footpaths and tracks on steep slopes from runoff related erosion (e.g. use of low berms at short intervals).
- Use multiple rather than a single point of discharge downstream of a dewatered area.

Significance Statement:

During the construction phase of the project, a medium to long term severe impact is definitely anticipated without mitigation. With these mitigation measures in place this impact can probably be reduced to MODERATE significance.

	Effect			Bick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Severe	Definite	HIGH
With Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE

Impact 1.2: Contamination from non-ore pollutants

Cause and Comment:

Hazardous materials and chemical pollutants (e.g. hydrocarbons, flotation reagents, uncured cement, paints, cleaning fluids, etc.) associated with construction, as well as washing detergents and soap, poorly-treated domestic effluents, and construction workers using rivers and riparian zones for ablutions, could pollute both groundwater and surface water. These pollutants could be harmful to aquatic biota and impact on drinking water quality for communities and domestic stock downstream.

Mitigation Measures:

- Strict management of hazardous chemicals.
- Prevent spills of hydrocarbon from machinery and vehicles.
- Treat domestic effluent from the mine camps in an on-site waste water treatment works
- Final effluent to be of high quality and used for irrigation or mining purposes.
- Contain and treat contaminated water from mine and associated infrastructure.
- Strict control of workers movements and behavior.
- Store chemicals of all types on impermeable surfaces in secure and bunded designated storage areas.
- Spills to be cleaned up immediately in accordance with an established protocol.
- Cement to be stored on impermeable storage areas protected from the rain and mixed only in designated areas. Cement residue to be cleaned up immediately.

- Prohibit defecation or any other ablutions other than in formal facilities.
- Develop and implement a stormwater management system for all areas from which sediment may be washed off into watercourses.
- Store fuel, oils and grease on impermeable surfaces with containment bunds and with drainage via Hydrocarbon separators;
- Hydrocarbon separators are to collect hydrocarbon residues and transfer them to a waste oil tank where they will be transported off site for recycling
- Piped and treat waste water and sewage in a properly designed, and maintained waste water treatment works. Regularly monitor the quality of effluent to ensure that it complies with Mozambique effluent standards. Where field toilets are necessary the number used will be sufficient for the number of people using them, and they will be regularly emptied and the contents disposed of at the waste water treatment works.
- Implement an ARD operating procedure.

Successful mitigation is readily feasible via a strictly implemented environmental management plan (EMP).

Significance Statement:

The construction phase may cause a medium term risk of pollution from chemicals and other hazardous materials, resulting in severe impacts of HIGH significance in the study area without mitigation. Since the proponent is committed to implementing the mitigation measures listed above the impact can be reduced to LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Severe	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Moderate	May Occur	LOW

Issue 2: Mine Dewatering

Impact 2.1: Mine Dewatering

Cause and Comment:

The initial excavations will not intercept large groundwater yielding features. Therefore, it is expected that the excavation will have a negligible dewatering impact on the weathered aquifers within the immediate vicinity of the pit area.

Mitigation Measures:

No mitigation measures are proposed as the initial excavation is unlikely to breach the water table at the Balama hills.

		Effect		Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Localised	Slight	Unlikely	LOW
With Mitigation	N/A	N/A	N/A	N/A	N/A

Issue 3: Mine water contamination

Impact 2.1: Mine water contamination

Cause and Comment:

Groundwater influxes into initial excavation are not expected. Deterioration in groundwater quality due to the increased suspended solids and oxidation of minerals during the construction phase is unlikely.

Mitigation Measures:

No mitigation measures are proposed as this impact is unlikely to occur.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Localised	Slight	Unlikely	LOW
With Mitigation	N/A	N/A	N/A	N/A	N/A

6.3.4 Impacts on the aquatic environment

Issue 1: Habitat Modification

Impact 1.1: Aquatic habitat modification

Cause and Comment:

During the construction phase aquatic habitats both within and adjacent to the project area might be modified. Degradation of upstream aquatic habitats will also impact on downstream reaches. The anticipated influx of work-seekers and the subsequent increase of the local population adjacent to the mine during construction will inevitably result in an increased degradation of the catchment, including clearing of vegetation, particularly in riparian areas, for farming activities and the construction of local dwellings. This secondary impact, together with the construction of new roads and upgrading of existing tracks near watercourses, may further degrade riparian zones leading to increased soil erosion and river bank instability resulting in elevated turbidity and sediment input degrading in-stream habitats. The opportunity for mitigating these impacts and protecting the riparian corridor and river channel will be greater within the designated project area, but attempts to mitigate the secondary impacts should also be made.

Mitigation Measures:

- Road and causeway construction will be guided by an EMP and specifications to ensure designs incorporate bank stabilization structures. These will be included on a construction environmental management plan (CEMP).
- Riparian buffer zones (no-development areas) of 30 to 50m on both banks to be demarcated on all watercourses within the project area where possible (and adjacent areas if feasible).

Significance Statement:

Without mitigation this highly significant, permanent potential impact on riparian and instream habitats will definitely occur both within and immediately adjacent to the project area. It should be noted that the proponent is committed to implementing the mitigation measures

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH
With Mitigation	Permanent	Study Area	Moderate	Probable	MODERATE

listed above and that the impact will be reduced to MODERATE significance

Impact 1.2: Loss of species of special concern

Cause and Comment:

The two fish species of special concern (the red-finned killifish and sand catlet) that may be new to science are adapted to shallow-water habitats and thus are vulnerable to impacts associated with this mining project, such as elevated sediment input and changes in flow dynamics. The other species of interest, the Red Data (Near Threatened) Mozambique tilapia, is known to be widespread in Mozambique, and there is a large "protected" population present in the Chipembe Dam, and which does not appear to be under any immediate threat.

Mitigation Measures:

A range of mitigation measures to reduce the negative impacts on aquatic habitats and fish biota in the study area are described in the aquatic assessment and in the sections above. However, effective mitigation is difficult, and in spite of these efforts, both these species may be at risk of being eradicated within the study area due to direct and indirect (secondary) impacts associated with the proposed mining venture, the latter been environmental degradation outside the mine project area. It is for this reason that the risk of this impact is rated as "may occur".

Significance Statement:

The significance on a regional or national level of losing these two "new" fish species of special concern is difficult to assess, as their distribution in adjacent rivers is currently unknown. If widespread in this region of northern Mozambique, the loss of these two species may not be highly significant. However, as this information is not presently available, a precautionary approach was taken in this assessment.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area	Severe	Probable	HIGH
With Mitigation	Long Term	Study Area	Moderate	May Occur	MODERATE

Issue 2: Aquatic Habitat Fragmentation

Impact 2.1: In-stream structures blocking migrations (bridges, causeways)

Cause and Comment:

The construction of any poorly designed in-stream structures associated with the project, could block natural fish migrations. Although the haul road does not traverse a steam, ancillary roads, especially during construction, are likely to impact on drainage areas.

Mitigation Measures:

- Ensure the provision of suitably designed bridges across rivers in the study area that allow free movement of fish and other aquatic biota.
- Incorporate suitably designed fishways on any in-stream dams or weirs, as required.

Significance Statement:

Any instream barriers to fish migration in these seasonal rivers would have devastating impacts on fish populations, as there would be no recruitment of migratory species into upstream reaches after the dry season. This could result in:

- Reduce breeding success of several fish species that undertake upstream spawning migrations.
- The natural longitudinal movements of fish for feeding, larval development or overwintering could be blocked, increasing mortalities.
- The isolation of upstream fish populations could result in negative genetic impacts and reduced survival fitness, while the prevention of recolonisation after high mortalities could threaten long-term viability of fish populations upstream of the barrier.

	Effect			Pick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area/ Regional	Severe	Probable	HIGH
With Mitigation	Long Term	Study Area/ Regional	Low	May Occur	LOW

Issue 3: Fisheries Resource

Impact 3.1: Over-utilization of fish resources

Cause and Comment:

The increase in local population due to the mining project and easy access to the rivers could result in overfishing and depleting of local fish populations. The few refuge pools retaining surface water in the dry season will most likely be very heavily fished. *Mitigation Measures:*

- This impact will be very difficult to counter by law-enforcement as this is not a declared fisheries area and currently environmental law-enforcement in this locality is virtually non-existent.
- A series of practical, common sense rules and restrictions to regulate fishing activities could be developed in consultation with the local Chief, village elders and local fishermen. If these rules are in place before the population increases, it will go a long way to help manage the fisheries resources in a sustainable way.
- The fisheries potential of Chipembe Dam should be investigated and possibly enhanced and developed. This could create work opportunities and catches from Chipembe Dam could provide a more sustainable all-year round source of fish for the local villages.

Significance Statement:

The fisheries resource in the seasonal rivers in the Study Area is fairly small and provides a

		Effect		Pick or	Overall
Impact Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Study Area/ Regional	Severe	Probable	MODERATE
With Mitigation	Long Term	Study Area/ Regional	Low	May Occur	LOW

seasonal protein source for a relatively small percentage of the local population.

6.3.5 Impacts on flora

Issue 1: Loss of Vegetation communities

Natural plant communities are dynamic ecosystems that provide habitats that support all forms of life. Different types of communities (and habitats) exist in the project area, and these occur within and around the project area. The Balama Graphite mine and associated project infrastructure will result in the clearance of approximately 150 ha of natural vegetation, resulting in the loss of plant communities. The impact of the loss of portions of the different habitats will differ, and these will need to be considered separately.

Impact 1.1: Loss of Riparian Woodland

Cause and Comment:

This vegetation type occurs along the banks of the river's and tributaries that occur in the project area. There are no planned project works that will directly impact on this vegetation type. Although degraded due to anthropogenic activities it is still considered to be an important ecological process area and activities in this area should be kept to a minimum.

Mitigation Measures:

The following mitigation actions are suggested:

- Detailed inventory in these areas to facilitate restoration;
- Restoration of this vegetation type after mining;
- Reducing the number of crossings through careful planning and design;
- Using bridge designs that afford the lowest impact on this vegetation;
- Locating project infrastructure away from sensitive areas where feasible;
- Locating bridges and river crossings at existing crossings and in areas that are already impacted;
- Designing and implementing a Rehabilitation Management Plan.

Significance Statement:

The loss of the Riparian Woodland during the construction phase will probably occur and will have a moderate, permanent impact. The environmental significance of this unmitigated impact would be MODERATE negative. With mitigation measures this will remain a MODERATE negative impact.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Moderate	Probable	MODERATE
With Mitigation	Permanent	Localised	Slight	Probable	LOW-

Impact 1.2: Loss of Miombo Woodland (Graphite)

Cause and Comment:

This vegetation type occurs on Mount Nassilala and will be most heavily and directly impacted by mining activities on the west and the east sections of the inselberg. Direct impacts are likely to be clearing of vegetation for the east and west pit as well as the plant site. Although there are large stands of bamboo, this vegetation type is fairly intact with a species composition unique to this inselberg. However, no locally endemic species were found to occur on the slopes of Mount Nassilala that did not occur elsewhere on the site. During the dry season it was noted that large trees were being harvested on this inselberg for construction purposes. This inselberg therefore provides an important ecosystem service to the surrounding communities.

Mitigation Measures:

- Detailed inventory in these areas to facilitate restoration;
- Areas impacted by construction activities and that are no longer required during the operation phase to be restored to their natural state;
- Restore impacted areas during the decommissioning phase;
- Creating no-go areas and ecological corridors on Mount Nassilala to preserve this area and facilitate the inselberg's continued function as a stepping stone and refugia for biodiversity (plants and animals);
- Demarcate and implement a 50 m buffer around this area;
- Avoid locating unnecessary infrastructure such as the TSF and mine plant within this 50 m buffer.
- Design and implement a Rehabilitation and Offset Strategy Management Plan.

Significance Statement:

A total of 834 ha is found on site, making up 10.5% of the project area. The loss of 7.8% of the *Miombo Woodland: Graphite* (64.3 ha) on site due to clearence during the construction phase will have a severe, permanent impact. The environmental significance of this unmitigated impact would be HIGH negative. With mitigation measures this will be reduced to a MODERATE negative impact.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH
With Mitigation	Permanent	Study Area	Moderatley Severe	Definite	MODERATE

Impact 1.3: Loss of Miombo Woodland: Granite

Cause and Comment:

This vegetation type occurs on Mount Coronge and may be directly impacted by mining activities on the western tail of the inselberg where the east pit is situated. Direct impacts are likely to be clearing of vegetation when the pit is mined. This vegetation type has been cleared for agriculture on the lower slopes and there is evidence of harvesting large trees higher up. Despite this, the areas that remain intact have a species composition that appears to be unique to this area. No locally endemic species were found to occur on the slopes of

this area. There are a number of large *Sterculia appendiculata* that occur on the slopes of Mount Coronge.

Mitigation Measures:

- Restore this vegetation type to its natural state after mining;
- Areas impacted by construction activities and that are no longer required during the operation phase to be restored to their natural state;
- Avoid locating infrastructure in areas with large numbers of Sterculia appendiculata;
- Where feasible, design the mining pits to reduce the amount of vegetation that needs to be cleared;
- Create qualified-go areas and ecological corridors on Mount Coronge to preserve the areas that will not be mined. This will allow this inselberg to continue functioning as a stepping stone and refugia for biodiversity (plants and animals) and will continue to provide important ecosystem services to the local communities;
- Demarcate and implement a 50 m buffer around this area;
- Move infrastructure such as the new mine camp, outside of this 50 m buffer;
- ECO to ensure that no structures within the mine camp area fall within the 50m buffer area; and
- Design and implement a Rehabilitation Management Plan.

Significance Statement:

Based on the current layout, no infrastructure or project activities will impact this vegetation type. The loss of the *Miombo Woodland: Granite* is therefore unlikely to occur and the severity of the impact is therefore rated as a moderate, short term impact. The environmental significance of this unmitigated impact would be MODERATE negative as only 1.5 ha will be cleared out of 149 ha. With mitigation measures this will be reduced to a LOW negative. If the layout is to change then this impact will need to be reassessed.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Moderate	Unlikely	MODERATE
With Mitigation	Short Term	Localised	Moderate	Unlikely	LOW

Impact 1.4: Loss of Intact Miombo Woodlands: Plains

Cause and Comment:

This vegetation type occurs to the east of Nquide village and has been assigned a high sensitivity. Although not directly impacted by project infrastructure, the displacement of agricultural fields and access to natural resources by the mine may lead to the clearing of this area as it is within easy walking distance of the village. In-migration from outside areas may place additional pressure on this area.

Mitigation Measures:

- Employ members of the local community instead of outsiders. This will reduce the level of in-migration from outside areas thereby reducing the pressure on the natural resources found in this vegetation type.
- Implement more efficient and intensive agricultural practices that reduces the amount of land cleared for agriculture. Possible irrigation systems using water from Chipembe Dam may be a viable solution.

• Introduce cash crops that are more economically viable than the cotton industry and produce greater yields per hectare. This will reduce the amount of clearing of natural vegetation.

Significance Statement:

The loss of intact *Miombo Woodland: Plains* during the construction phase is probable if there is an influx of outsiders seeking work at the mine and will have a severe, permanent impact. The environmental significance of this unmitigated impact would be MODERATE negative. With mitigation measures this will be reduced to a LOW negative impact.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Probable	MODERATE
With Mitigation	Long-Term	Localised	Slight	Unlikely	LOW

Impact 1.5: Loss of Degraded Miombo Woodlands: Plains

Cause and Comment:

This vegetation type occurs in the flat, low lying areas through much of the project site. This vegetation type is heavily harvested by villagers for construction timber, firewood and charcoal production. Consequently it has a low species diversity index. Despite this it is still considered an important ecological process area providing refuge to local wildlife such as birds, reptiles and amphibians.

Mitigation Measures:

- Where feasible, reduce the footprint of the infrastructure to the minimal required area;
- Impacted areas during the construction phase to be rehabilitated if not required during operation;
- It is possible that individuals who have had their agricultural land displaced by the mine will make up for this by clearing additional land within this vegetation type. Further clearing will result in induced secondary impacts which may be prevented through the introduction of more efficient agricultural practices as well as introducing cash crops that are more economically viable.

Significance Statement:

The loss of degraded *Miombo Woodland: Plains* during the construction phase will definitely occur and will have a moderate, permanent impact. The environmental significance of this unmitigated impact would be MODERATE negative. With mitigation measures this will remain a MODERATE negative impact.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Moderate	Definite	MODERATE
With Mitigation	Long Term	Study Area	Moderate	Definite	MODERATE

Issue 2: Loss of Biodiversity

The Balama Graphite Mine concession area consists of a number of habitats which include inselbergs, the riparian zone, agricultural areas and surrounding natural vegetation. These

habitats comprise of the following vegetation types: *Riparian woodland* in the Riparian zone; *Miombo Woodland: Granite* and *Miombo Woodland: Graphite* that occurs on the inselbergs and degraded and *Intact Miombo Woodland: Plains* that occurs in the flat low lying areas interspersed between agricultural land.

Unique habitats on the site have been shown to contain a high biodiversity, for example, the inselbergs that support the granite and graphite Miombo woodlands have a high biodiversity. The mine will result in the partial clearance of these habitats, particularly the Miombo Woodlands associated with the graphite deposits, reducing the areas potential to support biodiversity through habitat destruction and reduction.

Impact 2.1: Loss of Biodiversity (general)

Cause and Comment:

Mining activities and the associated infrastructure will result in the removal of large areas of vegetation, resulting in the loss of biodiversity.

Mitigation Measures:

- Set aside key representative portions of each vegetation type, as conservation areas within the mining area. The ecological corridors are presented to mitigate site specific impacts. However, in the event that additional resources are found to occur within these corridors, then alternative mechanism for protecting the habitats will be required. This may include, for example, establishing a biodiversity offset to protect similar habitats, contributing towards the management of existing protected areas or other mechanisms that achieve the end goal of protecting ecological processes and sensitive vegetation types of importance.
- Prevent mining employees from harvesting plants for personal use, firewood or charcoal within the mining area;
- Maintain ecological corridors within the mining area; and
- Design and implement a Rehabilitation Management Plan.

Significance Statement:

The mining activities will definitely result in the loss of biodiversity and this will have a severe permanent impact. The environmental significance of this unmitigated impact would be HIGH NEGATIVE. Mitigation measures will reduce this to a MODERATE NEGATIVE impact.

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH
With Mitigation	Long Term	Study Area	Moderate	Definite	MODERATE

Issue 3: Loss of Species of Special Concern

Three species of special concern (*Habenaria sp., Sterculia appendiculata* and *Afzelia quanzensis*) were identified at the Balama Graphite Project site and will be impacted on by the proposed mine. It is likely that additional species will be identified during the construction and operational phase of the project.

The impacts at a larger spatial scale will only be important in the case of species that have a globally restricted range, or are otherwise in need of protection. In these cases the mining process may significantly reduce the *area of occupancy* of the species. A reduction of the

area of occupancy in turn may threaten the chances of survival for these plant species of concern. However, the significance of an impact differs depending on our knowledge of the distribution of these plant species.

Impact 3.1: Loss of Species of Special Concern

Cause and Comment:

Mining activities and the associated infrastructure will result in the loss of species of special concern, as well as other species that are important to ecosystem functioning.

Mitigation Measures:

- Set aside key representative portions of each vegetation type as conservation areas within the mining area;
- Maintain an ecological corridor within the mining area;
- Avoid locating infrastructure such as the mine camp and TSF in areas with high numbers of species of special concern such as on the southern slopes of Mount Coronge where a number of *Sterculia appendiculata* trees were noted. Note that the revised layout plan has considered ecological sensitivity and have resulted in shifting some of the infrastructure including the camp site; and
- Collect seeds from established trees and where feasible relocate samplings of species of special concern.

Significance Statement:

The mining activities will probably result in the loss of Species of Special Concern and will have a moderate impact in the long term. The environmental significance of this unmitigated impact would be MODERATE negative. While mitigation measures could reduce the spatial and temporal scale of the impact, they are unlikely to be very effective and the impact will still remain MODERATE negative.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Localised	Moderate	Probable	MODERATE

Issue 4: Disruption of Ecosystem Function and Process

Impact 4.1: Fragmentation of vegetation and edge effects Cause and Comment:

Fragmentation is one of the most important impacts on vegetation, especially when this creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. This impact occurs when large areas are cleared for agriculture or burned to create green grass for grazing, or to establish crops. Fragmentation results in the isolation of functional ecosystems, and results in reduced biodiversity and reduced movement due to the absence of ecological corridors. Although the project area already has large areas cleared for agriculture, mining processes and associated infrastructure such as roads and pipelines will severely increase fragmentation within the project area, and possibly remove an important "stepping stone" through the clearing of vegetation on Mount Nassilala.

Mitigation Measures:

- Set aside an ecological corridor within the project area that encompasses all of the vegetation types defined in this report;
- Use existing access roads where feasible;
- Align roads and pipelines within a single corridor and keep this as narrow as feasible;
- Avoid locating linear infrastructure (such as roads and pipelines) through areas of high and moderate sensitivity.

Significance Statement:

The mining activities will definitely result in habitat fragmentation and will have a moderate, permanent impact. The environmental significance of this unmitigated impact would be HIGH negative. With mitigation, this will be reduced to a MODERATE negative impact.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH
With Mitigation	Long Term	Study Area	Moderate	Probable	MODERATE

Impact 4.2: Disruption of ecological systems and functions

Cause and Comment:

Dust will be generated as a result of construction activities and, in particular, where there is exposed ground. Specific activities that may contribute to release of fugitive dust include offloading and stockpiling of building materials such as sand, excavation, demolition of existing structures, storage of excavated materials and movement of heavy vehicles, but especially the clearing of vegetation in areas for site preparation. The generation of dust may be higher during windy, dry periods. Dust may result in the smothering of vegetation located adjacent to these areas reducing light penetration and, subsequently stunting or inhibiting development and growth.

Mitigation Measures:

- Employ dust suppression measures such as wetting of the project area during dry, windy periods;
- Avoid clearing unnecessarily large areas;
- Limit the height of stockpiles;
- Enforce speed limits for vehicles associated with the construction activities.

Significance Statement:

The impact to terrestrial systems associated with any dust produced during construction will probably be a short term, moderate impact. The overall significance would be MODERATE negative. This can be reduced to LOW negative with the implementation of mitigation measures.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Short Term	Localised	Low	Probable	LOW

6.3.6 Impacts on fauna

Various activities are associated with the construction phase of the mining project. This section presents the issues that may impact terrestrial faunal systems arising from the construction of the mine, including its associated infrastructure such as accommodation (which is minimal during normal operations), the haul road and the associated infrastructure.

Issue 1: Loss of Biodiversity

All faunal groups will suffer a general loss of biodiversity due to varied impacts, such as increased mortality from vehicle movements, loss and fragmentation of suitable habitat due to the footprint of project structures, and various forms of pollution associated with traffic and development. This will be greatest for small, slow-moving species, e.g. amphibians, tortoises and snakes; and terrestrial species will suffer higher mortalities than arboreal or burrowing species. Volant species (birds and bats) will suffer less mortality, except where important breeding or roosting sites are lost. For all groups there will be increased mortality. The main impacts affecting biodiversity include:

- Long-term displacement of faunal groups leading to loss of diversity due to a loss of essential habitat, especially woodland habitat.
- Definite and permanent loss of daily movement corridors for fauna dependent on closed-canopy vegetation or specialised (restricted) habitat along the drainage lines and rivers.
- Indirect, long-term impacts associated with increased anthropogenic encroachment and the non-sustainable use of natural resources (e.g., uncontrolled logging, charcoal extraction, and hunting).

Impact 1.1: Loss of Amphibian Diversity

Cause and Comment:

Amphibians are a specious group of terrestrial vertebrates in the concession area. Due to habitat loss and mortalities directly associated with specific project actions, a loss of amphibian diversity will probably occur. Amphibian mortalities will occur during all phases (construction and operational) but will be most significant in association with habitat loss, particularly of wetlands.

Applying a precautionary approach, a total of 39 amphibians may be expected to occur in the region of the study site.

The most sensitive habitats for amphibians are the riparian zone and associated wetlands, either on site or downstream from mining activities.

Mitigation Measures:

- Avoid clearing or damaging wetlands, and limit river and stream crossings as far as possible. Associated infrastructure, particularly transport linkages, should avoid these areas, including a buffer distance of 30 m.
- Wetlands will be protected and/or rehabilitated if damaged.
- Maintenance of water quality and flow dynamics.

Significance Statement:

Impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the Study Area on amphibian diversity. The environmental significance of this impact is MODERATE, and LOW after mitigation.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	LOW

Impact 1.2: Loss of Reptile Diversity

Cause and Comment:

The Study Area probably contains a greater diversity of reptiles than discovered during the survey. Reptile populations, particularly snakes, are difficult to study. Increased human numbers associated with the development of the project will lead to increased mortality of snakes directly from road mortalities and human attitudes, as well as the loss of other reptiles from habitat loss and fragmentation. Applying a precautionary approach, a total of 40+ reptiles may be expected to occur in the region of the study site.

The most sensitive habitats for reptiles are the rocky outcrops and wetlands, either on site or downstream from mining activities.

Mitigation Measures:

- Protect abiotic habitats, such as rock outcrops, which shelter many reptile species.
- Prohibit exploitation of sensitive reptiles, e.g. chameleons.
- Educate mine staff about the necessity of protecting snakes.

Significance Statement:

Impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the Study Area on reptile diversity. The environmental significance of this impact is MODERATE, and LOW after mitigation.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	LOW

Impact 1.3: Loss of Bird Diversity

Cause and Comment:

Birds are by far the most speciose vertebrate component in the region. Birds play important and diverse roles in ecosystem functioning (e.g. seed dispersal and trophic transfer) and maintenance of bird diversity is important to maintain viable habitats. Although a few birds are commensal, and can rapidly and successfully adapt to disturbed environments, the majority of birds are sensitive to disturbance and either migrate away from, or suffer greater mortality within, degraded habitats. However, because of their high mobility, birds are capable of rapidly re-colonising rehabilitated habitats, provided suitable microhabitats are available. Applying a precautionary approach, a total of nearly 300 birds may be expected to occur in the general region of the study site.

The most sensitive habitats for birds are mature miombo woodland, the riparian zone and associated wetlands.

Mitigation Measures:

- Maintain habitat connectivity, particularly to protected areas, via habitat corridors.
- Undertake habitat clearance during winter when birds are not breeding.

Significance Statement:

Impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the Study Area on bird diversity. The environmental significance of this impact is MODERATE, and LOW after mitigation.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	LOW

Impact 1.4: Loss of Mammal Diversity

Cause and Comment:

The long history of human settlement, associated with subsistence and later commercial farming, has greatly reduced the presence of large mammals in the region. The maintenance of the small mammal diversity depends on the maintenance of habitat corridors and diversity.

Despite the largely undisturbed nature of the habitat, the study area appears to have very limited mammalian activity due to a series of existing impacts. These include vegetation clearing and logging, subsistence hunting, the effect of feral dogs and the effects of livestock agriculture. These impacts on mammals could be intensified by activities associated with the mine, particularly accidental road kills and increased hunting associated with increased human numbers in the region. Applying a precautionary approach, a total of 50+ mammals may occur in the region of the study site, although a significant proportion of these will be small mammals, particularly bats, whose use of the area may be seasonal. The most sensitive habitats for mammals are mature Miombo woodland and rocky ridges.

Mitigation Measures:

- Maintain habitat connectivity, particularly to intact habitats, via habitat corridors.
- Protect abiotic habitats, such as rock outcrops, which shelter many small mammals, particularly bat roosts.

Significance Statement:

Impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the Study Area on

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Severe	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE

mammal diversity. The environmental significance of this impact is MODERATE.

Impact 1.5: Loss of Species of Conservation Concern

Cause and Comment:

No amphibian SSC occur in the region, although eight reptiles are listed on CITES appendices. Many large birds (particularly owls and raptors) and large mammal species are either of conservation concern, or are listed on international trade controls (CITES). Although no reptile species in the region are listed on the IUCN Red List, a number are listed on CITES. Trade in the African rock python (*Python natalensis*), two species of monitor lizard (*Varanus niloticus* and *V. albigularis*), two tortoises (*Stigmochelys pardalis* and *Kinixys zombensis*), and a chameleon (*Chamaeleo dilepis*) are regulated, all being listed on CITES App 2. One lizard (*Afroblepharus* cf. *wahlbergi*) is of problematic taxonomic status.

Among birds within the study area, three are endangered, five vulnerable and nine nearthreatened species. Based on its geographical position, the study area is expected to provide habitat for bird species that are prominent in Miombo woodlands, although there are no regional endemic species for this habitat in the region. Specifically, the riparian woodland, rock outcrops and intact Miombo woodland were identified as important bird habitats, as these facilitate bird dispersal and provide specialised habitat for habitat-restricted species. Parker (2005a) noted an increased utilization of birds for food and for the cage-bird trade that can be expected to increase with increasing access to Asian markets.

There are no IUCN Red Listed mammal SSC in the area that will be impacted by direct project activities.

Mitigation Measures:

- Maintain habitat connectivity, particularly to intact habitats, via habitat corridors.
- Protect abiotic habitats, such as rock outcrops, which shelter many small faunal species, including reptiles and bats.
- Design project structures and transport linkages will avoid where possible sensitive habitat corridors, e.g. drainage lines and wetlands.
- Where possible limit road traffic after dark, as much of the surviving fauna is nocturnal, e.g. bats, most snakes, small rodents, amphibians, etc.
- Vehicle speeds will be limited, and should not exceed 50km/h on the mine site.
- Drivers will be educated regarding their role in impacting on animals and the need to minimize collisions with animals at all times.

Significance Statement:

Impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the Study Area on Species of Special Concern. The environmental significance of this impact is MODERATE, and LOW after mitigation.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	LOW

Impact 1.6: Faunal impact of habitat fragmentation and loss

Cause and Comment:

Various components of the development will cause biodiversity loss directly or indirectly through fragmentation of viable habitats for the various faunal groups. This is usually a loss of vegetation (plant communities) that supply food or shelter, but may include abiotic features such as the loss of temporary wetlands, caves or rock outcrops.

Impacts to sensitive habitats are highly probable and will be local and negative in nature, and occur over the long-term. The significance of these impacts may vary from low to high depending upon the local importance of the habitat and the particular fauna that it harbours.

The proposed transport linkages and associated infrastructure will all cause additional habitat loss and fragmentation, over and above the mining area. The greatest impact on habitat loss and fragmentation will be associated with the waste and tailings areas, as well as the mine site, dwellings and the haul road. The negative impact of habitat loss associated with the development of the mine cannot be fully mitigated. But the following mitigation measures can assist in reducing the severity of the impact.

Mitigation Measures:

- All specific project actions associated with construction, access roads, borrow pits and cut-and-fill construction will avoid sensitive habitats as far as is practicable.
- Natural drainage will be maintained and the silt loads into rivers, streams and wetlands must stay within normal limits.
- Maintain habitat connectivity, particularly to intact habitats, via habitat corridors.
- Protect abiotic habitats, such as rock outcrops, which shelter many small faunal species, including reptiles and bats.
- Where possible, design project structures and transport linkages to avoid sensitive habitat corridors, e.g. drainage lines and wetlands.

Significance Statement:

Impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact on the fauna in the medium term in the Study Area due to habitat loss and fragmentation. The environmental significance of this impact is MODERATE, and LOW after mitigation.

	Effect			Pick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Study Area	Slight	May Occur	LOW

Issue 2: Additional Construction Impacts on Fauna

A variety of impacts are likely to result from the construction of the various components of the mine, both during the construction and operational phases.

However, a significant and widespread impact results from increased transport in the region. Roads are known to alter physical characteristics of the environment and through these impacts roads affect ecosystems, biological communities and species in numerous and different ways.

Impact 2.1: Ecological impacts from dust

Cause and Comment:

Increased dust levels are common during construction especially from veld clearance and increased vehicular traffic. Short-term increased dust levels will accompany all land preparation associated with construction of mine infrastructure.

Mitigation Measures:

- The unpaved haul road is to be watered down during high wind and dry weather conditions.
- Road speeds in sensitive regions e.g. near wetlands, across drainage lines, and during extreme dry climatic conditions, to be limited to curtail dust production.
- Vehicle speed should not exceed 50km/h.
- Where feasible, any construction material is to be transported by covered trucks or containers to avoid contamination to the surrounding area.

Significance Statement:

The impact of increased dust associated with the construction of the proposed mine development in the project area will definitely result in a moderate negative impact in the medium-term in the Study Area on the fauna. The environmental significance of this impact is MODERATE, and LOW after mitigation.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Short Term	Study Area	Slight	May Occur	LOW

Impact 2.2: Disruption to fauna from increased noise levels

Cause and Comment:

Mining construction and associated vehicle traffic will create noise pollution that can depress local populations of sensitive faunal groups. Animals differ in the degree to which they tolerate such disturbance, and can be expected to have potentially negative and positive impacts on various faunal groups. Large breeding birds do not usually tolerate continuous disturbance. Increased noise and motor vibrations in wetlands may also impact amphibian breeding choruses, but these impacts will be localised and many amphibian species are surprisingly tolerant of vehicle noise. Noise pollution will occur during all phases (construction, operational, and de-commissioning/closure). Little mitigation is possible.

Mitigation Measures:

• Mitigation of this impact is difficult, but noise reduction measures should be implemented in all sensitive areas (e.g. adjacent to wetlands) at sensitive times (e.g. at night).

• Construction activities after dark will only be considered in special highly managed circumstances.

Significance Statement:

Impacts associated with increased noise levels during the construction of the proposed mine development in the project area will definitely result in a moderate negative impact in the medium-term in the Study Area on the fauna. The environmental significance of this impact is MODERATE.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Short Term	Study Area	Slight	May Occur	LOW

Impact 2.3: Chemical Pollution

Cause and Comment:

Many faunal groups are sensitive to pollutants. Lead concentrations are higher in small terrestrial mammals collected alongside roads than in bats caught in the same areas. Frog diversity in ponds affected by pollution from road run-off is depressed, and the accumulation of herbicides and their residues in adjacent wetlands can lead to developmental abnormalities in tadpoles and metamorphosing froglets as well as masculinization of female frogs. Pollution may result from periodic accidents, or from a slow, on-going contamination. Operation of the mine particularly in relation to the use of inflammable liquids such as diesel will probably result in periodic accidents. Heavy vehicle traffic is also associated with increased local pollution resulting from exhaust fumes, oil spillage and accumulation of rubber compounds from tyre wear. These pollutants can cause localised impacts. Sensitive wetlands or patches of threatened vegetation may need protection from road surface water run-off containing such pollutants and the application of herbicides to control plant growth alongside roads and around buildings will be monitored.

Mitigation Measures:

- Storage facilities for chemicals, particularly diesel, will not be situated in low lying areas subject to flooding.
- Design chemical storage facilities so that in the event of spillage their contents are contained within the bunds for decontamination.
- The use of insecticides and herbicides will be closely monitored with dosages and applications detailed in the EMP.

Significance Statement:

Unmitigated chemical pollution resulting from impacts associated with construction of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the Study Area on the fauna. The environmental significance of this impact is MODERATE, and LOW after mitigation.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Short Term	Study Area	Slight	May Occur	LOW

6.4 Mining related impacts resulting from the operational phase

6.4.1 Impacts on topography and geology

Cause and Comment:

Mining activities will result in the excavation of mine pits, a tailings storage facility and out of pit stockpiles all of which will change the natural surface topography and geology.

Mitigation Measures:

- The height of out of pit stockpiles and WRD will be kept low and where possible designed to blend with the natural topography;
- Out of pit stockpiles will be removed or re-profiled to more natural forms as part of the mine rehabilitation;

Significance Statement:

The impact on topography and geology is considered permanent at a scale affecting the mine area. The issue is definitely considered to be of MODERATE significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Localised	Moderate	Definite	MODERATE
With Mitigation	Permanent	Localised	Slight	Definite	LOW

6.4.2 Impacts on soils and agriculture

Issue 1: Impacts on soils

Impact 1.1: Soil contamination

Cause and Comment

Leakages and spillages from storage and infrastructure facilities could have a negative effect on soil.

Mitigation measures:

Mitigation measures are the same as that listed for the construction phase, thus refer to Section 6.3.2, Issue 1, Impact 1.2.

Significance Statement:

The impact of contamination from storage and infrastructure is considered long term at a regional scale. The issue is considered moderate to severe and of HIGH significance. It is probable that the impact will occur. Since the proponent is committed to implementing the the mitigation measures listed above the impact will be of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Regional	Probable	Moderate to Severe	HIGH
With Mitigation	Short Term	Localised	May Occur	Slight	LOW

Issue 2: Impacts on agriculture

Issue 1: Groundwater contamination through tailings leachate

The remaining mined rock which has been ground to a slurry to allow removal of the graphite is tailings which are transferred and kept in a tailings storage facility (TSF). Water is decanted from the TSF and recycled while the dewatered solids remain. The tailings can contain sulphur which can convert to sulphuric acid if the tailings are exposed to oxygen. Acidity can be consumed by carbonates also contained in the ore but if not consumed could promote the leaching of metals in the ore that can migrate and contaminate the environment if not properly contained. Normal management of tailings would maintain high pH if necessary by the addition of lime during processing to avoid formation of acid. The impact is further mitigated by constructing the TSF with a clay liner, which will effectively prevent the penetration of any potentially contaminated leachate into the environment via the ground water.

Impact 1.1: Possible contamination of groundwater through leaching of toxic materials from tailings storage facility Cause and Comment:

Potential environmental impacts may include groundwater and surface water contamination due to the leaching of metals. However, based on the groundwater modeling, plume migration from the fractured aquifer beneath the TSF will be negligible to nil as the TSF will be clay lined, and no water supply borehole is predicted to be impacted due to seepage of AMD water from the TSF.

Mitigation Measures:

- Mining must target low sulphur oxidised ore of which there are large quantities with low sulphur levels.
- The levels of sulphur and carbonates in the ore are to be tested and investigation made to determine the potential for acid formation. If there is potential for acid formation lime must be added to the ore being processed to consume any acid formed;
- The tailings storage facility will be designed and operated to contain tailings to prevent infiltration of leachate with the potential to cause AMD into groundwater.
- Geotechnical studies will be undertaken to determine the need for appropriate liner and sub-drainage systems to collect or recycle water.
- Install leak detection equipment with an appropriate Leak Response Plan.
- Monitor surface and groundwater on a continuous basis throughout all phases of the project to ensure early detection.
- Install groundwater monitoring points around the TSF.

Significance Statement:

A moderate potential exists for AMD formation from the TSF due to the high sulphur content and acid generation potential. As a result of AMD, the potential exist for low pH water, bearing high concentrations of AI, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U to seep into the aquifers beneath these facilities during the operational phase, if the TSF and waste rock dumps are not lined. These ccontaminants will seep downward to the weathered aquifer beneath these facilities and are predicted to migrate further vertically to the underlying fractured aquifer, from where the plume will be directed towards the pits. However, as the TSF will be clay lined. This would result in an impact of HIGH significance. However, as the TSF will be clay lined plume migration from the fractured aquifer beneath the TSF is likely to be negligible to nil and the impact will be LOW negative.

Impact		Effect	Bick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Probable	Severe	HIGH
With Mitigation	Short Term	Localised	Unlikely	Moderate	LOW

6.4.3 Impacts on surface water resources

Issue 1: Water Quality

Impact 1.1: Sedimentation and elevated turbidity in rivers

Cause and Comment:

The negative impacts of sedimentation and elevated turbidity in rivers can be very significant and even lethal for aquatic biota, including fish. Earthmoving activities associated with mining operations may be undertaken without taking effective anti-erosion measures. After heavy rains sediment-laden run-off from mining sites, waste rock dumps (WRDs), as well as spills from the tailings storage facility (TSF), erosion of containment walls, etc., may result in sediment-laden water entering adjacent drainage lines leading to nearby rivers.

Mitigation Measures:

Mitigation measures are the same as what is listed for the construction phase, thus refer to Section 6.3.3, Issue 1, Impact 1.1.

Significance Statement:

During the operational phase of the project, a permanent impact of HIGH significance is definitely anticipated without mitigation. With mitigation this impact can probably be reduced to MODERATE significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Very Severe	Definite	HIGH
With Mitigation	Permanent	Regional	Moderate	Probable	MODERATE

Impact 1.2: Contamination from non-ore pollutants

Cause and Comment:

Hazardous materials and chemical pollutants (e.g. hydrocarbons, flotation reagents, uncured cement, paints, cleaning fluids, etc.) associated with mining activities, as well as washing detergents and soap, poorly-treated domestic effluents, and mine workers using rivers and riparian zones for ablutions, could pollute both groundwater and surface water. These pollutants could be harmful to aquatic biota and impact on drinking water quality for communities and domestic stock downstream.

Mitigation Measures:

Mitigation measures are the same as what is listed for the construction phase, thus refer to

Section 6.3.3.

Significance Statement:

The mining operations may cause a medium term risk of pollution from chemicals and other hazardous materials, resulting in severe impacts of high significance in the study area without mitigation. It should be noted that the proponent is committed to implementing the mitigation measures listed above and the impact can be reduced to LOW.

Impact		Effect	Pick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Very Severe	Probable	MODERATE
With Mitigation	Permanent	Regional	Moderate	May Occur	LOW

Impact 1.3: Contamination from Ore and waste rock dumps

Cause and Comment:

The ore is generally depleted of sulphur above the limit of oxidation. However deeper underground the ore deposit contains sulphur and in the presence of oxygen and water this can be converted to acidic sulphide minerals. The mining of ore will target oxidised ore for processing which has low sulphur. Areas of ore bearing sulphide minerals within the pit will be exposed to rainfall and could generate acid. Waste rock dumps (WRDs) may generate acid mine drainage (AMD). Neutralisation of any acid will occur through reactions with carbonates contained in the ore thus countering the potentially acid forming materials (PAF). The amounts of sulphur and neutralising minerals will be tested to determine potential for excess acid. A limestone quarry in the vicinity of the mine may be a source for further neutralisation if required.

Contamination by metals present in the ore body is a possibility if AMD is not mitigated. Correct exploitation of these "natural" neutralising pathways should significantly minimize the potential for AMD generation and downstream contamination of water bodies. AMD could contaminate adjacent rivers as well as groundwater and impact negatively on aquatic biota as well as constitute a health hazard to communities downstream from the mine site.

Mitigation Measures:

- Mining of low sulphur ore preferentially;
- Testing and determination of the potential for acid formation.
- Design waste rock dumps and stockpiles to include encapsulation of PAF materials and control of runoff so that it does not discharge;
- Utilise limestone to neutralise the acid forming potential from sulphide minerals in mine waste.
- Retain and pump contaminated water from the mining operations and WRD sites to the TSF.
- Treat and neutralize low pH water .
- Conduct regular chemical analyses of effluent from the mine, including for metal concentrations.
- Implement practices, as set out in EMP, to prevent pollution from the TSFs and WRDs to ensure full containment and treatment of contaminated run-off, as well as anti-pollution management practices during mining operations, as well as during decommissioning/closure –.

Significance Statement:

The operational phase may cause a risk of pollution from AMD, resulting in severe impacts of MODERATE significance in the study area without mitigation. With mitigations in place this impact should be reduced to LOW significance.

Impact		Effect		Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Severe	May Occur	MODERATE
With Mitigation	Permanent	Regional	Moderate	Unlikely	LOW

Issue 2: Hydrology

Impact 2.1: Alteration of river flow dynamics

Cause and Comment:

During operational phase earthworks associated with mining could alter the natural topography. This could destroy drainage lines or alter natural flow patterns within the project area and thus drainage to adjacent streams. Mine dewatering was modelled in the geohydrology study for two scenarios. An L-shaped zone of influence in the weathered aquifer was predicted to extend 3 km to the north. To the west, the zone of influence extends 1 km from the pit boundary towards Mualipue Town. The western zone of influence is not predicted to traverse the Mualipue River; however, the water levels in boreholes in the vicinity are predicted to be drawn-down by between 12 and 8 m during the operational phase. The zone of influence will likely extend 1.5 km south of the pit boundary and boreholes in Mualia Town are predicted to be impacted by the dewatering process. However, the results of the model indicate that all river systems fall outside the zone influenced by drawdown, and hence will not be directly impacted by any lowering of the water table Indirect effects due to topographical changes could affect the Mualipue River on the eastern boundary of the project area which drains into the Mehucua River, as well as the Mehucua River itself which is located downslope of the mining area to the south-east.

Mitigation Measures:

Little can be done to mitigate this impact apart from attempting to ensure that surface run-off within the project areas is kept as natural as possible and natural drainage lines remain functional. However, the impact is considered low and no mitigation, other than for stormwater management already mentioned earlier is required. In the long term rehabilitation at mine closure will mitigate this impact.

Significance Statement:

This long-term impact of moderate significance will probably only be apparent during the construction and operation phases, and the situation could revert close to the pre-mining condition after mine closure, with appropriate mitigation and rehabilitation measures. The groundwater contribution to base-flow in these seasonal rivers may be low, but could be important in maintaining permanent surface water in isolated refuge pools during the dry season, such as at the junction of the Namiticu and Naconha rivers.

Impact		Effect	Pick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Slight	Possible	LOW
With Mitigation	Permanent	Study Area	Slight	May Occur	LOW

6.4.4 Impacts on groundwater resources

Issue 1: Mine dewatering

Cause and Comment:

Excavation of the Balama pits will change the topography, creating a cone of depression with a hydraulic gradient toward the pit. As a result groundwater from the Balama hills will flow towards the Eastern and Western pits in response to the hydraulic gradient.

When groundwater flows towards the pit (during mining) it inevitably dewaters and lowers the groundwater levels in the surrounding area. As the pit develops, the zone of influence of the groundwater level drawdown migrates and expands as the groundwater system attempts to retain a state of equilibrium.

The Balama West pit is predicted to start intercepting groundwater inflow from the fourth quarter of 2018 at a rate of 84 m³/d. The inflow rate is predicted to increase to 2,275 m³/d towards the end of 2019, when mining in Stage 1 nears completion. At the end of Stage 2 mining (Q1 of 2021), the inflow rate is predicted to be 3,440 m³/d. During the first quarter of 2027, when mining in Stage 3 nears completion, the inflow rate is predicted to increase to 5,443 m³/d. At the end of mining at Balama West (Q3 of 2027), an inflow rate of 5,065 m³/d is predicted.

From the fourth quarter of 2027 onwards, the inflow rates into the Balama West pit is predicted to taper down following the cessation of dewatering from the pit. A pit lake will develop in Balama West Pit while active mining operations continue in Balama East Pit. Inflows into Balama West pit are predicted to gradually reduce to 124 m³/d until operations end in Balama East.

The Balama East Pit is predicted to start intercepting groundwater inflow from the fourth quarter of 2030, at an initial rate of 58 m³/d. The inflow rate is predicted to increase to 1,375 m³/d as Stage 5 mining reaches its peak (Q1 of 2032). The inflow rates are predicted to increase to 3,929 m³/d at the end of Stage 6 mining (Q3 of 2044). In the third quarter of 2049, when mining in Stage 7 nears completion, the inflow rates are predicted to decrease to 2,862 m³/d. At the end of mining at Balama East (Q4 of 2056), the inflow rates are predicted to rise to 4706 m³/d.

Mine dewatering is crucial to keep the pits dry for safe working conditions. The consequence of dewatering drawdown are conceptually the same as those caused by pumping groundwater for other purposes and can therefore generally be analysed in an analogous manner. The basic principles by Theis (1940) clearly show that abstraction from any aquifer will eventually be matched by some combination of the following three responses:

- A decrease in the volume of groundwater in natural storage;
- An increase in the rate of groundwater influx; and
- A decrease in the rate of natural groundwater discharge.

The peculiarity of mine dewatering systems lies in the deliberate maximisation of the first of those three responses, which is principally manifested in the lowering of the water table. The lowering of the water table in the vicinity of water supply, as a result of mine dewatering may lead to an increase in the pumping head (and therefore pumping cost), if not complete drying of boreholes, and a decrease in borehole yield or spring flow.

In Balama West, the dewatering process is unlikely to lower water levels in any of the supply boreholes in Mualipue Town, and boreholes Pirira BH1, Pirira BH2 and Pirira BH3 are not predicted to be impacted by mine dewatering. The Mualipue River is also not predicted to be impacted by mine dewatering .

The zone of influence is expected to extend 1.3 km in a northeast-southwest direction from the pit centre. Thus the camp water supply boreholes (Camp BH1 and Camp BH2) are also not predicted to be impacted by mine dewatering. The water level in monitoring borehole BBH2 is predicted to be drawn-down to a maximum of 10 m during mining at Balama West. BBH3 is not predicted to be impacted; as such it can be used as an early warning monitoring borehole for the water supply boreholes in Mualipue Town when mining is operational in Balama West.

The zone of influence at the end of the mining operations in Balama East is predicted to consist of a combination of the drawdown cone due to pit filling at Balama West and the cone due to dewatering at Balama East.

The water levels in boreholes Pirira BH2 and Pirira BH3 are predicted to be drawn-down by 2 and 1 m respectively during the last quarter of 2056. The water levels in Camp BH1 and Camp BH2 are predicted to decrease by 3 m, while that of BBH3 is predicted to decrease by 2 m. Boreholes Pirira BH1, Maulia Hand Pump and BBH6 are not predicted to be impacted. The water level in BBH2 is predicted to recover by 4 m, while the Balama West pit lake will be 7 m below pre-mining water levels.

Mitigation Measures:

- The mine will supply equal/better volumes and a better quality of water to affected communities that rely on groundwater in the receiving environment, if monitoring proves that there is an impact on specific users;
- Monitor groundwater levels and quality with continuous refinement and updating of the monitoring network to be based on the results obtained. Since the operational phase will take place over a prolonged period compared to the construction phase, more monitoring boreholes will be required (shown in plan 13 of the Hydrogeology report)

Significance Statement:

The impact is considered to be long term, localised, severe and probable, thus resulting in an impact of MODERATE significance. With mitigation measures in place this impact can be reduced to an impact of LOW significance.

Impact	Effect			Pick or	Overall
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Localised	Severe	Probable	MODERATE
With Mitigation	Long Term	Localised	Moderate	Unlikely	LOW

Issue 2: Mine water contamination

Cause and Comment:

A tailings storage facility (TSF) and a low grade/waste rock dump will be part of the Balama mine infrastructure. The function of a TSF is the safe, long-term storage of process waste with minimal environmental or social impact. The TSF, as well as the waste rock dumps will be clay lined.

A moderate potential exists for acid mine drainage (AMD) formation from the waste rock dump and TSF due to the high sulphur content and acid generation potential. As a result of AMD, the potential exist for low pH water, bearing high concentrations of AI, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U to seep into the aquifers beneath these facilities during the operational phase. The water quality impacts will however be reduced due to the construction of a clay liner beneath the TSF and waste dumps.

The results from plume migration show that contaminants from the TSF and waste rock dump are unlikely to seep downward to the weathered aquifer beneath these facilities. If seepage occurs, less than 1 % of initial source concentration will reach the aquifer beneath. Hence plume migration from the weathered aquifer beneath the WRD and TSF will likely be negligible.

At the Balama West pit, the plume will be restricted to the pit area because the dominant flow direction will be towards the pit as the pit fills up with water.

Finally, no water supply borehole is predicted to be impacted due to seepage of metals or AMD.

Mitigation Measures:

- Abstraction from boreholes that are close to the mine workings should be avoided so that contaminants will not migrate away from the mine, towards the abstraction boreholes;
- The mine must supply equal/better quality water to affected parties that rely on groundwater in the receiving environment, if proven that there is impact on specific users. Baseline water quality of private boreholes in and around Balama should be used for future comparisons to evaluate if the proposed mine has impacted the groundwater;
- Line the TSF and waste rock dump to significantly reduce seepage;
- Construct diversion channels and sedimentation ponds around and downstream of the waste rock dump and TSF to divert storm water and runoff ;
- Drill seepage interception boreholes downstream of the TSF to intercept and capture any possible seepage that may enter the groundwater system. Pump captured contaminated water back into the TSF;
- Monitor groundwater quality and water levels up and down gradient of TSF, waste rock dump and particularly down gradient of the mine site.
- Continuously refine and update the monitoring network.
- The operational phase will take place over a prolonged period compared to the construction phase and more monitoring boreholes must be established. The positions of the monitoring boreholes are shown in plan 13 of the hydrogeology report;
- Refine the conceptual and numerical models every six months in the first four years and thereafter every five years based on groundwater monitoring results;

- Undertake annual audits of monitoring and management systems by independent environmental consultants;
- Design mine to target oxidised low sulphur ore;
- The mine will supply an equal/better quality water to systems to be conducted by independent environmental consultants.

Significance Statement:

The impact is considered to be long term, localised, severe and probable, thus resulting in an impact of MODERATE significance. With mitigation measures in place this impact can be reduced to an impact of LOW significance.

		Effect		Bick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Localised	Slight	May Occur	LOW
With Mitigation	Long Term	Localised	Slight	May Occur	LOW

Issue 3: Hydrocarbon spillage

Cause and Comment:

Organic solvents, diesel or other organic fluids may be spilled or leak from storage tanks during mine operation. This could have a potential negative impact on groundwater quality. As the water table at Balama is fairly shallow, it is possible that the spilled organic compounds can reach the groundwater. Unlike the construction phase, this could occur over a longer period of time and could have the potential of impacting the environment.

Mitigation Measures:

- Store diesel and hydrocarbons in properly designed bunded storage areas such that if a leak were to occur in the storage vessels it is contained;
- Handle diesel and other chemicals with care to avoid spills;
- If a considerable amount of fluid is accidentally spilled, the contaminated soil will be scraped off and disposed of at an acceptable dumping facility and the excavation to be backfilled with soil of good quality;
- Monitor both groundwater level and quality to detect any changes in water during the construction and operation phase.

Significance Statement:

The impact is considered to be long term, localised, moderate and probable, thus resulting in an impact of MODERATE significance. With mitigation measures in place this impact can be reduced to an impact of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Localised	Moderate	Probable	MODERATE
With Mitigation	Long Term	Localised	Slight	Unlikely	LOW

6.4.5 Impacts on the aquatic environment

Issue 1: Habitat Modification

Impact 1.1: Aquatic habitat modification

Cause and Comment:

During the operational phase aquatic habitats both within and adjacent to the project area will be exposed to these impacts. Degradation of upstream aquatic habitats will also impact on downstream reaches. The anticipated influx of work-seekers and the subsequent increase of the local population adjacent to the mine during operation will inevitably result in an increased degradation of the catchment, including clearing of vegetation, particularly in riparian areas, for farming activities and the construction of dwellings. This impact, together with the construction of new roads and upgrading of existing tracks near watercourses, will further degrade riparian zones, leading to increased soil erosion and river bank instability resulting in elevated turbidities and sediment input degrading in-stream habitats. The opportunity for mitigating these impacts and protecting the riparian corridor and river channel will be greater within the designated project area.

Mitigation Measures:

- Demarcate riparian buffer zones (no-development areas) of 30 to 50m on both banks of watercourses within the project area (and adjacent areas if feasible).
- Initiate rehabilitation of riparian areas .

Significance Statement:

Unless mitigated this highly significant, permanent potential impact on riparian and in-stream habitats will definitely occur both within and immediately adjacent to the project area.

Impact		Effect				
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH	
With Mitigation	Permanent	Study Area	Moderate	Probable	MODERATE	

Impact 1.2: Loss of species of special concern

Cause and Comment:

Mining activities and the associated infrastructure will result in the loss of species of special concern, as well as other species that are important to ecosystem functioning.

Mitigation Measures:

Mitigation measures are the same as what is listed for the construction phase, thus refer to Section 6.3.4, Issue 1, Impact 1.2.

Significance Statement:

The significance on a regional or national level of losing these two "new" fish species of special concern is difficult to assess, as their distribution in adjacent rivers is currently not known. If widespread in this region of northern Mozambique, the loss of these two species
may not be highly significant. However, as this information is not presently available, a precautionary approach was taken in this assessment.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area	Severe	Probable	HIGH
With Mitigation	Long Term	Study Area	Moderate	May Occur	MODERATE

Issue 2: Aquatic Habitat Fragmentation

Impact 2.1: In-stream structures blocking migrations (bridges, causeways)

Cause and Comment:

The construction of any poorly designed in-stream structures associated with the project, particularly the new bridge or causeway over the Mehucua River on the new access road to the mine from the R242, or any other stream crossing for ancillary roads or during construction could block natural fish migrations.

Mitigation Measures:

- Ensure the provision of suitably designed bridges across rivers in the study area that allow free movement of fish and other aquatic biota.
- Incorporate suitably designed fishways on any in-stream dams or weirs, as required.

Significance Statement:

Any in-stream barriers to fish migration in these seasonal rivers would have devastating impacts on fish populations, as there would be no recruitment of migratory species into upstream reaches after the dry season. This could result in:

- Reduce breeding success of several fish species that undertake upstream spawning migrations.
- The natural longitudinal movements of fish for feeding, larval development or overwintering could be blocked, increasing mortalities.
- The isolation of upstream fish populations could result in negative genetic impacts and reduced survival fitness, while the prevention of recolonisation after high mortalities could threaten long-term viability of fish populations upstream of the barrier.

	Effect			Pisk or	Ovorall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area/ Regional	Severe	Probable	HIGH
With Mitigation	Long Term	Study Area/ Regional	Low	May Occur	LOW

Issue 3: Fisheries Resource

Impact 3.1: Over-utilization of fish resources

Cause and Comment:

The increase in local population due to the mining project and easy access to the rivers

could result in overfishing and depleting of local fish populations. The few refuge pools retaining surface water in the dry season will most likely be very heavily fished.

Mitigation Measures:

- This impact will be very difficult to counter by law-enforcement as this is not a declared fisheries area and currently environmental law-enforcement in this locality is virtually non-existent.
- A series of practical, common sense rules and restrictions to regulate fishing activities could be developed in consultation with the local Chief, village elders and local fishermen. If these rules are in place before the population increases, it will go a long way to help manage the fisheries resources in a sustainable way.
- The fisheries potential of Chipembe Dam should be investigated and possibly enhanced and developed. This could create work opportunities and catches from Chipembe Dam could provide a more sustainable all-year round source of fish for the local villages.

Significance Statement:

The fisheries resource in the seasonal rivers in the study area is fairly small and provides a seasonal protein source for a relatively small percentage of the local population.

		Effect	Pisk or	Ovorall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area/ Regional	Severe	Probable	HIGH
With Mitigation	Long Term	Study Area/ Regional	Low	May Occur	LOW

6.4.6 Impacts on Flora

Issue 1: Disruption of Ecosystem Function and Process

Impact 1.1: Invasion of alien species

Cause and Comment:

The removal of existing vegetation also creates 'open' habitats that will inevitably be colonised by pioneer plant species. While this is part of a natural process of regeneration, which would ultimately lead to the re-establishment of a secondary vegetation cover, it also favours the establishment of undesirable species in the area, such as the locally occurring species of Bamboo. These species are introduced along transport lines, and by human and animal movements in the area. Once established, these species are typically very difficult to eradicate and may then invade, posing a threat to the neighbouring ecosystem. This impact is likely to be exacerbated by careless management of the site and its facilities, e.g. seed dispersal via inappropriate organic waste disposal and inadequate monitoring.

Mitigation Measures:

The following mitigation actions will be implemented:

- Prepare an Alien Management Plan
- Eradicate alien plants as they appear;
- Put in place environmentally acceptable procedures for waste management;

- Do not use exotic species that are known to be invasive for rehabilitation purposes but rather use indigenous species and exotic species that are not invasive; and
- Monitor the project area for any new invasive plants.

Significance Statement:

Mining activities associated with the operational phase will probably result in the invasion of alien species into the project area and will have a severe, permanent effect. The environmental significance of this unmitigated impact would be HIGH NEGATIVE. Taking remedial action will reduce the impact to LOW NEGATIVE.

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Severe	Probably	HIGH
With Mitigation	Short Term	Localised	Moderate	Probable	LOW

Issue 2: Loss of Ecosystem Services

Ecosystem services refer to the benefits derived by humans from ecosystems and biodiversity.

Impact 2.1: Loss of ecosystem services provided by the plant communities identified in the project area

Cause and Comment:

Removal of vegetation communities due to mining activities will result in the loss of ecosystem services associated with each habitat and vegetation type. This is especially relevant since the local communities are heavily reliant on these areas as a source of food and medication, for construction materials and fuel wood and as a source of income through activities such as charcoal production.

Mitigation Measures:

- Align with recommendations made in the Social Impact Assessment to determine alternatives such as improved health care, woodlots for charcoaling, construction materials and fuel wood to offset the loss of ecosystem services to the affected communities.; and
- Set aside key representative portions of each vegetation type that will provide adequate ecosystem services to the communities within the project area (a Conservation Management Plan will be drawn up and these areas mapped in consultation with stakeholders).

Significance Statement:

Mining activities during the operational phase will definitely result in the loss of ecosystem services provided by the plant communities and will have a severe, permanent impact. The environmental significance of this unmitigated impact would be HIGH negative. With mitigation, this will be reduced to a MODERATE negative impact.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH
With Mitigation	Long Term	Study Area	Moderate	Probable	MODERATE

Impact 2.2: Disruption of ecological systems and functions

Cause and Comment:

Some dust may be generated as a result of operational activities and, in particular, where there is exposed ground. Specific activities that may contribute to release of fugitive dust include excavation of the mine pit and movement of heavy vehicles. The generation of dust may be higher during windy, dry periods. Dust may result in the smothering of vegetation located adjacent to these areas reducing light penetration and, subsequently stunting or inhibiting development and growth.

Mitigation Measures:

Mitigation measures are the same as what is listed for the construction phase, thus refer to Section 6.3.5, Issue 4, Impact 4.2.

Significance Statement:

The impact to terrestrial systems associated with any dust produced during the operation of the mine will probably be a long term, moderate impact. The overall significance would be HIGH negative. This can be reduced to LOW negative if mitigation measures are implemented.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact		Significance	
Without Mitigation	Long Term	Study Area	Severe	Probable	HIGH	
With Mitigation	Long Term	Localised	Slight	May Occur	LOW	

6.4.7 Impacts on fauna

This section presents the issues that may impact terrestrial faunal systems arising from the operation of the mine, the haul road and the mineral concentration plant and associated infrastructure.

Issue 1: Loss of Biodiversity

Impact 1.1: Loss of faunal biodiversity

Cause and Comment:

Impacts of the proposed developments on the surviving fauna will vary for the different groups. Amphibian diversity may be impacted by possible small scale, localized changes in water flow dynamics in the region of the mine path, particularly where it crosses drainage lines and wetlands. However, most frogs in the region are widespread and have rapid colonizing abilities. The reptile fauna comprises some species relatively tolerant of agricultural development. Birds are by far the most speciose vertebrate component in the

region, but many species are tolerant of low to medium disturbance. The remaining mammal diversity in the region consists of small mammals. With the exception of introduced rodents and bats, most mammals in the region are poor colonizers and require protected habitats to maintain viable population levels. Due to disturbance resulting from habitat loss there will also be an increase in animal mortality as animals move away from the region.

Mitigation Measures:

- Mitigation of the impact entails protection and where necessary, rehabilitation of adjacent habitats as an environmental off-set, particularly wetland and riparian habitats.
- Avoid clearing or damaging wetlands, and limit river and stream crossings as far as possible. Associated infrastructure, particularly transport linkages, to avoid these areas. Where possible include a buffer distance of 30 m.
- Maintain water quality and flow dynamics.
- Protect abiotic habitats, such as rock outcrops, which shelter many reptile and mammal species.
- Prohibit exploitation of sensitive species e.g. chameleons and birds within the project area and by project staff.
- Educate mine staff about the necessity of faunal groups such as crocodiles and snakes.

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will definitely result in a moderate negative impact in the medium-term in the Study Area on faunal biodiversity. The environmental significance of this impact is MODERATE.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Medium Term	Study Area	Slight	May Occur	LOW

Impact 1.2: Loss of Species of Conservation Concern

Cause and Comment:

Mining activities and the associated infrastructure will result in the loss of species of conservation concern, as well as other species that are important to ecosystem functioning.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.6, Issue 1, Impact 1.5.

Significance statement:

Impacts associated with the operation of the proposed mine development in the project area will definitely result in a moderate negative impact in the medium-term in the Study Area on Species of Special Concern. The environmental significance of this impact is MODERATE.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood Definite	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	MODERATE

Impact 1.3: Introduction of Alien fauna

Cause and Comment:

Developments such as mines and their associated roads create suitable corridors for the introduction of alien species. Introduced urban rodent pests such as the house mouse (*Mus musculus*), house rat (*Rattus rattus*) and the Norwegian rat (*Rattus norvegicus*) are likely to occur in populated areas such as mining villages. These species generally tend to survive alongside human habitation, and don't spread in natural areas.

The most widespread and common alien bird is the House Sparrow (*Passer domesticus*) which is now distributed almost worldwide and was recorded on site.

Mitigation Measures:

• Eradication programs of problem animals to be undertaken in consultation with conservation authorities.

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will probably result in a moderate negative impact in the medium-term in the study area from the introduction of alien species. The environmental significance of this impact is LOW.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Slight	May Occur	LOW
With Mitigation	Medium Term	Study Area	Slight	May Occur	LOW

Issue 2: Habitat impacts

Impact 2.1: Faunal Impact of habitat fragmentation and loss

Cause and Comment:

Habitat fragmentation can have diverse consequences for ecosystems and their fauna and flora. Habitat loss is rarely uniform and usually occurs piecemeal, leaving a mosaic of habitat fragments that may serve as refugia for the surviving fauna. Intervening unsuitable habitat, however, creates artificial barriers to normal migration and prevents or inhibits genetic interchange between the isolated populations. Tolerance of habitat fragmentation depends on numerous factors and will thus affect different faunal groups differently.

Mitigation Measures:

• Where possible ensure minimal fragmentation of sensitive habitats through the planning of the mine path, roads and the location of buildings .

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will definitely result in habitat fragmentation and habitat loss resulting in a moderate negative impact in the medium-term in the Study Area on the fauna. The environmental significance of this impact is MODERATE.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood Definite	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	LOW

Impact 2.2: Increased Dust Levels

Cause and Comment:

Increased dust levels during the operational phase will be mainly related to digging activities, crushing and increased vehicular traffic on unpaved surfaces. Dust settling on adjacent vegetation can block plant photosynthesis, respiration and transpiration, in addition to causing physical injuries of plants. Its presence may also make plants unpalatable, thus acting as a possible deterrent to grazing. Dust from road surfaces can also transport chemical pollutants to adjacent regions, thus affecting riparian ecosystems via impacts on water quality.

Mitigation Measures:

- Water down the haul road to inhibit dust production.
- Limit road speeds especially in sensitive regions e.g. near wetlands, across drainage lines, and during extreme dry climatic conditions, to curtail dust generation.
- and in areas of high dust production road surfaces should be dampened.

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will definitely result in increased dust levels resulting in a moderate negative impact in the medium-term in the Study Area on the fauna. The environmental significance of this impact is MODERATE.

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood Definite	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	MODERATE

Impact 2.3: Noise Pollution

Cause and Comment:

Mining activities, associated housing developments and greater vehicle traffic will increase noise levels in the study area. This will reduce the abundance of sensitive bird species. Increased noise and motor vibrations in the vicinity of wetlands will also impact amphibian breeding choruses, but these will be localised and many amphibian species are surprisingly tolerant of urban noise.

Mitigation Measures:

• Mitigation of this impact is difficult and unlikely to be effected, but could involve noise reduction measures in sensitive areas (e.g. adjacent to wetlands) at sensitive times (e.g. at night).

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will definitely result in increased noise levels resulting in a moderate negative impact in the medium-term in the study area on the fauna. The environmental significance of this impact is MODERATE.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	- Risk or Likelihood Definite	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	MODERATE

Impact 2.4: Chemical Pollution

Cause and Comment:

Many faunal groups are sensitive to pollutants. Lead concentrations are higher in small terrestrial mammals collected alongside roads than in bats caught in the same areas. Frog diversity in ponds affected by pollution from road run-off is depressed, and the accumulation of herbicides and their residues in adjacent wetlands can lead to developmental abnormalities in tadpoles and metamorphosing froglets as well as masculinization of female frogs. Pollution may result from periodic accidents, or from a slow, on-going contamination. Operation of the mine particularly in relation to the use of inflammable liquids such as diesel will probably result in periodic accidents. Heavy vehicle traffic is also associated with increased local pollution resulting from exhaust fumes, oil spillage and accumulation of rubber compounds from tyre wear. These pollutants can cause localised impacts. Sensitive wetlands or patches of threatened vegetation may need protection from road surface water run-off containing such pollutants and the application of herbicides to control plant growth alongside roads and around buildings will be monitored.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.6, Issue 2, Impact 2.3.

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will probably result in chemical pollution resulting in a MODERATE negative impact in the medium-term in the study area on the fauna. The environmental significance of this impact is MODERATE. With mitigation measures in place the significance is reduced to LOW.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Medium Term	Localized	Slight	May Occur	LOW

Issue 3: Impacts from Product Transport

Impact 3.1: Threats to Animal Movements

Cause and Comment:

Linear developments, such as haul roads and above-surface pipelines, disrupt the movement of species within their normal home ranges or the seasonal movements of migratory species. Habitat fragmentation may require species to make long movements between patches of suitable habitat in search of mates, breeding sites or food. At such times they may suffer increased mortality, either directly by road vehicles, or from their natural predators due to increased exposure.

Reptiles and amphibians do not undertake long distance migrations, but both groups may undertake short seasonal movements. Many snakes undertake movements between winter hibernation sites and their summer foraging areas. Amphibians are known to experience the highest levels of mortalities associated with the presence of roads among vertebrates. This is mainly attributed to en masse seasonal migrations to and from their breeding sites. Some amphibians, particularly toads, are explosive breeders, and move en masse to the breeding ponds. At such times they may suffer heavy casualties whilst crossing roads.

Impacts on animal movements will be significant for all faunal groups. For amphibians this impact will be greatest where the road runs adjacent to wetlands suitable for breeding.

Mitigation Measures:

- Mitigation depends firstly on on-going assessment of the significance of animal road mortalities, levels of which will be monitored during the construction and operational phases.
- Where possible design project structures and transport linkages to avoid sensitive habitat corridors, e.g. drainage lines and wetlands.
- Road designs will incorporate, where possible, underpasses and culverts that allow the movement of animals. This is of particular importance along drainage lines, which form natural corridors for faunal movements.
- Where possible, limit the road traffic after dark, as much of the surviving fauna is nocturnal, e.g. bats, most snakes, small rodents, amphibians, etc. In addition to this dipped headlights to reduce light pollution into adjacent habitat are required, and lower speeds to be enforced. These recommendations will help reduce night driving impacts.
- Limit vehicle speed, and will not exceed 50km/h.
- Educate drivers regarding their role in impacting on animals and the need to minimize collisions with animals at all times.

Significance Statement:

Impacts associated with the operation of the proposed mine development in the project area will definitely result in threats to animal movements resulting in a moderate negative impact in the medium-term in the Study Area on the fauna. The environmental significance of this impact is MODERATE.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Moderate	Definite	MODERATE
With Mitigation	Medium Term	Study Area	Slight	Probable	MODERATE

6.5 Impacts resulting from the decommissioning phase

6.5.1 Impacts on topography and geology

The decommissioning phase impacts on topography and geology are exactly the same as the construction phase impacts (section 6.3.1).

6.5.2 Impacts on soils and agriculture

The decommissioning phase impacts on soils are exactly the same as the construction phase impacts (section 6.3.2). No decommissioning phase impacts on agriculture are anticipated.

6.5.3 Impacts on surface water resources

Issue 1: Water Quality

Impact 1.1: Sedimentation and elevated turbidity in rivers

Cause and Comment:

Inadequate rehabilitation of cleared and de-vegetated areas, contaminated run-off from old mining pits, old mining camps, WRD sites and the TSF and poor maintenance of anti-soil erosion measures, as well as run-off from old roads, particularly at eroded river crossings, may result in sediment input and elevated turbidity levels in adjacent rivers.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.3

Significance Statement:

During the decommissioning/closure phases of the project, a medium to long term severe impact is definitely anticipated without mitigation. With appropriate mitigation this impact can probably be reduced to MODERATE significance.

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Severe	Definite	HIGH
With Mitigation	Permanent	Regional	Moderate	May Occur	MODERATE

Impact 1.2: Contamination from non-ore pollutants

Cause and Comment:

Chemical pollutants from machinery (e.g. hydrocarbons) and workers (faeces, soap) associated with decommissioning and rehabilitation work, as well as seepage from old waste sites, may contaminate groundwater or wash into drainage lines leading to the Mehucua River, downstream of the mine site.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.3,

Significance Statement:

The decommissioning phase may cause a medium term risk of pollution from chemicals and other hazardous materials, resulting in severe impacts of high significance in the study area without mitigation. Since the proponent is committed to implementing the mitigation measures listed above, the impact is considered to be of LOW significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Severe	Probable	MODERATE
With Mitigation	Permanent	Regional	Moderate	May Occur	LOW

Impact 1.3: Ore contamination

Cause and Comment:

The ore deposit to be mined contains sulphide minerals (The sulphide mineral most commonly associated with AMD formation is pyrite, however pyrrhotite behaves in similar chemical manner with the proportion of Fe to S being slightly different. Pyrrhotite was documented in 5 out of the 9 samples send for analysis) that will end up in the tailings stream. Therefore without mitigation it is likely that the tailings storage facility (TSF), as well as the waste rock dumps (WRDs), may generate acid mine drainage (AMD). There is potential for natural AMD neutralisation through carbonates contained in the ore, and a limestone quarry in the vicinity of the mine may be a source for further neutralisation if required. Correct exploitation of these "natural" neutralising pathways should significantly minimize the potential for AMD generation and downstream contamination of water bodies. Contamination by metals present in the ore body is also a possibility if AMD is not mitigated. Unless adequate precautions and long-term maintenance programmes are put in place AMD water could seep into groundwater or flow out of old mine pits, containment dams, the TSF and old WRD sites and wash into the adjacent river systems.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.3.

Significance Statement:

The decommissioning phase may cause a permanent risk of pollution from AMD, resulting in severe impacts of high significance in the study area without mitigation. With appropriate mitigation this impact should be reduced to LOW significance.

		Effect	Pick or	Overall	
Impact Temporal Spatial		Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Severe	May Occur	MODERATE
With Mitigation	Permanent	Regional	Moderate	Unlikely	LOW

Issue 2: Hydrology

6.5.4 Impacts on groundwater resources

Issue 1: Mine water contamination

Cause and Comment:

Groundwater levels will recover during the decommissioning and post-closure phase, due to the cessation of mine dewatering. This will lead to the re-establishment of groundwater levels, flow directions and flow gradients to near pre-mining levels and water will accumulate in the pits. The groundwater levels will initially recover at a faster rate, due to higher flow gradients. Groundwater level in the pit will rise quickly during the years following the cessation of dewatering due to the pit shell shape and then stabilise at around 533 to 536 mamsl.

Chemical reactions could occur between the pit lake water and the (relatively) freshly exposed rocks of the pit walls. Products of these reactions could enter the pit waters. Fracturing in the pit walls will result in an increased reactive surface area. This could significantly increase the mass of acidity produced by AMD processes. Thermal processes resulting from seasonal temperature variations might lead to "turn-over" of the water in the pit lake, thereby thoroughly mixing it. Evaporation of pit water might lead to increased concentration of chemicals in the pit lake water.

Assuming that the clay liner underneath the WRD's and TSF will still be effective, contaminant migration form these facilities to the aquifer beneath will be very limited, as in the operational phase.

The result of plume migration show that contaminants from the pits will preferentially migrate in a southeast direction towards Maulia Town. However, concentrations of more than 1% of the initial source concentration are not expected to reach Maulia Town. The TSF and the WRDs are not predicted to pose any major threat to the post closure environment as it they will be clay lined.

Mitigation Measures:

- All the mitigation methods proposed during the operation phase are applicable for the decommissioning phase;
- A low oxygen permeability (diffusion) clay cover will be used to encapsulate the waste stock pile and TSF to inhibit water and oxygen ingress thus reducing both oxidation rate and product transport;
- The establishment of a permanent wetland on the TSF may be used as an effective cover for the post closure environment. Once the available oxygen in the water is consumed, the rate of reaction is reduced and the rate of oxygen replacement will be relatively slow. The resultant diminished availability of oxygen is the single most effective inhibitor to sulphide oxidation;
- During mine closure the pits will be left to flood, resulting in a pit lake that will render the reactive materials chemically inert by diminishing the available oxygen; and
- If AMD is present at mine closure then mine water monitoring will continue for a minimum of 10 years after closure. Monitoring requirement needs after 10 years will be determined by the monitoring results from the first 10 years.

Significance Statement:

The impact is considered to be long term, localised, severe and probable, thus resulting in an impact of MODERATE significance. With mitigation measures in place this impact can be reduced to an impact of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Localised	Moderate	Probable	MODERATE
With Mitigation	Permanent	Localised	Moderate	Unlikely	LOW

Issue 2: Mine decant

Cause and Comment:

Decant occurs when a mine void fills with groundwater to a decant elevation where the groundwater will discharge onto the surface. In an open pit mining environment, decanting onto surface will occur at the lowest surface elevation that is located within the mined out area. The lowest elevation at which the Balama West pit intersects the surface is 548 mamsl. At Balama East, the decant elevation is 545 mamsl.

Model simulations show the water levels in the pits will reside between 533 and 536 mamsl, 100 years after closure. Hence the pits are not predicted to decant. It is only if rainfall and surface water runoff from the surrounding area floods the pits to their decant elevation that decant would occur.

Mitigation Measures:

Should decant occur, then passive or active treatment plans will be considered for treatment before the decant joins the streams. With the implementation of such precautionary mitigation methods in place, the environmental impacts of any potential decants (if they occur) can be reduced to Negligible.

Significance Statement:

The impact is considered to be permanent, localised, severe and unlikely, thus resulting in an impact of MODERATE significance. With mitigation measures in place this impact can be reduced to an impact of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood	Significance
Without Mitigation	Permanent	Localised	Severe	Unlikely	MODERATE
With Mitigation	Long Term	Localised	Moderate	Unlikely	LOW

6.5.5 Impacts on the aquatic environment

Issue 1: Habitat Modification

Impact 1.1: Aquatic habitat modification

Cause and Comment:

Even after mine closure, the pressure of the increased population and associated negative

environmental impacts will probably continue unless comprehensive rehabilitation plans are put in place.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.4, Issue 1, Impact 1.1.

Significance Statement:

This highly significant, long-term potential impact on riparian and instream habitats will definitely occur both within and immediately adjacent to the project area, unless mitigated.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood	Significance
Without Mitigation	Long Term	Study Area	Severe	Definite	HIGH
With Mitigation	Short Term	Study Area	Moderate	Probable	LOW

Impact 1.2: Loss of species of special concern

Cause and Comment:

Cause and comment is the same as what is listed for the construction phase, thus refer to Section 6.3.4, Issue 1, Impact 1.2.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.4, Issue 1, Impact 1.2.

Significance Statement:

The significance on a regional or national level of losing these two "new" fish species of special concern is difficult to assess, as their distribution in adjacent rivers is currently not known. If widespread in this region of northern Mozambique, the loss of these two species may not be highly significant. However, as this information is not presently available, a precautionary approach was taken in this assessment.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area	Moderate	Probable	MODERATE
With Mitigation	Short Term	Study Area	Moderate	Probable	MODERATE

Issue 2: Fisheries Resource

Impact 2.1: Over-utilization of fish resources

Cause and Comment:

The increase in local population due to the mining project and easy access to the rivers could result in overfishing and depleting of local fish populations. The few refuge pools retaining surface water in the dry season will most likely be very heavily fished.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 6.3.4, Issue 3, Impact 3.1.

Significance Statement:

The fisheries resource in the seasonal rivers in the study area is fairly small and provides a seasonal protein source for a relatively small percentage of the local population.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Study Area/ Regional	Severe	Probable	MODERATE
With Mitigation	Short Term	Study Area/ Regional	Low	May Occur	LOW

6.5.6 Impacts on flora

The decommissioning of the project could have a high positive impact on the natural vegetation, if the areas of high sensitivity are restored to their natural state and areas of moderate and low sensitivity are appropriately rehabilitated to a near-natural state. However, detailed baseline monitoring will be required to refine the alpha diversity and indicator species, as well as to confirm and augment the list of SSCs (especially geophytes, the majority of which flower in the early wet season, and which may not have been identified during the late-wet season sampling), in order to more precisely characterise the pre-mining ecological conditions. It will also be necessary to establish nurseries to determine which of the naturally occurring plant species can be successfully propagated for rehabilitating areas disturbed by mining activities.

However, rehabilitating disturbed areas to a natural or near-natural condition may not meet the livelihood requirements of the project-affected communities, whose needs may be better served by reinstating the land to agriculture or woodlots. Accordingly, prior to commencing any rehabilitation activities it will be necessary to undertake a programme of stakeholder engagement to assess the needs of the communities. In this case the decommissioning phase will result in a net loss of biodiversity, in as much as natural vegetation will be replaced by species of direct economic value to the communities, and thus this will be considered to be a negative ecological impact.

As a Rehabilitation Plan has not yet been prepared for the proposed development, the decommissioning phase impacts cannot be realistically assessed at this stage.

Small residual impacts as a result of the decommissioning phase will be similar to those listed for the construction phase and will include:

- Increased dust levels
- Increased access (along the haul road)
- Loss of ecosystem services as a result of increased access

6.5.7 Impacts on fauna

A variety of impacts are likely to result from the decommissioning of the various components of the mine. General decommissioning operations may cause chemical pollution, raise dust levels, increase noise and light levels and lead to changes in fire regimes.

Impact 1: Increased Dust Levels

Cause and comment:

Increased dust levels are common during decommissioning. Dust settling on adjacent vegetation can block plant photosynthesis, respiration and transpiration, in addition to causing physical injuries of plants (Farmer, 1993). Its presence may also make plants unpalatable, thus acting as a possible deterrent to grazing (Trombulak and Frissel, 2000).

Mitigation Measures:

• Areas cleared of vegetation will be watered down during periods of high wind conditions to reduce dust.

Significance Statement:

Dust levels will be raised during the decommissioning of the mine and will definitely result in a moderate negative impact in the medium-term in the study area. The environmental significance of this unmitigated impact would be MODERATE, but with mitigation would reduce to LOW.

	Effect			Pisk or	Ovorall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Definite	Moderate	MODERATE
With Mitigation	Medium Term	Study Area	May Occur	Slight	LOW

Impact 2: Chemical Pollution

Cause and Comment:

Many faunal groups are sensitive to pollutants. Pollution may result from periodic accidents, or from a slow, ongoing contamination. Decommissioning of the mine particularly in relation to the use of inflammable liquids such as diesel will probably result in periodic accidents. Heavy vehicle traffic is also associated with increased local pollution resulting from exhaust fumes, oil spillage and accumulation of rubber compounds from tyre wear. These pollutants can cause localised impacts.

Mitigation Measures:

- Design chemical storage facilities so that in the event of spillage their contents are fully contained within the bunds for decontamination.
- The use of insecticides and herbicides will be monitored with dosages and applications detailed in the EMP.
- Chemical control of mosquitos will be selective and only government approved insecticides will be used.

Significance Statement:

Chemical pollution will definitely result in a moderate negative impact in the medium-term in the study area. The environmental significance of this unmitigated impact would be MODERATE, but with mitigation would reduce to LOW.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	- Risk or Likelihood Moderate	Significance
Without Mitigation	Medium Term	Study Area	Definite	Moderate	MODERATE
With Mitigation	Medium Term	Study Area	May Occur	Slight	LOW

Impact 3: Noise Pollution

Cause and Comment:

Decommissioning activities, will increase noise levels in the study area. This will reduce the abundance of sensitive bird species, particularly forest birds. Increased noise and motor vibrations in the vicinity of wetlands will also impact amphibian breeding choruses, but these will be localised and many amphibian species are surprisingly tolerant of urban noise.

Mitigation Measures:

Mitigation of this impact is difficult and unlikely to be effective, but could involve noise reduction measures in sensitive areas (e.g. adjacent to wetlands) at sensitive times (e.g. at night).

Significance Statement:

Increased noise and vibration levels in the mining area will definitely result in a moderate negative impact in the medium to long-term in the study area. The environmental significance of this unmitigated impact would be MODERATE, but with mitigation would reduce to LOW.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Study Area	Definite	Moderate	MODERATE
With Mitigation	Medium Term	Study Area	May Occur	Slight	LOW

6.6 Cumulative Impacts

6.6.1 Impacts on topography and geology

There are currently no other developments proposed for the project affected area and thus no cumulative impacts on topography and geology are anticipated.

6.6.2 Impacts on soils and agriculture

There are currently no other developments proposed for the project affected area and thus no cumulative impacts on soils and agriculture are anticipated.

6.6.3 Impacts on surface and groundwater resources

In terms of deterioration of water quality in watercourses downslope of the mine the cumulative impacts of the various operations associated with the mining (e.g. AMD, hydrocarbons, litter, sedimentation, etc.) could potentially all combine to exacerbate the individual impacts. These individual impacts include increased sedimentation and turbidity, pollution from chemicals or hazardous substances used in mining and acid mine drainage originating from mine ore.

Additional factors that will tend to increase the severity of the water quality issues include:

- a) Reduction in runoff to rivers (e.g. due to dewatering for the mine pit) will tend to increase the impact of any pollution event due to the reduction in the beneficial effects of dilution, and
- b) The clearing of riparian vegetation and reducing the width and density of the riparian buffer zone would reduce the important function this habitat plays in absorbing and filtering polluted run-off before it can enter the river channel.

6.6.4 Impacts on the aquatic environment

The cumulative impacts listed for water quality above may result in loss of fish and aquatic biodiversity due to synergistic effects.

6.6.5 Impacts on flora

Since Mozambique's economy is growing rapidly due to foreign investments, it is highly probable that additional large scale projects/developments will occur adjacent to the mine during the lifespan of the project. Consequently, the following cumulative impacts for this scenario have been identified:

- Loss of vegetation communities (i.e. dambos, Miombo woodland etc) through direct (clearing) and indirect (displacement of agriculture) will be exacerbated; and
- Loss of Species of Special concern will be exacerbated to the point where local extinctions in the area could be expected.

6.6.6 Impacts on fauna

The following cumulative impacts could be associated with fauna:

- Exploitation by locals, with influx and improved road conditions.
- If water quality will be affected, this will have an impact on the fauna (especially amphibians).
- Increase vehicle collusions and road kills.

7. ASSESSMENT OF SOCIO ECONOMIC IMPACTS

7.1 Introduction

The following chapter identifies the potential impacts (both negative and positive) of the proposed project on the Project-Affected Communities (PACs), as well as broader district and region. By so doing, it provides mitigation and/or enhancement measures for the mine to reduce possible project-induced negative impacts, but also to enhance the positive impacts of the project. These impacts have been identified after consultation with the PACs through focus group discussions, the Socio-Economic Baseline Survey (SEBS), the Health Impact Assessment, as well as a study of secondary literature and data sources.

7.2 Planning and Design Phase Impacts

Activities associated with the design and pre construction phase pertain mostly to exploration. As the project has a mining concession impacts associated with exploration and the mitigation of these impacts were included in the Exploration EMP compiled to obtain this concession and will therefore not be repeated in this section.

7.3 Impacts resulting from the existing land use / no-go options

7.3.1 Socio-economic impacts

There are currently no identified impacts on the social environment.

7.3.2 Health related impacts

The main existing impact on health within the area is the fact that health care is limited within the project affected area. This issue can be summarised as follows:

- There are only two health facilities within the immediate vicinity of the project. These are Balama Hospital and Ntete Health Centre.
- Complicated cases are usually referred to Montepuez, then Pemba and then Nampula.
- Most people live far away from a health facility and do not have immediate access to one. The costs for consultation are 1 Metical and 5 Metical for medicine.
- Most of the health facilities in the district lack a stable water supply, a maternity ward, electricity and ambulances. These were identified as the critical needs of the health facilities.
- There is only one medical doctor in the whole district. All other health facilities are manned by nurses.
- The district health authorities reported that there is generally a good stock and supply of drugs and consumables.

7.3.3 Impacts on natural resources

Natural resources provided by the flora and fauna as well as the rivers surrounding the proposed development site are an important component of the livelihoods of the potentially affected communities. As in many parts of Africa, the local communities around these forests and woodlands rely heavily on the resources offered by the natural environment for their livelihoods and survival. The area has numerous resources including, fuelwood, wild fruit and vegetables, medicinal plants, wild bird and bush meat, fuel for slash and burn agriculture, wood for charcoal, and timber. The local rivers provide fish and drinking water for

local communities. Demand for natural resources is great, and the ecological systems are stressed and over utilized in the area. The majority of the project area has been cleared for agricultural purposes (mainly through slash and burn practices – Figure 7.1). The majority of the remaining vegetation is considered to be degraded, partly as a result of natural resource utilisation such as charcoaling.

7.4 Impacts resulting from the construction phase

7.4.1 Socio-economic impacts

Issue 1: Employment Opportunities and the Stimulation of Economic Growth

The area has a significantly large youth population, who might demand local employment. The area also lacks real employment opportunities or economic growth, and the mining development could provide a much needed economic thrust in terms of sourcing material and services locally, stimulating the area's general economy.

Therefore, there is a strong possibility that the prospective mining operation will draw migrant labour in search of employment opportunities. Surrounding villages are poor and uneducated, which means that more educated and skilled labour will certainly be needed from areas such as Balama, Montepeuz or even Pemba. Villagers in rural Mozambique are known to be migrators, and provided that mining operations are expanding in the district, a steady increase in migrants is foreseen. Such an influx can either cause some of these villages (especially Pirira and/or Maputo) to expand significantly, or cause a temporary increase in labour.

As with most social impacts, in-migration may also have a positive impact in terms of providing locals with small business opportunities due to an increased demand for local produce and other goods, as well as opportunities for cultural exchange.

Two impacts are discussed below, namely employment, skills training and scholarships, as well as temporary or permanent in-migration by outsiders in search of job opportunities.

Impact 1.1: Employment, Skills Training and Scholarships

Cause and Comment:

The mine will need highly skilled workers with graduate degrees or experience in minerelated tasks. Nevertheless, many of the tasks can be performed by local labour, and the developer will, as far as reasonably possible, increase such opportunities, in accordance with local recruitment procedures. If sufficient employment opportunities are not provided to the local populace, a significant influx of labourers into the area could occur, causing pressure on local resources and possibly conflict with the local population. Another consequence might also be local resistance to the project, or even tension between the locals and the developer.

Mitigation Measures:

The following enhancement measures are proposed:

- Develop industry specific and appropriate Human Resources (HR) policies and procedures;
- Establish a labour desk/employment committee to design and implement an Employment Enhancement Plan. This will ensure that recruitment is done in a fair

and transparent way, and that job creation opportunities are maximised;

- Provide scholarships and work apprenticeships to the local population (especially the youth);
- Support the primary schools and, especially, learners who need financial support (such as bursaries) to allow them to enrol in higher education institutes;
- Adhere to the recommendations contained in IFC PS 2 (Labour and Working Conditions) in developing the following labour policy and operational guidelines:
 - Developing appropriate HR policies and procedures (Nr 8);
 - Establishing appropriate working conditions (Nr 10);
 - Ensuring non-discrimination and providing equal opportunities (Nr 15);
 - Establishing a Grievance Mechanism for labour issues (Nr 20);
 - Protecting the work force (Nr 21-22); and
 - Occupational Health and Safety (Nr 23).
- Adhere to the following International Labour Organisation (ILO) conventions:
 - ILO Convention 87 on freedom of association and protection of the right to organise;
 - ILO Convention 98 on the right to organise and collective bargaining;
 - ILO Convention 29 on forced labour;
 - \circ $\:$ ILO Convention 105 on the abolition of forced labour;
 - ILO Convention 138 on the minimum age of employment;
 - ILO Convention 182 on child labour;
 - ILO Convention 100 on equal remuneration; and
 - ILO Convention 111 on discrimination.
- As far as possible, incorporate labourers involved in the construction phase as permanent staff for the operational phase;
- Ensure there are employment opportunities for women and disabled persons;
- Consider differential treatment for villages which are differentially affected by the project. Directly affected residents should be given first priority in job offers and training opportunities; and
- As far as reasonably possible, develop and implement a plan for gradual replacement of expats and outsiders by local people.

Significance Statement:

Should these mitigation and/or enhancement measures not be implemented, the significance of employment would only be moderate positive during the construction phase. With enhanced employment opportunities the significance during the construction phase would be highly positive.

		Effect	Bick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Short-term	Study area	Moderate Beneficial	Probable	MODERATE	
With Mitigation	Short-term	Study area	Very beneficial	Definite	HIGH	

Impact 1.2: Temporary or permanent in-migration in search of job opportunities

Cause and Comment:

Although influx is considered outside the control of project developers, the IFC guidelines on project-induced in-migration suggest that influx can threaten 'project security' and that it should be managed as a project threat (*cf.* IFC, 2009). The direct and indirect impacts associated with an influx of labourers (outsiders) are likely to have significant impacts on

these villages, as it usually result in many social, cultural, economic and political changes. Some of these include (but are not limited to):

- Creating tension and conflicts between locals and migrants concerning natural resources, land and employment opportunities;
- Inflating local food and produce prices;
- Placing increased pressure on already limited social and natural resources;
- Increasing the incidence of so-called 'social ills', including prostitution, alcohol abuse, and crime;
- Increasing the prevalence of communicable diseases, such as diarrheal diseases, vector-borne diseases, such as malaria, and sexually transmitted infections (refer to section 7.4.2 below); and
- The creation of 'poverty gaps', such as inequalities in terms of income and wealth accumulation between locals and migrants.

Mitigation Measures:

The developer will explore opportunities to manage and mitigate the negative impacts associated with an influx of workers by developing appropriate management plans. Some of these options include:

- Developing a Labour, Recruitment and Influx Management Plan. The following guidelines may be used in developing such a plan:
- *Information dissemination:* Employment opportunities need to be advertised, however the procurement and procedures for such employment needs to be made available to the public. Regular briefings are necessary.
- Recruitment and supply chain transparency: Recruitment and procurement rules and opportunities have to be transparent and, most importantly, accessible to the public. This will be the responsibility of the community liaison officer, as well as the human resource manager. *Influx management and security arrangements:* While the need for project security is understandable, such security measures can have further implications on the surrounding villagers' safety and mobility. A mechanism needs to be implemented to allow free access to their surrounding villages, while still restricting the uncontrolled influx of job seekers. Regular engagements with the local villagers and the security personnel through workshops and meetings should build a relationship between these parties.

Significance Statement:

If no plans are developed and implemented, the impact of in-migration might be highly negative for the construction phase, as this phase of the mining development can cause a significant influx of job seekers in the short-term, restricted to the study area. The likelihood of this is probable and the effect might be very severe on the local populations and their culture.

With mitigation measures in place, the impact should be low negative on the affected villages during the construction phase, as the mine could stimulate the local skills base and limit the number of outside workers required.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short-term	Study area	Very severe	Probable	HIGH
With Mitigation	Short-term	Study area	Severe	Slight	LOW

Issue 2: Land Acquisition

As indicated by the findings of this SIA, all the PACs are engaged in subsistence agricultural farming (98.4% of those who farm have *machambas*). Since many shift their cultivation from one field to the other, ample land, and importantly, different types of land, is needed to sustain their livelihood and food security. Although cash income from agricultural production is small, in many cases, it is the only income received by households. In addition, many farmers are part of larger cotton and maize production out-grower schemes (such as Plexus), where companies assist smallholder farmers with seeds, in exchange for locals selling their cotton and maize to the companies. This means that any loss of land will reduce the farmers' potential to participate in the cotton and maize industries - incomes which are significant, not only to individual households, but also to villages.

If this issue is not mitigated, it might have multi-dimensional and far-reaching consequences, such as increasing food insecurity, reduced income, as well as a change in the livelihood opportunities of these residents.

Two related impacts are discussed below, namely a reduction in access to productive land and economic displacement and heightened food insecurity. Please note that even though this impact is assessed in the SIA for both the construction and operational phases, this is considered to be mainly a construction phase impact, as economic resettlement and compensation will take place during the construction phase of the project. For this reason it is only discussed in this section of the ESHIA.

Impact 2.1: Reduced access to Agricultural Land

Cause and Comment:

There is a concern that the mine will reduce access to productive land within the mining footprint (mine exclusion zones) and lead to a significant loss of *machambas*. According to the Resettlement Action Plan over 200 *mashambas* totalling 400 hectares will be lost. Reduced access to land is coupled with economic displacement (i.e. where productive or future farmland is lost to the mine), as well as an increase in erosion.

Local farming practices mean that relatively large areas of land are needed for villagers to rotate their fields and obtain sufficient yields for future food security. The loss of productive land and natural resources is likely to be the impact of greatest concern to the villagers. Access to land and the resources that flow from this land are of critical importance to sustaining livelihoods in villages that are extremely vulnerable as a result of poverty and their isolation from cash income-generating activities. Vulnerable households will be more significantly affected, such as female-headed households, or households with disabled and/or elder members.

Apart from compensation for crop and tree losses, international best practice increasingly advocates the provision of alternative land with the same potential, *in lieu* of providing cash compensation for land-loss. As part of the RAP process, discussions will be held with the affected farmers to establish appropriate mitigation measures, as well as their preferences for alternative land.

Syrah must provide alternative land, a land for land compensation strategy, as is required by the resettlement regulations in Mozambique (2012).

Mitigation Measures:

- Households that are affected by economic resettlement have to be identified through a consultative process (this has been completed as part of the Resettlement Action Plan, please refer to Part 6 of the ESIA reports);
- As part of the RAP, a detailed asset and agricultural inventory has been undertaken with each affected household to develop appropriate compensation and development strategies to be developed with mutual consensus;
- During the RAP process, a Technical Working Group (TWG) has been established with the affected villages. The TWG has representation from the affected villages, relevant Mozambique ministries and developer representatives [as per the Regulations for the Resettlement Process resulting from Economic Activities (Government of Mozambique, 2012)]. The role for the affected villages is to discuss future resettlement and displacement issues with the developer, and to establish ways to deal with project impacts (in the case of the Syrah Balama Project only economic displacement is required); and
- As part of this RAP, village access to natural resources has been considered, and mine infrastructure designed in order to ensure continued access to such resources (this has already been done);
- Livelihood restoration strategies is to be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options are being considered by the developer;
- In compliance with IFC PS 5, a grievance mechanism has been established through which the affected villages can engage with the developer throughout the RAP process.
- In accordance with the IFC PS 5, the RAP needs to include a detailed agricultural valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes. This will be included in the RAP (this has been completed as part of the Resettlement Action Plan, please refer to Part 6 of this report)
- Prior to acquiring land for the mine development, those farmers or households affected by the loss of farms will be assisted by the developer and Ministry of Agriculture with alternative farmland This also ensures compliance with the IFC under its PS 5 which is called 'transitional support'; and
- An established TWG is the primary vehicle for engagements between the developer and the affected households and farmers and will be used to establish crop and tree compensation rates, the provision of alternative agricultural land, as well as livelihood restoration/development strategies (such as agricultural programmes, for example). As part of this TWG, the relevant Mozambique ministries will be part of the process, as per the Regulations for the Resettlement Process resulting from Economic Activities (Government of Mozambique, 2012).

Significance Statement:

If no mitigation or enhancement measures are implemented, the significance of reduced access to productive land and economic displacement due to establishing a mine will be VERY HIGH negative. Land loss is a significant issue which, even with mitigation measures, remains a serious concern and threat to the livelihoods and food security of rural villagers. With mitigation and enhancement measures implemented, the mine could still have a probable severe long-term negative effect at the scale of the study area, of MODERATE significance. The reason for this high rating really relates to the number of farms and amount

of land that will be lost (the RAP estimated over 200 *mashambas* totalling 400 hectares will be lost – CES, 2014).

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long-term	Study area	Very severe	Definite	VERY HIGH
With Mitigation	Long-term	Study area	Severe	Probable	MOD

Impact 2.2: Increased Food Insecurity

Cause and Comment:

Coupled with the issue of economic displacement and reduced farmland, is the impact of food insecurity. As noted, nearly all the villagers are subsistence farmers. An insignificant number of household members are formally employed.

Food insecurity might become a serious issue for several reasons. One reason is that the mine development will lead to the loss of many *machambas*, It is therefore important to ensure that those affected receive alternative land of the same value and same productive potential, with new fields that can be adequately prepared for beneficiary farmers to have a first harvest for food security prior to the acquisition of land by Another reason is that erratic and changing weather conditions affect households' agricultural harvests which is compounded by a lack of fertile land that may result in households being forced to diversify (or change) their income-earning livelihoods. Even though many might become dependent on employment on the mine, limited employment opportunities in the area could impede the villagers' ability to sustain their households' nutritional needs.

Mitigation Measures:

The following mitigation measures are proposed:

- Compensate affected households for lost crops and trees and assist the affected households with alternative farming land of at least the same quality;
- Discourage affected villagers from discontinuing their agricultural practices, despite the possibility of employment opportunities. Assist farmers with their new farms, through the provision of agricultural extension services as part of a Farmers Development Programme (FDP), discussed in the RAP report;
- No farmland will be acquired before allowing the affected farmer and/or household to harvest the field or alternatively before the farmer and/or household has been compensated with equivalent produce for the crops already planted; and lastly
- In the future implement a food security/nutritional monitoring programme with a sample of households. This monitoring programme will have a key focus on determining the farmers' ability to re-establish themselves on their new land, and to ensure on-going food security at least at the same level of food security prior to being moved. As part of the proponent's obligations under the RAP to provide transitional support through the new land allocation process, a Farmers Development Programme (FDP) is currently being implemented and managed by the proponent. The objectives of this programme are for the mine to allocate alternative land to each affected farmer, to deliver entitlement (seeds/structures) and to provide temporary agricultural transitional support. The programme is intended to ultimately ensure that those households who received alternative land actually utilise this land, whilst asisting the economically displaced during the land acquisition period with preparing their replacement land.

Significance Statement:

Without mitigation, food insecurity amongst the PACs will become a serious impact of the project and should be viewed in a very serious light. Food insecurity might also result in a strained relationship between the project developer and its PACs, and might even evoke violence.

With mitigation measures in place, the impact will be HIGH negative. With appropriate mitigation measures, the impact should have a LOW positive impact.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Very severe	May occur	HIGH
With Mitigation	Short-term	Regional	Slight beneficial	Probable	LOW

Impact 2.3: Reduced Access to Natural Resources

Cause and Comment:

Natural resources are widely used as essential ecosystem services by a relatively large population. The data indicated that little cash income is actually received by households from these resources. However, of the income received, charcoal and local trading (such as in bush meat, wood or wild plants) are substantial components of livelihood strategies. Even though the footprint of the mine's natural resource extraction will be limited, the resources offered by these two mountains is significant (refer to the Botanical Specialist Survey Report, 2013).

Mitigation Measures:

The following mitigation measures are proposed:

- A RAP is currently being conducted by CES. As part of this RAP, village access to natural resources will be documented and specific sites and/or trees that are used by villagers will be recorded;
- According to international guidelines, the loss of access to natural resources is seen as economic displacement, especially if local residents derive an income from such resources (IFC, 2012). Consequently, through discussions with the TWG, the RAP has established compensation and entitlement frameworks for such losses in consultation with the MoA (represented at district-level by the District Services of Economic Activities);
- As part of a RAP, a grievance mechanism was established, through which the affected villages and farmers can engage with the developer throughout the RAP process and lodge complaints;
- A TWG has already been established with representation from the affected villages, relevant Mozambique ministries (such as the MoA) as well as a representative from the developer. The role of the TWG would be for the affected villages and farmers to discuss future resettlement and displacement issues with the developer, and to establish mitigation measures for such losses (including livelihood restoration strategies and project benefits); and
- Offset the impacts of reduced access to natural resources by providing agricultural services to the affected villages and farmers.

Significance Statement:

The significance of this impact would be HIGH negative if no mitigation measures are in place. Access to natural resources will become restricted, which will reduce the sustainability of villagers' livelihoods and might increase villagers' dependence on economic opportunities in the region (which are lacking).Food insecurity might also be an associated impact. Mitigation measures would be able to off-set this impact to MODERATE significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long-term	Study area	Severe	Definite	HIGH
With Mitigation	Short-term	Study area	Moderate	Probable	MODERATE

Impact 2.4: Loss of Sacred and Culturally Significant Sites

Cause and Comment:

In the mine lease area, there are a number of culturally important sites, including sacred trees and forests. Should any of these sites be disturbed or access denied or restricted, the developer will have to engage with the affected villagers with regard to compensation packages (e.g. religious ceremonies). The RAP recorded all these sites. These sites are clearly marked by the mine in order for the project, as far as possible, to avoid these areas (refer to the RAP report).

Mitigation Measures:

Some of the mitigation measures which should reduce the significance of this impact include:

- This SIA already recorded all the affected villages' sacred and cultural sites, and indicated whether the current mine layout plans should be re-considered and amended to avoid these sites entirely. Subsequent to the compilation of this report, the developer has amended the mine's infrastructural layout plans with due consideration of the sacred sites identified;
- A Grievance Mechanism is already in place to allow the affected villagers to voice their concerns; a mechanism which should allow for the developer to take appropriate mitigation measures in accordance with the issues and/or concerns of the villages;
- As part of the RAP, compensation measures have been established between the developer and the GoM through open and transparent engagements with the villages, interested parties and relevant stakeholders; and lastly
- Develop a Cultural Heritage Management Plan in consultation with the affected villages. This plan proposes to:
 - Protect the cultural heritage of the area;
 - Identify all sacred sites in the area and propose ways to protect and/or relocate these sites; and
 - Assist the developer to understand the cultural norms and values of the locals in the area.

Significance Statement:

If no mitigation measures are in place, villagers might permanently lose their sacred sites, or have only limited access to such sites in the future. This impact would be restricted to the study area, but would be severe. This could cause significant, and on-going, dissatisfaction among the affected people. These sites are highly intertwined with the cultural fabric of these villages, and culture should be protected. With appropriate measures in place (such as to avoid mining in areas that are culturally significant), the affected villages' sacred sites might be protected.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study area	Severe	May occur	HIGH
With Mitigation	Permanent	Study area	Slight	Probable	LOW

Impact 2.5: Loss of Graveyards/Cemeteries

Cause and Comment:

Several graves and cemeteries have been identified and clearly marked through the RAP process. As far as possible, the mine's layout will avoid these areas. Still, there is the possibility that some graves and/or cemeteries might be affected/disturbed during the construction phase.

Mitigation Measures:

• The RAP recorded each affected graveyard and gravesite in the area with the assistance of the villagers;

The following mitigation measures are applicable:

- As explained, as part of the RAP, a TWG and grievance mechanism has been established. After consultation with those affected families, the mine will bear the costs for grave exhumation and reburial, as well as for traditional ceremonies. No compensation will be paid, as this is against their culture. This is covered in the RAP.
- Develop a Cultural Heritage Management Plan in consultation with affected villages;
- Engagement with affected villages must have already taken place and all agreements must be in place prior to land clearing or preparation. During engagement, the affected villages need to be sensitised to the new areas to be cleared and prepared, and discussions with regard to the possible relocation of graves or compensation for the removal of such graves will need to be entered into between the affected villagers and the developer. Aspects to consider would include preparing new burial sites and appropriate means of transporting and re-interring the dead.

Significance Statement:

Graveyards and gravesites are central to the African religious practice, as they embody the spirits of ancestors and represent physical places of sacred value. Removing such sites has permanent, far-reaching consequences, as it directly affects core values and patterns of relationships at the heart of these villagers' lives. Any disruption to these sites without adhering to the established and agreed upon protocol and relocation strategy will be seen as very serious.

Disruption of graves or gravesites, save for one, has been avoided. However, the additional mitigation measures provided above should enable villagers to voice their concerns and have an input into the planning and implementation stages of the project. This should allow affected villagers to feel part of the project, and have a meaningfully contribution to how their graves might be removed and/or relocated.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study area	Very severe	Probable	VERY HIGH
With Mitigation	Permanent	Study area	Slight	Unlikely	LOW

Issue 3: Community Safety Risk

Cause and Comment:

With any development initiative, there are health, safety and security risks. Impacts related to the possible pollution of water resources are discussed in the Groundwater Specialist Assessment as well as in Chapter 6 of this report and are thus not assessed here. Traffic-related impacts, such as an increased risk of accidents due to increased traffic volumes and the use of heavy machinery are discussed in the Transport Specialist Assessment as well as in Chapter 8 of this report.

The mine area will be fenced for safety considerations. However, depending on the mine's final layout plans, routes such as the bypass road from the R242 to Ntete and the Chipembe Dam need to remain accessible to the local villagers who are dependent on these passageways. With the introduction of security personnel at any entrance gates, conflict sometimes exists between the security personnel and the local villagers. This may arise if security personnel are inadequately trained in using force, or abuse their position of power.

Mitigation Measures:

- A Grievance Mechanism has been established during the RAP through which affected villagers can voice their concerns to the developer;
- Training of security personnel will be to high standards and will take into account local traditions.

The IFC is very specific when it comes to mitigation measures related to project security personnel (*cf.* PS 4). Several measures are proposed:

- If a private security company is used, the developer will sign an agreement with the private security company which will allow for the following:
 - Security personnel need to be properly trained in the use of force and, most importantly, appropriate conduct towards local residents;
 - Instant dismissal for any security personnel involved in theft or abuse; when appropriate evidence can be produced;
 - A code of conduct must be developed for the security personnel;
 - The above-mentioned code of conduct must be consistent with the United Nation's (UN) Code of Conduct for Law Enforcement Officials, and the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials; and
- Reported incidences need to be assessed by the developer who will implement appropriate measures;
- All the PACs need to be informed about the roles and responsibilities of the security personnel.

Significance Statement:

This is potentially a serious impact, and failing to implement mitigation measures might result in fractious relationships between the developer and the PACs. Without mitigation, this impact will have a moderately negative impact. The project should have no effect on the surrounding villagers if appropriate protocols are implemented.

		Effect	Risk or		
Impact	Temporal scale	Spatial scale	I scale Severity of likelihood		Significance
Without mitigation	Short-term	Study area	Severe	May occur	MOD -
With mitigation			No impact		

Issue 4: Stakeholder and Community Engagement

Cause and Comment:

Effective stakeholder and community engagement is of pivotal importance. Syrah are committed to stakeholder and community engagement and will continue having structured and regular engagements with stakeholders and affected villagers. Doing so will mitigate potential serious implications for the project by delivering on sound constructive communication methods and opportunities. These communications should also mitigate any potential for social unrest and or tensions between the company and the affected communities

Mitigation Measures:

• A Stakeholder Engagement Plan (SEP) has been drafted and implemented

The following measures are proposed:

- Implementation of the Social and Environmental Management System (SEMS);
- Implement two separate grievance mechanisms for labour and for community issues (a community Grievance Mechanism has been introduced as part of the RAP).

Significance Statement:

Without implementing enhancement measures related to regularly engaging with the affected villagers, the significance of the project could potentially have a moderate negative impact on the affected villagers. The reason for this is that poor stakeholder engagement could cause considerable tension between the project development and community members, especially if villagers are not informed of the project and regular project related activities.

With enhancement measures implemented during the construction phase, the significance would be moderately positive.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short-term	Localised	Severe	Probable	MODERATE
With Mitigation	Short-term	Localised	Beneficial	Probable	MODERATE

7.4.2 Health related impacts

Issue 1: Communicable Diseases linked to Housing Design

Impact 1.1: Transmission of communicable diseases due to overcrowding

Cause and Comment:

TB is endemic in Mozambique. The capacity of the health care services to manage TB is limited, especially in case detection. Moreover, the link with HIV is a growing problem and this increases the challenge in monitoring for any negative impact related to increased transmission from the disease. The project will inherit this as well as the poor socioeconomic and housing conditions as described in the SIA and HIA.

Respiratory tract infections, from a viral and bacterial origin are important to consider. This can include seasonal influenza and pandemic strains that the local communities may be naïve to due to their isolation. Vulnerable groups in these communities, especially the elderly and those with underlying disease, are particularly susceptible as their immune systems are often weakened. Any management plans for respiratory diseases developed by the project must consider community health as this may affect business continuity and reputation, where the project runs the risk for being blamed for disease outbreaks especially with movements of people in and out of area.

Mitigation Measures:

The following mitigation measures are proposed:

- Support community based information campaigns related to TB symptoms and the need to seek care. The campaign will aim to address the risk of co-infection between HIV and TB. This can be managed through community-based peer health educators;
- Labour policies will aim to encourage hiring of local staff to avoid job seeking migrants. The project will not hire at the front gate but consider a recruitment office at an off-site location;
- Influx management and advice with regards to town planning to prevent overcrowding;
- Develop partnerships to support the community based TB control programs in conjunction with the authorities and any agencies/NGO. These partnerships aim to include case detection, management and surveillance activities under the national TB program policy and strategy;
- Support the health management information system and collect longitudinal data on key TB indicators. This will require health systems strengthening to get this essential data;
- Support improvements in the capacity of local TB case management. This will
 include training of health care staff, appropriate diagnostics for case detection and a
 referral system for effective treatment. This can be through support of a local NGO
 and/or the national program. This will assist in addressing case surveillance and in
 ensuring that the TB situation does not deteriorate in the area.

Significance Statement:

Without mitigation this impact is considered to be long term, severe and probable and thus of HIGH negative significance. With mitigation measures in place this impact is considered to be moderately positive.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Study Area	Severe	Probable	HIGH	
With Mitigation	Long term	Study Area	Moderately Beneficial	Probable	MODERATE	

Issue 2: Vector-related diseases

Impact 2.1: Malaria burden

Cause and Comment:

Malaria is the most significant public health threat and cause of mortality in the project area. Malaria was mentioned as the most important disease in the focus group discussions at the local community level. However, there is good knowledge and understanding of malaria transmission and prevention. Ownership of Insecticide-treated Bed Nets (ITNs) is good, although it is difficult to assess proper utilisation. There are also good diagnostic and treatment mechanisms in the area, with consistent use of Rapid Diagnostic Tests (RDTs) to diagnose malaria as well as adequate stock of Artemisinin-based Combination Therapy (ACT) which is standard treatment. This is also coupled with good health seeking behaviour amongst community members.

Very little is described on the entomology in the area. This includes the vector complexes, their breeding preferences and behaviour (resting and feeding), as well as susceptibility patterns to different classes of insecticide. This is vitally important for the project to describe as it will influence the type of mitigation measures required from a source reduction and control perspective.

While the malaria burden is high in the communities, and there is obviously a suitable environment for mosquito breeding and disease transmission to occur, the project does have the potential to impact malaria transmission. This will require mitigation; interventions may differ based on seasonal and land use practices. Modification of the environment frequently changes the habitat for mosquitoes to breed in. The presence of a dam in the project area strongly increases the malaria risk during the rainy season.

Influx of individuals may also play a role in increased disease transmission. More people from outside the area may increase the naturally occurring parasite pool and changes in land use may also alter the environment. This is challenging for the project to manage as their responsibility, as it is already part of the baseline conditions.

The health of the workforce also needs to be considered, especially as some of the workforce will come from the local community. The risk of the disease could have significant health and economic impacts to the project if not mitigated properly. Malaria can have the following impacts at the workplace level:

- Absenteeism through repeated infections: This will have a significant impact on productivity and increased costs. It is estimated that an expatriate non-immune employee will take 5-7 days to reach optimal productivity after an uncomplicated case of malaria and a semi-immune local employee 2-3 days.
- *Health and safety risks*: Patients with malaria who still work may pose a risk to fellow employees and themselves. The effects of the disease and the treatment drugs may decrease alertness. The medications may also reduce hearing sensitivity.
- *Increase cost of overall health care*: The cost of malaria management through large case-loads can become significant even if managed at the local site medical service.

An uncomplicated case of malaria may cost about \$15 to manage, without considering human resource and capital expenses (Asante and Asenso-Okyere, 2003). The impact of a complicated case of malaria, that may require medical evacuation and extended hospitalisation in an intensive care unit (ICU), can be very costly, and may run into hundreds or thousands of dollars.

- *Increased burden on the medical service*: High case loads of malaria will take a significant amount of time in the medical service and limit the effectiveness of other health programs, such as occupational health.
- *Employee turnover and attractiveness*: Exposure to risk may decrease the ability to attract skilled staff to work in the area. Repeat infections and decreased morale from the risks related to the disease may also increase employee turnover.
- *Employer liability*: The risk exists for an employer to be held liable for complications that may arise from an infection, especially if mitigation measures have not been implemented.

In summary, the way malaria transmission will be influenced by the project will depend on determinants such as the epidemiological setting, local vector behaviour and management, change in land use related to vector activity, socio-economic conditions and health seeking behaviours. The highly endemic nature of the disease means that the project is unlikely to significantly add to the already high disease burden of the community during the wet season. However, during the dry season, the increased potential for breeding sites will play a major role and change the normal epidemiology of the disease vectors. The behaviour of the vector is not known and may need to be described and understood to determine if land use will alter the behaviour and lifecycles of the vectors. In spite of these potential unknown factors, mitigation measures are warranted and are likely to play a significant beneficial role to the community if well planned and executed.

Mitigation Measures:

- Collect baseline data that will inform planning related to the integrated programs. Develop monitoring and evaluation programs based on this data. The following data should be collected:
 - Entomology survey including the most common mosquito species complex, their feeding and resting habits as well as their susceptibility to the different classes of insecticides;
 - Baseline malaria indicator survey in the communities (people aged 6-59 months) to determine the burden of malaria in the community, and also serve as an indicator to monitor the impact of the disease and interventions; and
 - A knowledge, attitude and practice (KAP) study in the community to support the design and implementation of information, education and communication programs to promote behaviour change and monitor interventions.
- Ensure project designs reduce the potential for sources of vector breeding;
- Develop community based programs in partnership with the local authorities and based on the strategy of the national malaria control program e.g. ITN distribution;
- Any workplace malaria and vector control program to include measures for reducing the potential for increasing vector densities and thus decrease disease transmission in the communities;
- Extend the workplace program into the community program to ensure maximal positive benefits and reduction in workplace risk. The sustainability of these interventions will need to be closely considered given the duration of the project; and
- Encourage source reduction in communities through environmental control mechanisms based on community work groups. These activities can assist with the reduction in other vector related diseases.

Significance Statement:

Without mitigation this impact is considered to be long term, severe and probable and thus of HIGH negative significance. With mitigation measures in place this impact is considered to be highly positive.

		Effect	Pick or	Overall		
Impact Temporal Spatial Sc		Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Study Area	Severe	Probable	HIGH	
With Mitigation	Long term	Regional	Very Beneficial	Probable	HIGH	

Issue 3: Sexually Transmitted Infections, including HIV/AIDS

Impact 3.1: Transmission of STIs and HIV/AIDS

HIV/AIDS and STI are significant existing public health challenges nationally and within the immediate project area. Although the HIV prevalence in the project area is low, it is still of public health concern. STIs, if present and untreated, have been found to increase the risk of transmission of HIV, if one partner is infected. HIV's link with TB and its importance has been discussed above (impact 1.1).

Influx or/and movement of labour into the area will pose an increased risk for STIs. There will be more disposable income either as a direct or indirect consequence of the project. Commercial sex workers are more likely to establish in Montepuez, but may also be attracted to the immediate project area, where local community may be vulnerable to opportunistic sexual liaisons. The likely effect of the project employing a number of relatively well-paid employees may also increase the risk for transactional sex, especially if they are away from their normal family unit. Economic upliftment and settlement in the project area may also lead to the adoption of "urban" values and lifestyle changes, which may also play a role in casual sexual engagement.

Women and young girls are extremely vulnerable and have limited negotiating power for safe practices and family planning. Gender based sexual violence is common and while there are NGO's active in the area there is very little support for victims. It is important to recognize the role gender plays in sexuality and its effects on HIV transmission and prevention especially when considering the higher burden of disease in women compared to men in Mozambique.

HIV/AIDS should be considered a major risk for the project and the community and interventions should be implemented on a broad base in the workforce and the community. It may also be influenced by considering the **4M's** detailed below (International Food Policy Research Institute (IFPRI), 2005):

• *Mobility*: The transport corridors which will be improved with the development of the project will increase traffic to the area. Transport drivers are well known to engage in casual sexual practices as they are often away from family units. This can not only result in high risk sexual activity along the whole transport route but also in Balama as an end destination. The migration of people into the project area in search of work may cause similar consequences. The contract workforce also needs to be considered. This workforce may come from areas where the HIV prevalence rates are significantly higher and also carry different viral strains. They may have also

worked in remote settings away from their normal partners for extended periods and thus causal sexual relations become the norm.

- *Money:* There will be adequate amounts of disposable income in the area which will increase during the duration of the project. People who benefit directly and indirectly from the project may have more money available to partake in forms of transactional sex. These include local hires as well as semi-skilled contract workers and even senior expatriates.
- *Men:* Men play a predominant role in the local society and will form the bulk of the workforce due to the physical demands from mining. Transport workers and the construction work-force are also generally men.
- *Mixing*: This is strongly linked into mobility. In-migration of outsiders, returning migrants, the construction workforce and the transport workers are all different population groups that may mix with the present indigenous population. This may result in mixing of people with high prevalence with those with low prevalence of disease, and also introduce different virus strains.

There was no confirmed accurate data on HIV prevalence and very little in the way of data to understand practices and behaviour linked to HIV. The cumulative impacts of HIV, STIs and TB need to be considered.

Mitigation Measures:

- Develop a HIV/AIDS policy that incorporates both the workplace and community considerations;
- Develop an integrated HIV management program that considers both the workplace and the community but with different levels of intervention. The workplace should include a comprehensive program while the community program should have a focus on awareness and prevention activities. TB and STI must be integrated into this;
- Conduct a KAP study to understand levels of awareness and knowledge in both the workplace and community. This needs to have an emphasis on practices so that appropriate behaviour change programs are developed;
- Conduct a sero-prevalence study in the area in partnership with the local health authorities;
- Support the local health authorities in extending care and treatment programs in the area. Support the local health authorities with the establishment of Voluntary Counselling and Testing (VCT) centres in the area;
- Support information campaigns and community based peer educator programs in both the workforce and community. These need to use locally acceptable tools and based on the finding of the KAP study. These must serve as indicators to monitor the impact of the behaviour change and must have a gender focus. Community based peer health educators will play a key role;
- Develop an Influx Management Plan that also considers HIV;
- Support equal employment opportunities for women and support livelihood programs;
- Support NGO groups active in area on gender-based sexual violence;
- Prevent fraternization of external contractors with the community through codes of conduct and reduce the number of external people sleeping in the community at night.
- Support the development and extension of prevention of mother to child transmission programs;
- Support community based condom distribution centres; and
- Support health services in area with improved infection control and medical waste management.

Significance Statement:

Without mitigation this impact is considered to be permanent, very severe and definite and thus of VERY HIGH negative significance. With mitigation measures in place this impact is considered to be moderately positive.

Impact	Effect			Pick or	Overall
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Regional	Very Severe	Definite	VERY HIGH
With Mitigation	Long term	Regional	Moderately Beneficial	Probable	MODERATE

Issue 4: Soil, water and waste-related diseases

Impact 4.1: Soil, water and waste related diseases

Cause and Comment:

The communities in the project area have limited access to clean/improved water supplies. There is a heavy reliance on non-protected wells as a primary source of drinking water.

Influx may also play a role in availability of water due to increased demand, which may ultimately negatively affect water quality. Water-borne diseases such as diarrhoea are common and are linked to contaminated water and poor sanitary conditions. Water-washed diseases such as eye and skin infections are common. These are linked to poor hygiene.

Sanitation services in the area are limited and the prevalence of indicators for sanitation such as soil-transmitted diseases and schistosomiasis may suggest a high-level burden of disease. Chipembe Dam may also have the potential to increase the prevalence of schistosomiasis in the area. A study conducted in Mozambique by the International Water Management Institute (IWMI) found that the transmission of urinary schistosomiasis increased after the construction of dams, especially in the semi-arid northern areas of the country. This is because reservoirs provide perennial water bodies in the area for the intermediate snail host. The prevalence of urinary schistosomiasis in villages with and without dams was found to be statistically significant (Boelee et al., 2009). There is also no formal waste disposal system.

The project may influence water and waste related diseases in the following ways:

- Development of water storage facilities: The project will develop water storage dams for water use in the plant and to store excess water pumped from Chipembe Dam or underground sources. The community will not have access to these.
- Access to water. Other than resettlement or restriction of movement the project should not reduce access to community water supplies.
- *Quantity of water*: The project will require water for the plant operations. The planned low rate of abstraction of water from Chipembe Dam means that there may not be any significant impact on the quantity of water available.
- Quality of water: The project may have an impact on community water quality through domestic use on site and from plant operations. The potential pollution of surface water from the discharge of water from the sewerage treatment plant that will need to be developed to support the working camps will be limited if recommendations related to waste management (refer to Chapter 8) are implemented.
In-migration and unplanned settlements: Pressure on existing limited services in terms of water supply and sanitation could dramatically increase the risk of water related diseases. There is little data on basic water and sanitation practices or burden of disease linked to specific water and sanitation indicators. There is the potential for the project to be accused of polluting the water bodies in the surrounding communities from plant or domestic water and thus it is important to establish firm baselines for mitigation. Water and sanitation are significant existing needs in the community and if BGM supports any initiatives they should be linked to specific indicators to measure impact. Due to influx into the area and the indirect pressure it will cause on available sanitation services, the project is likely to have an impact on the sanitation situation in the area. However, improving the sanitation situation is likely to have major beneficial impacts in the communities and improve their overall quality of life.

- The quality of groundwater and surface water will be monitored to ensure that the project does not have any detrimental effects on community water sources;
- Influx management of migrant workers;
- Restrict access to project created water bodies;
- Conduct baseline water and sanitation studies on practices based on accepted health indicators;
- Perform end user analysis of water quality. This serves as an indicator for monitoring water quality where it is consumed and determines the level of general sanitation and hygiene even if water is collected from clean sources;
- Conduct baseline soil transmitted helminths and schistosomiasis studies to provide an indicator for monitoring sanitation in the communities. This will be used to inform a proper baseline in the communities so the potential impact of increasing the disease burden from schistosomiasis can be monitored. Soil Transmitted Helminthiasis (STH) are a good indicator for the baseline status of sanitation in the area and an important cause for co-morbidity;
- Ensure proper disposal of human waste that is generated from the project. There must be proper waste water treatment plants with the capacity to manage the expected throughput with required contingencies. The design should be such that if there is a failure that the risk of direct exposure to communities and their water sources is minimised;
- Ensure proper waste management from project generated waste according to waste management principles;
- Support the local authorities and other partners in improving water and sanitation services;
- Establish water and sanitation committees in the communities to manage their own water and sanitation services. This will improve sustainability of any outreach support;
- Promote and support local authorities in improved collection and disposal of waste in communities;
- Support information campaigns in the community on water use, hygiene and general sanitation; and
- Depending on the results of the baseline study, support the government's school deworming programme in partnership with local authorities. Schools should be supported with VIP latrines.

Without mitigation this impact is considered to be long term, severe and definite and thus of HIGH negative significance. With mitigation measures in place this impact is considered to be highly positive.

		Effect		Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Localised	Severe	Definite	HIGH	
With Mitigation	Long term	Regional	Very Beneficial	Probable	HIGH	

Issue 5: Food and nutrition related issues

Impact 5.1: Malnutrition

Cause and Comment:

Malnutrition is extremely common in Mozambique and a big problem in the project area. More than a half of the children in Cabo Delgado Province were found to be stunted in 2010 (Institut National de la Statistique et de la Démographie (INSD) et al., 2011).

Reasons for malnutrition include a lack of food due to poor yields of crops, challenging farming techniques with lack of mechanisation, limited variety in diet, expense of food and also poor feeding practices.

Food security in Mozambique is currently a national challenge. Feeding practices and general diet is not that well understood, although reports suggest that women are poorly educated on proper feeding practices. Feeding practices are extremely important to address as these are problematic and simply having adequate supply of food will not ensure adequate nutrition.

Influx of people into the area will put a strain on existing land and yields may reduce. Inflation could reduce food security in a situation of already high food prices that communities cannot afford.

Changes in practices also need to be considered over the medium term. The community may start buying more food in the form of refined products as a result of economic upliftment. A reduction in physical exertion may also result as a result of changing livelihoods. Ironically, the final result could be an increased incidence of obesity.

- Perform a baseline nutritional assessment through anthropometric measures in children under 5 and also micronutrient deficiencies (anaemia as an indicator). Perform surveillance on nutritional status through this data set as means to track well-being;
- Reduce project related communicable diseases that may impact nutrition;
- Minimise agricultural land loss through resettlement programmes;
- Favour local procurement of food items in combination with incentives to increase local production;
- Support mitigation measures for communicable diseases such as malaria, diarrhoea and respiratory infection to reduce the co-morbidity created by malnutrition;

- Support sustainable livelihood programs through increased use of agriculture. The financial benefit of farming over other practices will be essential to support;
- Promote access to education and schooling for women;
- Health systems strengthening for recognition and management of nutritional disorders;
- IEC programs that promote proper feeding practices at relevant age groups including improved complementary feeding;
- Support maternal and child health programs. This can include supporting the promotion of antenatal care, breastfeeding practices, food preparation/hygiene, and family planning; and
- Support any nutritional activities in partnership with the government or NGO in the project area.

Without mitigation this impact is considered to be long term, moderate and probable and thus of MODERATE negative significance. With mitigation measures in place this impact is considered to be moderately positive.

		Effect		Bick or	Overall	
Impact	Temporal Scale	ral Spatial Severi Scale Impa		Likelihood	Significance	
Without Mitigation	Long term	Localised	Moderate	Probable	MODERATE	
With Mitigation	Long term	Localised	Moderately Beneficial	May Occur	MODERATE	

Issue 6: Accidents/Injuries

Impact 6.1: Road traffic accidents and other accidental injuries

Road traffic accidents (RTA) are the most common form of accidental injury. These are common on the road between Balama and Montepuez. Other injuries are reported from farming activities. This could change with the further development of the project as the area is likely to see a large increase in the number and size of vehicles passing in and around the project area (transport of goods and personnel). The conditions of the roads are also likely to improve which will allow people to drive faster. The roadworthiness of the vehicles, the lack of driving skills and traffic regulation enforcement will mean that RTA will be a major hazard moving forward. At present domestic transport is mainly pedestrian or with bicycles and neither of these groups is aware of the risk of road accidents and road users are unlikely to respect the safety of these groups.

Some community members may be relatively naïve to risks from road traffic accidents and the larger volumes of traffic may increase their exposure risk. This is especially relevant for small children. Community members have expressed concerns that their children and animals are most vulnerable to the construction of the access road connecting the 242 main road to site and the utilization of the 242 main road by haul trucks.

The health facilities along the 242 main road have very limited capacity to respond and manage any form of complex trauma or multiple casualty situations. In addition, there are limited emergency services so delays to care can be significant and inappropriate movement has the potential to exacerbate injuries.

Mitigation Measures:

- Develop community security and safety management plans for the project related to the different activities. This will include emergency response plans for both community related accidents and also for the workplace. This must include a fire, rescue and chemical spill response capability, as well as medical emergency response strategies;
- Conduct a traffic impact assessment to assess the impact of increased traffic within the project area (this has been completed and forms part of the specialist volume, i.e. Part 5 of this document);
- Develop a clear policy for the management of emergencies or accidents in the community as a direct result of the projects activities;
- Support with local safety and security;
- Support the refurbishment of the local health facilities to support any injuries or trauma. This will be limited to first aid and stabilisation prior to transport. This can also include emergency care training of the local health care practitioners; and
- In partnership with the local authorities and police coordinate information campaigns about responsible driving including speed management and vehicle safety. Educational efforts on road safety should also be supported through the school system.

Significance Statement:

Without mitigation this impact is considered to be long term, severe and probable and thus of MODERATE negative significance. With mitigation measures in place this impact is considered to be moderately positive.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Localised	Severe	Probable	MODERATE
With Mitigation	Long term	Localised	Moderately Beneficial	Probable	MODERATE

Issue 7: Hazardous Materials, Noise and Malodours

Impact 7.1: Air pollution, noise and mal-odours

Cause and Comment:

The health impacts of noise are well described at both a physical and psychosocial level. Noise at the plant site will need to be managed with worker health and safety requirements and as a minimum must meet IFC guidelines to reduce ambient noise that may affect surrounding communities.

Dust generation was highlighted in the air quality assessment as a potential impact especially in operations linked to crushing and drying of the graphite.

Mitigation Measures:

• Evaluate and manage air, water and noise issues as part of the environmental impact assessment and environmental management plan requirements. Human health considerations will be considered based on results of the surveillance activity;

- Collect data on a longitudinal basis from the local health centres on incidence of increased respiratory disease- especially upper respiratory tract infections that could be ascribed to dust. While these may not be specifically ascribed to the project the prevailing trends are useful to monitor so that any concerns could be addressed. This may require health systems strengthening to support recording; and
- Develop transport management plans to minimise dust exposure.

Without mitigation this impact is considered to be long term, moderate and probable and thus of MODERATE negative significance. With mitigation measures in place this impact is considered to be LOW positive.

		Effect		Pick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Localised	Moderate	Probable	MODERATE
With Mitigation	Long term	Localised	Moderately Beneficial	May Occur	LOW

Impact 7.2: Chemicals, pesticides and heavy metals

Cause and Comment:

No obvious dangerous chemicals or agents are likely to be used in the construction phase of the project. Cement will be used but should not pose any community health threats. Hydrocarbon fuels pose a risk to water bodies and need to be controlled.

Pesticides are likely to be used in general camp management and possibly for vector control programs. These will need to be managed to ensure that they do not have a negative impact on human health and the environment. The project will adopt a pest management approach so that minimal pesticides are utilised at the project. The Food and Agricultural Organisation (FAO) has developed an International Code of Conduct on the Distribution and Use of Pesticides that focuses on risk reduction, protection of human health and the environmental, and support for sustainable agricultural development by using pesticides in an effective manner and applying integrated pest management strategies (WHO and FAO, 2010).

The potential for acid rock drainage from waste rock with more heavy metals being available for leaching will need to be considered. However, the WRD will be clayed lined, thus reducing the risk of AMD. Whilst heavy metal exposure is not one of the major potential impacts of the project, there is no adequate biological baseline data on heavy metal exposures in the area and key informants in the health services reported that they would not be able to accurately diagnose any heavy metal exposures.

The operational phase will involve flocculants, and some may be flammable and hazardous in high concentrations.

- Hazardous chemical substance management is required as part of the environmental management plan requirements;
- Determine baseline values of arsenic and mercury in PACs. These will be sampled in communities across similar exposure groups to determine background community

exposures. Hair samples are preferred but otherwise urine is considered to be adequate;

- Water monitoring as proposed in the environmental management plan will include surveillance for heavy metals;
- Background naturally occurring radiation levels (NORM) will be measured; and
- Ensure the project complies to IFC Performance Standard 3: Pollution prevention and abatement. These standards will apply to the planned integrated vector control programs. The least hazardous product is to be chosen for control and selected based on the World Health Organization Recommended Classification of Pesticides by Hazard Class. The guidelines of the FAO will be followed for procurement, storage, application and disposal of insecticides for malaria control.

Significance Statement:

Without mitigation this impact is considered to be long term, very severe and probable and thus of MODERATE negative significance. With mitigation measures in place this impact is considered to be LOW.

		Effect	Pick or	Overall		
Impact	Impact Temporal Scale		Severity of Likelihood		Significance	
Without Mitigation	Long term	Localised	Severe	Probable	MODERATE	
With Mitigation	Long term	Localised	Slight	Probable	LOW	

Issue 8: Social determinants of health

Impact 8.1: Gender-based violence, alcohol and drugs

Cause and Comment:

Gender-based violence occurs commonly and is often related to substance abuse. Women and young girls are often the most vulnerable.

While drug and alcohol abuse are currently not a major problem, these have the potential to increase during the lifespan of the project.

Influx and development of make-shift structure and settlements may be important to consider, although these may not alter the baseline significantly.

- Social management plans and recommendations as part of the social impact assessment to be implemented;
- Gender empowerment to be considered through these programs.
- Support information programs in the community on domestic violence, role of men and support of women, alcoholism and drug abuse; and
- Support local authorities with improved policing and criminal justice system for gender-based violence.

Without mitigation this impact is considered to be long term, very severe and may occur and thus of HIGH negative significance. With mitigation measures in place this impact is considered to be moderately positive.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Localised	Very Severe	May Occur	HIGH
With Mitigation	Medium term	Localised	Very Beneficial	Probable	MODERATE

Impact 8.2: Social cohesion and well-being

Cause and Comment:

Influx into the project area will play a major role in lifestyle and perceptions of wellbeing. Education is a major existing need in the community. The level of education in the project area is described as low. It was cited as a priority developmental need in the community. Women's literacy is extremely important to enhance health needs in the family unit as they are the gatekeepers to health.

Individuals from the local population will be employed as unskilled labour for the construction phase and selected individuals possibly up-skilled to be employed for the the operational phase. Syrah resources will however need to make use of skilled migrant workers, as training may be too complex. Once the mine becomes operational, several permanent jobs will be created for skilled, semi-skilled and unskilled labourers. Many of the highly-skilled workers may come from outside of the project area which may lead to community tension.

It is not the intention of the HIA to address social issues in detail as this has been covered in more detail in the social impact assessment. However, it is important to recognise the wellbeing and perceptions on quality of life have both a social and health basis.

Mitigation Measures:

- Many elements will be addressed in the social management plan including influx management and resettlement management. It is essential that where possible health is integrated into social programs;
- Extensive communication and management of expectations will need to be conducted with stakeholders. Community expectations will need to be managed carefully;
- Supporting education programs with a gender equity focus;
- Support cultural activities and sports especially in schools;
- Support vulnerable groups; and
- Support graduate training programs for the youth in the community.

Significance Statement:

Without mitigation this impact is considered to be long term, very severe and may occur and thus of HIGH negative significance. With mitigation measures in place this impact is considered to be moderately positive.

		Effect		Dick or	Overall
Impact	Impact Temporal Spatial Severity of Scale Impact		Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Localised	Very Severe	May Occur	HIGH
With Mitigation	Long term	Localised	Very Beneficial	May Occur	MODERATE

Issue 9: Health systems issues

Impact 9.1: Health system strengthening

Cause and Comment:

There are two health facilities within the project area with one of these being the district hospital in Balama. However, there remain challenges in the accessibility to the health facilities, as well as the capacity of these facilities.

There are also a few NGOs which support health infrastructure and health system strengthening programs. *Medicus Mundi International* has been providing consumables for health facilities in the local community while *Medecins Sans Frontieres* assist in transportation of sick people to Montepuez or Pemba.

In terms of project impacts, influx may create increased demand for what is already a scarce resource. This has the potential to create tension.

Health information management is generally good in the health facilities that surround the project. This data is limited by the fact that diagnostics and human resource capacity is basic. However, it serves as the best form of health surveillance for the monitoring of health impacts if supported and managed well. Strategic investment in local health facilities can support this.

- Influx management and supporting already limited health facilities to cope with the increased population, if this is related to the project, is required;
- Support community volunteer programs through expansion of the community based peer health educator group;
- Support the health information management system at the local health facilities as a means of supporting the monitoring of specific health impacts. This will provide a longitudinal tool to track specific health conditions and through the partnership provide access to information. The project should set up a basic monitoring tool with support of the local health facilities;
- Develop a plan to support health infrastructure in the project area. This strategic investment should consider the existing health needs of the community and be designed in such a way as to evolve with likely future health needs. Even minimal support with the local health infrastructure will result in significant positive impacts;
- The needs and the location of the facilities need to be discussed and agreed with the communities so that the projects are community owned and supported. This will be done cautiously so that expectations are managed and disparities are not created;
- Develop a memorandum of understanding (MoU) with the government for the mutual support of the health facilities in the project area. The project does not intend to become the de-facto government as this will create an unsustainable situation. The project will support upgrading of facilities and eventually with the development of new ones (e.g. a mobile clinic) to a level that supports the needs of the community and

supports the planned mitigation and enhancement activities. The community leaders must be part of this MoU;

- The following model is proposed in the event that a new health facility is developed:
 - The communities provide land and labour to construct facilities. This will be based on government standards;
 - The project will provide materials and construction supervisory support;
 - The project will equip the facility through an NGO agreement; and
 - The government must provide staff and supply of essential drugs and consumables.
- The local health authorities meet with all health oriented NGOs working in the project area regularly, and this serves as an ideal opportunity for the project to seek to engage NGO partners, and to do so in collaboration with the local health authorities;
- Support outreach services to local communities through support or partnership with programs e.g. vaccination and logistics support; and
- Support the health information management system through the following mechanisms:
 - Improve information technology through education of staff and providing computers;
 - Ensure adequate diagnostic equipment;
 - Support training on the national system to ensure accurate reporting; and
 - Develop a basic site based monitoring program to track key health trends.

Significance Statement:

Without mitigation the influx of people will exacerbate an already difficult situation, and without any health system strengthening this impact will continue to be long term, severe and definite and thus of HIGH negative significance. With mitigation measures in place this impact is considered to be highly positive.

		Effect		Pick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Study Area	Severe	Definite	HIGH
With Mitigation	Long term	Study Area	Very Beneficial	Probable	HIGH

Issue 10: Non-communicable diseases

Impact 10.1: Non-communicable diseases

Cause and Comment:

These diseases are poorly described in the country and district. This is due to the high burden of communicable diseases in the country that have focussed the human and economic resources to this sector.

NCD may play a major role in the economics of the country as it is well recognised that poor adult health negatively effects economic well-being at an individual and household level, but also at a macro level. Labour productivity will fall, and the social and medical costs of managing chronic diseases as well as an ageing population, will increase.

The project will in all likelihood enhance the socio-economic conditions in the area either from direct or cumulative benefits. As the project starts to uplift health programs in the area through direct or indirect means, it will hopefully increase the life expectancy in the area and also the productive time of breadwinners. The short term effects may be an increased spending ability and adoption of more western sedentary lifestyle and diet. With prosperity

and organised settlement may come a degree of urbanism with associated changes in values and behaviour, which predisposes the community to an increase in lifestyle related diseases such as obesity, hypertension, diabetes, dental caries and some forms of cancers. This may place an additional burden on the local health care facilities that may not have an ability to diagnose and appropriately manage these conditions.

The project will employ a number of permanent and temporary workers. Diet and lifestyle will need to be monitored in this sector as they will have access to increased incomes and at least one free meal a day on the project site. This is a workplace health as well as a community health concern.

In terms of the significance of the project on the communities the following can be considered:

- Reduction in traditional lifestyle and values;
- Social and environmental factors that increase stress and unhealthy behaviours; and
- Increase pressure on existing health care facilities that only practice limited preventive health care.

These conditions are chronic in nature and difficult to predict at the local level. The cumulative impacts of the economic upliftment of the country will need to be considered and as such the impacts cannot solely be ascribed to the project. Mitigation and management at the local level is however important.

Mitigation Measures:

- Collect indicator data on NCD in the area. Focus on hypertension and diabetes as most common conditions;
- Support health education programs as part of a community based peer health educator program. These should focus on lifestyle risk factors such as diet, exercise, smoking and alcohol consumption.
- Support the district health authorities implement a local integrated non-communicable disease intervention program possibly based on the WHO Stepwise program. This seeks to reduce risk factors in the community, enhancing the preventive practices of the health care personnel and ensuring provision of correct diagnostics and treatment. This may need to be a strategy that develops over time due to local policy priorities;
- Support the local health care personnel with training on disease management programs and the recognition of NCD symptoms and associated management. This is to include integrated management to include proper management strategies for hypertension and high cholesterol; and
- Support with diagnostic medical hardware.

Significance Statement:

Without mitigation this impact is considered to be long term, moderately severe and probable and thus of MODERATE negative significance. With mitigation measures in place this impact is considered to be moderately positive.

		Effect		Bick or	Overall	
Impact	pact Temporal Spatial Sca		Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Study Area	Moderately Severe	Probable	MODERATE	
With Mitigation	Long term	Study Area	Moderately Beneficial	Probable	MODERATE	

7.4.3 Impacts on natural resources

Natural resources are defined as materials and components that occur naturally within the natural environment. A natural resource may exist as separate entities such as fresh water and air, as well as living organisms such as animals or fish, or it may exist in an alternate form which must be processed to obtain the resource such as metal ores, oil, and most forms of energy.

Natural resources currently used in the Syrah Balama concession include:

- Water
- Wood
- Medicinal and food plants
- Grasses
- Soil and mud

Impact 1.1: Construction of new mining infrastructure may result in permanent loss of fruit trees, wood sources and other natural resources.

Cause and Comment:

Approximately 350 ha of vegetation will be cleared for the construction of the mine and associated infrastructure This will result in significant impacts on natural resource use since these resources provide households with building materials, food, medicine and income (i.e. charcoal production).

- A RAP has been drafted to include a detailed agricultural valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes;
- Livelihood restoration strategies will be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options include supporting the cotton and maize production capacity of the area by investing in market access, seed provision and agricultural training programmes. A key focus of such programmes needs to be the empowerment of vulnerable children and youth, as well as women (especially female-headed households);
- Villagers will have controlled access to the proposed mining area prior to clearing commencing to harvest all available resources.
- The implementation of measures that would allow local residents to access the forest resources that are cleared will also help to meet local needs and reduce the pressure on the remaining forest resources in the short term.
- Any rehabilitation programmes will involve a stakeholder engagement process to determine the needs of the local communities and how these can be integrated into

rehabilitation programmes.

 As part of the social corporate responsibility some funding is to be made available for the initiation of community projects such as a bee keeping project, woodlots, etc. These projects will be established in degraded areas in close proximity to villages and not in indigenous forest. This will also help to alleviate existing impacts on natural resources.

Significance Statement:

The removal of vegetation will be required for the construction of the mine and associated infrastructure. The nature of the impact would be long term as this is an open cut mine and thus rehabilitation options are limited. The impact is of moderate severity and of MODERATE significance as it is anticipated that under the no-go situation these areas will be regularly harvested and even cleared for agricultural purposes. With mitigation measures in place this impact could be reduced to that of LOW significance.

		Effect		Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Study Area	Moderate	Definite	MODERATE	
With Mitigation	Long term	Study Area	Low	Definite	LOW	

	Im	pact	1.2:	Increasing	demand	for	natural	resources
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Cause and Comment:

The proposed development is likely to result in the in-migration of job seekers, the employment and accommodation of mine staff, increased tourism (linked to improvements in infrastructure and increased demand for accommodation, meals and entertainment by mine staff), and increased trading opportunities. This influx of people needing accommodation, meals and entertainment and improved infrastructure is likely to increase the demand for charcoal, building materials, thatch and other natural resources. It should be noted that according to the land, natural resource and agriculture assessment, harvesting of natural resources is currently mainly taking place in degraded areas. This may change if there is a significant increase in the demand of these resources.

Mitigation Measures:

• An influx management plan will be developed for the proposed project to deal with the issue of in-migration in its entirety.

Significance Statement:

It is *probable* that there will be in-migration to the area due to the potential for employment. The nature of this secondary impact would be long term and severe and of HIGH significance. The mitigation measures provided would reduce the likelihood of clearing and the severity, resulting in a MODERATE post-significance rating of the impact.

		Effect		Pick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Study Area	Severe	Probable	HIGH
With Mitigation	Long term	Study Area	Moderate	May Occur	MODERATE

7.5 Impacts resulting from the operational phase

7.5.1 Socio-economic impacts

Issue 1: Employment Opportunities and the Stimulation of Economic Growth

The area has a significantly large youth population, who might demand local employment. The area also lacks real employment opportunities or economic growth, and the mining development could provide a much needed economic thrust in terms of sourcing material and services locally, stimulating the area's general economy. With this possibility of providing employment opportunities, there is a strong possibility that the prospective mining operation will draw migrant labour in search of employment opportunities. Surrounding villages are poor and uneducated, which means that more educated and skilled labour will certainly be needed from areas such as Balama, Montepeuz or even Pemba. Villagers in rural Mozambique are known to be migrators, and provided that mining operations are expanding in the district, a steady increase in migrants is foreseen. Such an influx can either cause some of these villages (especially Pirira and/or Maputo) to expand significantly, or cause a temporary increase in labour.

As with most social impacts, in-migration may also have a positive impact in terms of providing locals with small business opportunities due to an increased demand for local produce and other goods, as well as opportunities for cultural exchange.

Two impacts are discussed below, namely temporary or permanent in-migration of migrants in search of job opportunities, as well as employment, skills training and scholarships.

Impact 1.1: Temporary or permanent in-migration in search of job opportunities

Cause and Comment:

Cause and comment is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 1, Impact 1.1.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 7.4.1, Issue 1, Impact 1.1.

Significance Statement:

If no plans are developed and implemented, the impact of in-migration might be highly negative for the operational phase, as this phase of the mining development can cause a significant influx of job seekers in the long-term. The likelihood of this is probable and the effect might be very severe on the local populations and their culture.

With a commitment to implementing mitigation measures, the impact would be moderately negative on the affected villages during the operational phase, as the mine will stimulate the local skills base and limit the number of outside workers required.

	Effect			Risk or	
Impact	Temporal scale	Spatial scale	Severity of impact	likelihood	Significance
Without mitigation	Long-term	Regional	Very Severe	Probable	HIGH -
With mitigation	Long-term	Regional	Slight	May occur	LOW -

Impact 1.2: Employment, Skills Training and Scholarships

Cause and Comment:

Cause and comment is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 1, Impact 1.1.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 1, Impact 1.1.

Significance Statement:

Should these mitigation and/or enhancement measures not be implemented, the significance of employment would only be moderate positive during the construction and operational phases. With employment opportunities, households can have a regular source of income. This could assist many households to diversify their income-earning opportunities, or even to buy the necessary equipment to bolster their farming practices.

Impost		Effect	Risk or likelihood	Significance	
Impact	Temporal scale	Spatial scale	Severity of impact		
Without mitigation	Long-term	Study area	Moderate Beneficial	Probable	MODERATE +
With mitigation	Long-term	Study area	Very beneficial	Definite	HIGH +

Issue 2: Land Acquisition

Although land will only be acquired during the mine's construction phase, there is the possibility that additional land could be affected by the mine's operational phase as well, especially related to nuisance impacts or farms which might still be too close to the operation.

Impact 2.1: Reduced Access to Natural Resources

Cause and Comment:

Cause and comment is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 2, Impact 2.3..

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 2, Impact 2.3.

Significance Statement:

The significance of this impact would be HIGH negative if no mitigation measures are in place. Access to natural resources will become restricted, which will reduce the sustainability of villagers' livelihoods. A restriction in natural resources might also increase villagers' dependence on economic opportunities in the region (which are lacking), whilst food insecurity might also be an associated impact. Mitigation measures would be able to off-set

this impact to one of MODERATE significance, provided agricultural services are offered to the affected communities.

Impact	Effect			Dick or	Overall
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study area	Very severe	Definite	HIGH
With Mitigation	Permanent	Study area	Moderate	Probable	MODERATE

Issue 3: Community Safety Risk

With any development initiative, there are health, safety and security risks. Impacts related to the possible pollution of water resources are discussed in the Groundwater Specialist Assessment as well as in Chapter 6 of this report and are thus not assessed here. Traffic-related impacts, such as an increased risk of accidents due to increased traffic volumes and the use of heavy machinery are discussed in the Transport Specialist Assessment as well as in Chapter 8 of this report.

Impact 3.1: Community Safety Risk

Cause and Comment:

Cause and comment is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 3.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 3.

Significance Statement:

This is potentially a serious impact, and failing to implement mitigation measures might result in fractious relationships between the developer and the PACs. Without mitigation, this impact will have a moderately negative impact. The project should have no effect on the surrounding villagers if appropriate protocols are implemented.

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long-term	Study area	Severe	May occur	MODERATE
With Mitigation	N/A	N/A	N/A	N/A	N/A

Issue 4: Stakeholder and Community Engagement

Cause and Comment:

Cause and comment is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 4.

Mitigation Measures:

Mitigation measures is the same as what is listed for the construction phase, thus refer to Section 2.4.1, Issue 4.

Without implementing enhancement measures related to regularly engaging with the affected villagers, the significance of the project could potentially have a moderate negative impact on the affected villagers. The reason for this is that poor stakeholder engagement could cause considerable tension between the project development and community members, especially if villagers are not informed of the project and regular project related activities.

As enhancement measures will be implemented during the operational phase, the significance would be highly positive.

Impact		Effect	Bick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long-term	Regional	Moderate	Probable	MODERATE
With Mitigation	Long-term	Regional	Beneficial	Probable	MOD

7.5.2 Health related impacts

The majority of health related impacts as a result of the project can be ascribed to the influx of job seekers into the overall area. As discussed previously this impact usually occurs through all phases of the project life, thus the project related health impacts for the operational phase will be the same as those listed for the construction phase in Section 7.4.2 above.

7.5.3 Impacts on natural resources

Impact 1.1: Increasing demand for natural resources

Cause and Comment:

The proposed development is likely to result in the in-migration of job seekers, the employment and accommodation of mine staff, increased tourism (linked to improvements in infrastructure and increased demand for accommodation, meals and entertainment by mine staff), and increase trading opportunities. This influx of people needing accommodation, meals and entertainment and improved infrastructure is likely to increase the demand for charcoal, building materials, thatch and other natural resources. It should be noted that according to the land, natural resource and agriculture assessment, harvesting of natural resources is currently mainly taking place in degraded areas. This may change if there is a significant increase in the demand of these resources.

Mitigation Measures:

• An influx management plan will be developed for the proposed project to deal with the issue of in-migration in its entirety.

Significance Statement:

It is *probable* that there will be in-migration to the area due to the potential for employment. The nature of this secondary impact would be long term and severe and of HIGH significance. The mitigation measures provided would reduce the likelihood of clearing and the severity, resulting in a MODERATE post-significance rating of the impact.

Impact		Effect	Bick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Study Area	Severe	Probable	HIGH
With Mitigation	Long term	Study Area	Moderate	May Occur	MODERATE

7.6 Impacts resulting from the decommissioning phase

7.6.1 Socio-economic impacts

Issue 1: Loss of social services

Cause and Comment:

During the decommissioning of the mine various social projects initiated during the various phases of the proposed project such as educational projects, agricultural projects, etc. may be lost.

Mitigation Measures

Ensure that the project is undertaken in a sustainable manner so that it can continue within the region post mine closure, i.e. include basic business training.

Significance Statement:

This impact is considered to be of MODERATE negative significance and will remain moderately negative with mitigation measures employed.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	May Occur	MODERATE
With Mitigation	Permanent	Study Area	Severe	Unlikely	MODERATE

Issue 2: Retrenchment

Cause and comment

During the decommissioning phase of the proposed project the majority of staff previously employed will be retrenched as all mining activities has ceased.

Mitigation measures

A retrenchment policy will be in place prior to any retrenchment activities being undertaken. If the proposed project continues onto Phase 2, employees appointed for Phase 1 of the development will be maintained for the second phase which would reduce the amount of staff to be retrenched.

Significance Statement:

This impact is considered to be of VERY HIGH negative significance but can be reduced to moderately negative with mitigation measures employed.

Impact		Effect	Pick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Very Severe	Definite	VERY HIGH
With Mitigation	Permanent	Study Area	Moderate	May Occur	MODERATE

7.6.2 Health related impacts

The majority of health related impacts as a result of the project can be ascribed to the influx of job seekers into the overall area. As discussed previously this impact usually occurs through all phases of the project life, thus the project related health impacts for the decommissioning phase will be the same as those listed for the construction phase in Section 7.4.2 above.

7.6.3 Impacts on natural resources

Impact 1.1: Loss of fauna and flora due to increased access along the haul road

Cause and Comment:

The proposed haul road could be handed to the appropriate government departments (i.e. Department of Roads) and could potentially be utilised by the local communities once mining has been completed. This would result in increased access by the local communities to faunal and floral species for natural resource harvesting in the project area. It should however be noted that a large number of tracks are present within the overall project area and although the existence of the haul road may result in increased access it will by no means create new access within the area.

Mitigation Measures:

• There are no real mitigation measures for this impact.

Significance Statement

The haul road would provide increased access for the local residents to the areas directly adjacent to the road. Left uncontrolled, this will result in further removal and extirpation of biodiversity within the area. The environmental significance of this impact would be severe permanent, and of HIGH significance.

		Effect	Pick or	Overall		
Impact Tempora Scale		Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Study Area	Severe	Definite	HIGH	
With Mitigation	N/A	N/A	N/A	N/A	N/A	

7.7 Cumulative impacts

7.7.1 Socio-economic impacts

Due to the fact that there are no additional projects planned for the proposed project area, it is unlikely that there will be any cumulative impacts related to the socio-economic environment.

7.7.2 Health related impacts

Due to the fact that there are no additional projects planned for the proposed project area, it is unlikely that there will be any cumulative impacts related to the health of local residents.

7.7.3 Impacts on natural resources

Due to the fact that there are no additional projects planned for the proposed project area, it is unlikely that there will be any cumulative impacts related to natural resource use.

8. ASSESSMENT OF INFRASTRUCTURE, WASTE AND PROCESS RELATED ISSUES

8.1 Planning and Design Phase Impacts

Activities associated with the design and pre construction phase pertains mostly to exploration. As the project has a mining concession impacts associated with exploration and the mitigation of these impacts were included in the Exploration EMP compiled to obtain this concession and will therefore not be repeated in this section.

8.2 Impacts resulting from the existing land use / no-go options

8.2.1 Impacts related to waste and wastewater

Typically the final destination of solid waste in Mozambique is simple open air rubbish dumps, where waste is burnt, buried or compacted, causing certain environmental and health concerns. Recycling is rare and generally only practised in the larger cities, where a market exists for collected recyclables. Sanitation systems and sewage treatment facilities are not present in the project area. Should the project not go ahead, waste and sewage will continue to be disposed in the surrounding environment, causing environmental damage in the long term.

8.2.2 Impacts related to traffic and transport

Roads in the project area currently have only light volumes of traffic. The biggest contributor to traffic are small, two-axle trucks delivering consumables to the rural villages, and returning with goods produced in the villages, for example, charcoal, cotton and cassava. Light passenger vehicles are few in number. Bicycles and motorbikes, travelling between villages, are common, as are pedestrians. Should the project not proceed, conditions as they are would be expected to persist.

8.2.3 Impacts related to noise

The existing noise sources in the immediate area of the proposed project are limited to agricultural activities, as well as infrequent vehicular movement on the surrounding road infrastructure.

8.2.4 Impacts related to air quality

The area is a greenfields site devoid of industry and sources that would have significant impacts on air pollution. In the area, subsistence farming is predominant and the associated bush burning from such agricultural practices will contribute to ambient air pollution. In September 2013, sampling revealed dust deposition rates at Nquide and Pirira of 1061 mg/m²/day and 850 mg/m²/day respectively. Although the sampling procedure may have been slightly flawed, the elevated level of dust observed during the dry season might not be far from the ambient dust deposition rates in the area. The proposed mine operation and associated activities will add to the background ambient particulate loading in the area.

8.3 Impacts resulting from the construction phase

8.3.1 Impacts related to waste and wastewater

<u>Issue 1: Management of non-process general and hazardous wastes (Construction,</u> <u>Operation and Decommissioning)</u>

Impact 1.1: Pollution of land and water

Cause and Comment:

Inappropriate storage of wastes, particularly those exhibiting harmful properties (i.e. hazardous wastes), can result in the contamination of land and water resources. As a result of rainfall events, leachate may be formed as water percolates through the solid waste, and this leachate may contain nutrients and a variety of toxic compounds, including metals. As such, it could result in the contamination of water and land. In extreme cases, release of large quantities of nutrients to a water body can result in eutrophication. The presence of certain toxic compounds in water as a result of pollution by wastes may have significant long-term negative impacts on the aquatic ecosystems and render the water unsuitable for certain applications including human consumption.

Mitigation Measures (General wastes):

- Manage wastes according to the requirements of Mozambican legislation and, preferably, the requirements of the IFC General EHS Guidelines (2007);
- General wastes that cannot be reused or recycled to be stored temporarily in a dedicated area and then transported regularly to the proposed landfill for disposal;
- The proposed general landfill site will be sited, designed and operated to international standards in order to isolate the wastes and prevent environmental contamination, particularly groundwater contamination (EHS Guidelines for Waste Management Facilities 2007 and EPA 2000) and will be licenced by the developer early in the construction phase. Until such time as this facility is fully operational, all general waste produced during the construction phase will be stored on site in a secure access control area, in a legally-compliant manner that minimises environmental impacts;
- It will be essential to implement a ground water monitoring system in the vicinity of the constructed landfill site in order to detect any changes to the quality of subsurface water;
- Cover bins for temporary storage of waste that are located outdoors to prevent ingress of water and access by animals;
- Develop a comprehensive Integrated Waste Management Plan for the site and include Key Performance Indicators (KPIs) against which the management of wastes can be audited;
- Inform employees, contractors and visitors to the site of correct waste management procedures, including separation of general and hazardous waste at source;
- Locate waste storage and disposal areas at least 100m from surface water resources or important drainage lines.

Mitigation Measures (Hazardous wastes):

• Cover the management of hazardous wastes within the Integrated Waste Management Plan for the facility;

- Prior to safe disposal, all hazardous wastes will be temporarily stored at the temporary hazardous waste storage facility. This facility will be designed to include secondary containment lined and covered to protect the contents from weather (sunlight and rain). If wastes are corrosive, the base of the storage facility will be lined with an acid-resistant coating;
- Return, where possible, empty containers for hazardous chemicals to suppliers. Where empty containers for hazardous chemicals (hydrocarbons, pesticides, laboratory chemicals, degreasing agents etc.) cannot be returned to the suppliers, they will be triple-rinsed, punctured and stored in a secure area until such time as they can be disposed of safely. Rinse water will not be discharged directly to the environment;
- Dispose of empty pesticide containers according to the Food and Agricultural Organisation's Guidelines on Management Options for Empty Pesticide Containers (Food and Agriculture Organisation (FAO) 2008);
- A hydrocarbon management Operating Procedure should be designed and implemented. Copies of this document should be made available at designated facilities where hydrocarbons are used or stored. The purpose of this procedure is to provide for the proper storage and handling of hydrocarbons, including waste hydrocarbons, on site and hence prevent any form of contamination;
- Remove and dispose of soil contaminated with hydrocarbon at a soil bioremediation facility on site or else disposed of as hazardous waste;
- MSDS for all chemicals will be readily available on site and the precautions stipulated in these will be adhered to. Staff to be trained on the correct management of bunded facilities, including the discharge of collected liquids;
- Spill kits will be readily available at strategic points throughout the site and staff to be trained on the correct use of these kits;
- No hazardous wastes will be disposed of into drains as this may impact negatively on the performance of the septic tanks;
- There are two potential disposal options for medical waste which will be managed according to the management procedure described in Annex 3 of the ICRC Medical Waste Management (2011) and the requirements of the Mozambican legislation. The first is to transport this material to the Balama regional clinic for safe disposal. The second is to incinerate the material on site to render it harmless and then dispose of it at the on-site landfill.

Impacts associated with the management of general (non-hazardous) solid waste may occur and the impacts are potentially long-term. The extent of the impacts (excluding potential impacts to water resources which are assumed to be covered in the Surface Water specialist report) are likely to be limited to the study area. Without mitigation the impacts will definitely occur and should probably be regarded as moderately severe. With the recommended mitigation the severity could be reduced to slight. The overall significance of the impact without mitigation would be MODERATE but with mitigation would be LOW.

Based on the most likely nature of non-process hazardous wastes, impacts may occur and, due to the potential for certain hazardous substances to accumulate in the environment, are potentially permanent. Due to potential transport of these substances into water, their impact may be of significance to the district. Without mitigation the impacts will definitely occur and would probably be regarded as very severe and of VERY HIGH significance. However, with mitigation the severity could be reduced to moderate and the overall significance of the impact would be MODERATE.

General Non-Hazardous Was	ste:
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		Effect	Bick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Study area	Moderately Severe	Probable	MODERATE	
With Mitigation	Long term	Study area	Slight	Probable	LOW	

Hazardous Waste:

		Effect	Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	District	Very Severe	Probable	VERY HIGH
With Mitigation	Permanent	District	Moderate	Probable	MODERATE

Impact 1.2: Nuisance impact (Production of odours, visual impact and attraction of pests and vermin)

Cause and Comment

The uncontrolled storage of solid waste, in particular food waste, can attract vermin and pests including rodents, birds and flies. These vermin / pests may pose a nuisance to adjacent communities of Nquide, Ntete, Maputo and Pirira and may act as vectors for disease. The uncontrolled storage of solid waste can result in the release of unpleasant odours which may be regarded as a nuisance to adjacent land-users, particularly those down-wind of the material. Odorous compounds are also released from relatively well-managed solid waste disposal facilities. The presence of large quantities of litter around the facility or at the proposed landfill may constitute a visual impact to employees and local communities.

Mitigation Measures:

Refer to mitigation measures for Impact 1.1 (above).

Significance Statement:

Nuisance impacts associated with the management of solid waste will probably occur and the impacts are potentially long-term but limited to the study area. Without mitigation the impacts should probably be regarded as moderately severe but with mitigation the severity could be reduced to slight. The overall significance of the impact without mitigation would be MODERATE but with mitigation would be LOW.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	patial Scale Severity of Likelihood	Significance	
Without Mitigation	Long Term	District	Moderately Severe	Probable	MODERATE
With Mitigation	Long Term	District	Slight	Probable	LOW

Issue 2: Disposal of domestic wastewater and sewage sludge

Impact 2.1: Pollution of soil and water Cause and Comment:

Domestic sewage is characterised by a high concentration of nutrients, high organic matter and a variety of pathogens. As such, it must be properly treated prior to discharge to the environment to avoid negative impacts to human health and the environment. If untreated sewage is discharged to the environment, the high nutrient concentration could lead to eutrophication of surface water resources and subsequent disruption of ecological function within the aquatic environment. The sewage sludge from sanitary treatment facilities would have to be removed periodically. Sewage sludge also contains high concentrations of nutrients and may have a similar impact on water resources if not stored and disposed of in a manner that minimises the likelihood of migration of contaminants from the sludge to water resources.

- Domestic wash water and sewage will be diverted to the septic tanks or packaged sewage treatment plants for treatment. Discharge from these facilities will meet discharge standards prior to release into the process water pond. Sewage sludge from these facilities will be managed as described in the EHS Guidelines for Water and Sanitation (2007). This includes to stabilize by drying in purpose-built beds or composting. The stabilized sludge can then be dried and either disposed at the proposed landfill or alternatively, applied as a soil conditioner during rehabilitation of the mine, provided that levels of toxic constituents is sufficiently low. If soil application is adopted, soil contamination will be avoided and the soil standard prescribed by the AfDB (African Development Bank, 1995) will be adhered to.
- Pre-treat oil and grease containing effluents from canteens with a grease trap prior to discharge into sewage treatment facilities;
- If possible Chemical toilets will not be used during the construction period unless the contents can be disposed of in a manner that does not pose a threat to the environment. Instead, alternatives such as VIPs, composting toilets or similar will be considered as preferred alternatives;
- If VIPs are used, they will be lined, maintained and sited in a way that minimises the risk of contamination of surface and sub-surface water resources;
- All sewage treatment facilities will be well maintained. To this end, at least one employee on site will be trained to maintain the system(s);
- The performance of the sewage treatment systems will be monitored regularly. Where a system is found to be performing poorly, the cause of the poor performance will be investigated timeously and remediation measures put in place to restore performance;
- In the event that sludge has to be removed from the system(s), it will be disposed in a manner that minimises potential risk to human health and the environment and will comply with the National legislation;
- The environmental monitoring programme for the facility must incorporate monitoring points that are able to detect a negative impact on water quality (surface and groundwater) and the correct parameters for monitoring potential impacts related to the discharge of treated sewage.

Environmental impacts associated with the disposal of sewage will definitely occur. As the proposed project will be operational for approximately 25 years, impacts associated with the release of untreated effluent and poor sludge management are potentially long-term and may affect the study area. Without mitigation the impacts on soil and water would probably be moderately severe and of MODERATE significance. However, with implementation of the recommended mitigation measures the severity of the impacts would be slight and of LOW significance.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Study Area	Moderately Severe	Probable	MODERATE	
With Mitigation	Long Term	Study Area	Slight	Probable	LOW	

Impact 2.2: Health impacts to employees and communities

Cause and Comment:

Sewage and sewage sludge is normally characterised by high concentrations of pathogenic microorganisms (viruses and bacteria) and helminths. Exposure to untreated effluent, either directly or through contaminated water resources, can result in the spread of numerous diseases including cholera.

Mitigation Measures:

Refer to mitigation measures for Impact 2.1 above. In addition, the following mitigation measures are applicable:

• Any employees tasked with management of sewage and sanitation systems will be vaccinated against key diseases associated with these waste streams.

Significance Statement:

Pathogenic microorganisms are commonly found in untreated sewage and release of these organisms to water bodies used for irrigation, drinking, recreation or fishing can result in the spread of disease such as cholera. The health impacts associated with the release of untreated sewage effluent and poor sludge management are potentially long-term and may affect the district. Without mitigation the associated health impacts would probably be severe and of HIGH significance. However, with implementation of the recommended mitigation measures the impacts would be of slight severity and of LOW significance.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	District	Severe	Probable	MODERATE	
With Mitigation	Long Term	District	Slight	Probable	LOW	

Impact 2.3: Nuisance impacts (odour and flies)

Cause and Comment:

Raw sewage, sewage sludge and sewage treatment facilities are frequently associated with the release of unpleasant odours and may attract large numbers of insect pests such as flies. The persistent odours and presence of insect pests would most likely be regarded as a nuisance to employees and local community members. If sewage is managed correctly, the level of these nuisance factors can normally be reduced significantly.

Mitigation Measures:

Refer to mitigation measures for Impact 2.1 above.

Significance Statement:

The management of sewage will definitely be associated with odours and insect pests and, due to the influence of wind, the impact on any one receptor would probably be short-term. The treatment plant will, however be relatively small and so the impact is likely to be confined to the study area. There are also currently no communities in the immediately vicinity of the mine. Without mitigation the impacts would probably be Moderately Severe and of MODERATE significance. However, with implementation of the recommended mitigation measures the impacts would probably be of slight severity and of LOW significance.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Short Term	Study Area	Moderately Severe	Probable	MODERATE	
With Mitigation	Short Term	Study Area	Slight	Probable	LOW	

Issue 3: Disposal of run-off / storm water

Impact 3.1: Pollution of land and water

Cause and Comment:

Run-off water is likely to be generated on site as a result of the high rainfall, washing of machinery (including vehicles) and, possibly, dust suppression activities. As this water migrates across the site it has the potential to pick up various pollutants such as hydrocarbons and small solid particles. Furthermore, the run-off from machine washing activities is also likely to contain hydrocarbons. If this water is discharged without treatment, chemicals (hydrocarbons, pesticides etc.) and sediment could be transported into surface and sub-surface water bodies, resulting in ecological disruption.

Mitigation Measures:

• The management of all run-off will comply, as a minimum, with the requirements of Mozambican legislation but preferably with the requirements of the IFC's General EHS Guidelines (2007);

- Develop a Storm Water Management Plan for the mine and incorporate measures to divert clean storm water away from stockpiles, waste storage and disposal areas and other operation areas;
- Aimto reduce contact between storm water and hazardous chemicals. This will be considered during the planning of the storm water drainage system for the mine facilities;
- In terms of minimising discharge of pollutants and run-off quantity requiring treatment, storm water run-off must be properly segregating and clean water run-off diverted to prevent it mixing with water containing a high solids content, to minimize the volume of water to be treated prior to release;
- Run-off from machine wash areas will pass through an oil trap. Other run-off water will pass through a sediment trap to remove the majority of suspended solids prior to discharge to the environment. All settled material will be disposed of at the landfill; and
- The quality of liquid waste streams discharged from the site, including storm water, will be monitored regularly to ensure compliance with the requirements of relevant legislation and standards.

Impacts associated with the disposal of run-off may occur and the impacts are possibly Long-term and, considering the relatively dry climate, impacts may be of significance to the study area. Without mitigation the impacts should be regarded as moderately severe but with mitigation the severity could be reduced to slight. The overall significance of the impact without mitigation would be MODERATE but with mitigation would be LOW.

		Effect	Bick or	Overall	
Impact	Temporal Scale	I Spatial Scale Severity of Likelihood		Significance	
Without Mitigation	Long Term	Study Area	Moderately Severe	Possible	MODERATE
With Mitigation	Long Term	Study Area	Slight	Possible	LOW

8.3.2 Impacts related to traffic and transport

Impact 1: Increase in traffic frequency through villages

Cause and Comment:

Currently, the route EN106 from Pemba to Metoro and the EN242 from Metoro to Montepuez, are relatively quiet roads. The EN242 from Montepuez to Balama has even less activity, due to the poor condition of the road. From Montepuez to Balama, the road is mainly used by pedestrians on bicycles, motorbikes, and on foot. The volumes of existing vehicular traffic are relatively low, much of this due to transport trucks delivering goods to towns and villages along the route, and picking up agricultural produce such as cotton and cashew nuts for sale elsewhere. There are a total of 27 villages (excluding Montepuez) of various size and states of activity located between the project site and Pemba. Some of these towns, especially Namanhumbir and Nanhupo, have very busy markets located on both sides of the road. Pedestrians frequently cross the road or, due to the sheer number of people in the market, are forced to walk in the road in order to make headway. In other villages, hitchhikers, playing children and motorbike repairmen utilise the side of the road for their activities. In most villages, there will be at least a few stalls selling merchandise such as timber poles, straw or clothes. It is obvious that without proper management, the risk of accidents involving pedestrians could be quite high.

Mitigation Measures:

It is essential for drivers to obey the speed limits in force in these settlements. Drivers must be strongly encouraged to proceed slowly and with patience through villages. Schedules for deliveries should be reasonable, and take account of road, and local pedestrian and vehicular traffic conditions en route, so that drivers can travel within speed limits, and exercise due patience when travelling through for instance, trading areas. Drivers should also be encouraged to use their hooter liberally.

A Construction Emergency Preparedness and Response Plan must be developed and implemented that includes provisions to deal with traffic accidents, particularly accidents involving personal injuries, and all drivers must be made aware of the procedures to be followed.

Significance Statement:

The impact will take place at a regional scale and would be severe and of MODERATE significance. Without mitigation the impact may occur, but with mitigation the risk or likelihood of an accident taking place is reduced to unlikely. The residual impact is still MODERATE.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Regional	Severe	May occur	MODERATE
With Mitigation	Short term	Regional	Severe	Unlikely	MODERATE

Impact 2: Transport of abnormal loads

Cause and Comment:

Although not certain, it is likely that some abnormally sized plant components will need to be transported from either the port of Pemba or Nacala to the project site. An abnormal load will require two escort vehicles (one behind and one in front) to warn other road users of the hazard ahead. The vehicle will also be slow moving relative to other traffic, which could cause delays. There are no road obstacles which could be envisaged to halt an abnormal load. The bridge referred to as bridge number 2 in the Specialist Traffic and Transport Assessment (see Plate 4.3, page 18 of the specialist report) would need to have its structural integrity assessed by an expert before passing any heavy loads over it. Also, there are three 90-degree turns within Montepuez where the delivery truck will be likely to need the entire road in order to make the turn. It would need to be arranged with local traffic authorities for the roads around the turns to be blocked for 10 minutes while the truck passes through.

Mitigation Measures:

Trucks with abnormal loads will be escorted by at least two vehicles (one before and one behind). The truck should consider pulling off the road periodically to allow trailing vehicles to overtake. Bridge number 2 is to have its structural integrity assessed prior to passing heavy loads over it. Traffic authorities are to be consulted with regards to the passing of these large trucks through Pemba / Nacala and Montepuez, if these trucks need two lanes to turn.

Significance statement

Any impacts will take be of short term duration but take place at a regional scale. Impacts

will be of *slight* severity and of LOW significance. Without mitigation the impact may occur, but with mitigation the risk or likelihood of an accident taking place is reduced to unlikely. The residual impact is LOW.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Regional	Slight	May occur	LOW
With Mitigation	Short term	Regional	Slight	Unlikely	LOW

Impact 3: Dust generation

Cause and Comment:

Currently the road from Balama to Montepuez is not surfaced but CMC Africa Austral Lda is in the process of upgrading it. The road will be surfaced upon completion, and therefore vehicles travelling on it will not generate dust. Upgrading is due to be completed by December 2015. If completion of the upgrade is delayed, or Syrah mine construction begins before completion of the upgrade, construction phase traffic on the road will generate dust. This will impact the four sizable villages along this route: Maputo, Nacole, Mapupulo and Massaspi. There are also smaller unnamed settlements. In most cases, houses are built with their front facing the road, and in many cases little further than 10 metres from the road edge. The increase in traffic along this unpaved road is certain to cause fugitive dust emissions from the wheels of vehicles, which will coat the surrounding houses, including the vegetables and merchandise of traders.

Mitigation Measures:

Methods that could be employed to reduce dust levels generated within the villages include:

- Speed reduction all mine vehicles should be required to obey reasonable speed limits through urban settlements to prevent potential accidents from occurring, as well as to reduce dust emissions, especially during windy conditions;
- The road could be surfaced with gravel, if this can be sourced locally, although this is still likely to result in some dust emissions;
- Surface the road (CMC is in the process of upgrading the road (July2013));
- The road could be treated with chemical binders.

Significance Statement:

These impacts of short term duration will take place at a regional scale. The impact without mitigation is *severe* and may occur, resulting in an impact of MODERATE significance. With mitigation the likelihood of the impact taking place is reduced to may occur and if bitumen is added to road sections through villages, the residual impact will be LOW.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Regional	Severe	May occur	MODERATE
With Mitigation	Short term	Regional	Slight	Unlikely	LOW

8.3.3 Impacts related to noise

Impact 1: Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the construction phase.

Cause and Comment:

The equipment and machinery involved, such as excavators, pneumatic tools, bulldozers and haul trucks may impact on the surrounding ambient noise levels at the noise sensitive receptors near the project area.

Mitigation Measures:

Standard mitigation measures to ensure vehicle noise is kept within acceptable limits:

- Keep vehicles in good repair and use standard exhaust and silencing equipment.
- Stick to designated speed limits.
- Keep roads in good condition.
- If possible enclose fixed noise sources such as generators.
- Switch off equipment when not in use.

Additional mitigation measures may include:

• If fixed noise producing sources such as generators, pump stations and crushers are not housed in enclosures, then put up barriers around the noise source. The barriers to be installed between the noise source and sensitive noise receptor, as close to the noise source as possible. Barriers may be in the form of soil berms.

Significance Statement:

Impacts before mitigation are severe but of short term duration at the scale of the study area. They will definitely occur, and result in MODERATE impact. After mitigation the residual impact will be of LOW significance.

		Effect	Bisk or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Study area	Severe	Definite	MODERATE
With Mitigation	Short term	Localised	Moderate	May occur	LOW

8.3.4 Impacts related to air quality

Impact 1: Site Clearing: removal of topsoil and vegetation and stockpiling of overburden topsoil

Cause and Comment:

A number of operations take place at and during this phase, such as land clearing, topsoil removal, loading of material, hauling, grading, stockpiling, bulldozing and compaction. Initially, topsoil and subsoil will be removed with large scrapers. The topsoil will be stockpiled for rehabilitation.

Each of the aforementioned activities has its own duration and potential for dust generation. This phase is often associated with the generation of fugitive dust i.e. TSP (total suspended

particulate), as well as PM_{10} and $PM_{2.5}$ (dust with a size less than 10 µm, and dust with a size less than 2.5 µm giving rise to health impacts).

It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the scale and duration of each activity, coupled with the prevailing meteorological conditions. The construction phase will be short-term, and presumed localised, and will have a low impact that will stop once the construction activities are finalised.

Mitigation Measures:

- Limit removal of topsoil to non-windy days and months in order to reduce exposure of loose surface material to wind erosion.
- Minimise the area of disturbance and avoid unnecessary clearing of vegetation.
- Minimise drop heights when loading soil into trucks or on stockpiles,
- Water or a binding agent can be used for dust suppression on roads.
- When using bulldozers and graders, it will be necessary to minimise travel speed and distance, as this equipment generates a large amount of dust.

Significance Statement:

Impacts before mitigation are slight and of short term duration at a localised scale. They will definitely occur, and result in a MODERATE impact. After mitigation the residual impact will be of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Local	Slight	Definite	MODERATE
With Mitigation	Short term	Local	Slight	Probable	LOW

Impact 2: Construction of any surface infrastructure

Cause and Comment:

This involves the construction of any surface infrastructure e.g. main offices, change room, access roads, haul roads, pipes and temporary facilities for the contractors. There is movement of the workforce, vehicle activity on access roads, levelling and compacting of surfaces. These activities will result in fugitive dust emissions containing TSP, as well as PM_{10} and $PM_{2.5}$.

Mitigation Measures:

Measures applicable to Impact 1 (site clearing) are applicable to this impact as well.

Significance Statement:

Impacts before mitigation are slight and of short term duration at a localised scale. They will definitely occur, and result in a MODERATE impact. After mitigation the residual impact will be of LOW significance.

		Effect		Dick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood	Significance
Without Mitigation	Short term	Local	Slight	Definite	MODERATE
With Mitigation	Short term	Local	Slight	Probable	LOW

Impact 3: Transportation of materials and workers to site

Cause and Comment:

During this activity, there is transportation of workers and materials to and from site. This often leads to the production of fugitive dust containing TSP, as well as PM_{10} and $PM_{2.5}$. This activity will be short-term, localised, and will have low impacts on the atmospheric environment and will cease once the construction activities are finalised.

Mitigation Measures:

- Apply a dust suppressant, such as water on the dirt road to avoid the generation of dust.
- If conditions are dusty, vehicular traffic should be reduced and when traveling on a dusty dirt road, the travel speed and distance should be minimised to reduce dust generation.

Significance Statement:

Impacts before mitigation are slight and of short term duration at a localised scale. They will definitely occur, and result in a MODERATE impact. After mitigation the residual impact will be of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Local	Slight	Definite	MODERATE
With Mitigation	Short term	Local	Slight	Probable	LOW

Impact 4: Temporary storage of hazardous products

Cause and Comment:

These hazardous products include fuel, explosives, waste and sewage. The impacts of the hazardous materials and waste management are related to the types and amount of equipment and machinery used during construction and the waste produced. Impacts anticipated include evaporation of diesel fuel and heavy fuel from temporary storage tanks and possible spills on site during re-fuelling of heavy machinery and trucks.

- Develop and enforce a hazardous products and waste management plan. It is to identify the following
 - Anticipated waste streams
 - o Inspection
 - Waste minimisation
 - Storage locations
 - Waste-specific management; and
 - o Disposal requirements

• A recycling strategy.

Significance Statement:

Impacts before mitigation are slight and of short term duration at a localised scale. They will probably occur, and result in a MODERATE impact. After mitigation the residual impact will be of LOW significance.

Impact		Effect	Dick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Local	Slight	Probable	MODERATE
With Mitigation	Short term	Local	Slight	May occur	LOW

8.3.5 Geochemistry related impacts

Impacts related to geochemistry are only applicable to the operations phase. Environmental risks are associated with the Waste Rock Dumps (WRD), Tailings Storage Facility (TSF), and the ore material (Graphite).

8.3.6 Radiation related impacts

Impacts related to radiation exposure will be most significant in the operations phase. Therefore, all impacts and mitigation measures are presented in the operations phase section (section 8.4.6).

8.4 Impacts resulting from the operation phase

8.4.1 Impacts related to waste and wastewater

Impacts associated with process wastes

Issue 1: Disposal of waste rock and tailings

Tailings and waste rock will be generated from the graphite mine throughout the life of the mine.

Impact 1.1: Health and safety of employees and local communities

Cause and Comment:

The TSF will be designed by an independent globally recognised expert in tailings dam design and will be managed according to best practice. However, the communities of Nquide, Ntete, Maputo and Pirira are within the footprint of the project site, with Pirira located close to the West Pit. In the highly unlikely event of a TSF failure, unstable tailings material could pose a risk to members of nearby communities. In addition, there is also a chance of small scale instability events on the slopes of the rock dumps which may result in injury to employees working at the dumps. However, these risks would normally be managed along with other routine occupational health and safety risks.

Mitigation Measures:

• The management of waste rock and tailings will conform to the requirements of the IFC's EHS Guidelines for Mining (IFC, 2007);

- Develop practices in terms of design and operation to prevent sediment run-off, inclusive of cut-off drains.
- As above, as far as practical, the waste rock dump and TSF must be sited in a location such that in the event of failure, pollution of soil and water as well as physical risk to communities is minimised;
- The integrity of the waste rock dump and tailings facility must be inspected regularly by suitably qualified personnel throughout the life of the mine;
- Access to the TSF and waste rock dump should be restricted as far as practical and all local communities will be informed of the potential risks associated with these facilities through site notices and community meetings.

A long term impact may occur within the study area and due to the potential for harm to individuals, including possible fatalities; the severity of the impact is regarded as high. Without mitigation, significance will be HIGH and with mitigation, this could be reduced to LOW significance.

Impact		Effect	Bick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Localized	High	May Occur	HIGH
With Mitigation	Long Term	Localized	Slight	May Occur	LOW

Issue 2: Spillage of Run of Mine while Trucking

Impact 2.1: Disruption of ecological function

Cause and Comment:

The transportation of extracted ore by trucking to the processing facility is anticipated to result in the some spillage of the ore materials along the haul route. The ore material contains heavy metals that would be dispersed during transportation. Over time, this would accumulate resulting in the heavy metal contamination of soil (http://medbib.com/Graphite). Spilled material could also result in increased turbidity of water bodies and smother plants.

Mitigation Measures:

- Avoid overloading the trucks with ore;
- Clean-up significant spillages, as soon as possible;

Significance Statement:

Heavy metals have the tendency to accumulate within living organisms and can interfere with normal physiological processes leading to disruption of ecosystems. The disruption of ecosystems by heavy metals was determined to be localized. Without mitigation the significance was considered MODERATE and with mitigation it was considered to be LOW.

Impact		Effect	Pick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Localized	Moderate	May Occur	MODERATE
With Mitigation	Long Term	Localized	Slight	May Occur	LOW

Issue 3: Storage of effluent in the process water pond and TSF

The Process Water Pond will serve as the collection point for the decant water from the tails, regrind mill and process overflows. This effluent water is anticipated to contain some levels of process feed. The effluent water in the Process Water Pond will be diluted with water make-up from the environment and re-circulated to the plant raw water system for crusher dust suppression, reagent mixing, flocculant make-up, and to the plant water supply system.

It is anticipated that the re-circulated water in the Process Water Pond will contain at least low concentrations of heavy metals and frothers. Over time, the re-circulation and evaporation may result in an increase in the concentration of the abovementioned compounds. The presence of a large process water pond containing potentially harmful substances could pose a threat from environmental contamination, particularly if the pond was to overflow after a period of heavy rainfall.

Impact 3.1: Pollution of soil and water resources

Cause and Comment:

In the event that the pond overflows or is otherwise compromised, the accidental release of stored process water and associated sediment, could lead to pollution of water resources and soil and an increase in the turbidity of nearby water bodies. The potential consequences of increased turbidity include reduced light penetration and growth of aquatic plants. This could have subsequent, long-term negative impacts on local ecosystems and human health.

Mitigation Measures:

- The TSF and process water storage pond to be fenced off and the gate locked at all times to limit unauthorised access;
- As drowning from falling into the water is a heightened risk employees should wear a floatation device when working within the fenced off area. In addition, flotation devices must be readily available at the facility;
- Incorporate water body risks into the the Health & Safety induction training;
- Conduct periodic inspections of the integrity of the TSF and Process Water Pond by an independent and suitably qualified and experienced engineer;
- Ensure the operation of all facilities containing water maintains sufficient freeboard to ensure that the ponds do not overflow;
- Monitor the quality of the stored process water so that in the event of accidental discharge, the contaminants released into the environment are known.
- Place warning notices and "do not enter" signage around such facilities.

Significance Statement:

The impact of the pond water released into the ecosystem without mitigation was considered to be very severe with a MODERATE significance. With mitigation it was considered to be LOW with a slight severity.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Localized	Very Severe	Unlikely	MODERATE
With Mitigation	Medium Term	Localized	Severe	Unlikely	LOW

Impact 3.2: Risk to Health and Safety of Employees

Cause and Comment:

Water from the TSF will be pumped to the process pond prior to blending with the input process water to the plant. The presence of a large pond containing process water which contains potentially harmful substances will pose a threat to the health and safety of employees. Access to the pond by individuals who are not able to swim may result in drowning.

Mitigation Measures:

- The TSF and process water storage pond will be fenced off and the gate locked at all times to limit unauthorised access;
- Flotation devices will be readily available around the facility;
- The Health & Safety induction training should incorporate these risks;
- The integrity of the TSF must be inspected regularly by an independent and suitably qualified and experienced engineer;
- The operation of the facility must ensure sufficient freeboard to ensure that the pond does not overflow;
- The quality of the stored process water should be monitored so that in the event of accidental discharge, the contaminants released into the environment are known.
- Warning notices should be placed around such facilities.

Significance Statement:

It is possible that without mitigation, an employee could fall into the TSF/pond and drown. As such, the impact to human health and safety without mitigation was considered to be *very severe* with a HIGH significance. The likelihood of the impact occurring could be reduced through implementation of mitigation measures. With mitigation, the overall significance of the impact is expected to be LOW.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium Term	Localized	Severe	May occur	HIGH
With Mitigation	Medium Term	Localized	Slight	Unlikely	LOW

Issue 4: Disposal of potentially hazardous process chemicals

Impact 4.1: Risk to health and safety of employees

Cause and Comment:

Certain of the bulk chemicals used in the process, such as paraffin as flotation agent and associated wastes, are classified as hazardous (SANS 10234:2008). They will be managed according to the IFC's General EHS Guidelines (2007).

Mitigation Measures:

Please see mitigation measures described above
Significance Statement:

The storage of process-related hazardous chemicals (paraffin) and associated wastes constitutes a risk to the safety of employees, but this risk can be reduced relatively easily through operational procedures. With and without mitigation it was deemed to be of MODERATE and VERY HIGH significance, respectively.

		Effect	Bick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Localized	Severe	May Occur	VERY HIGH	
With Mitigation	Long Term	Localized	Slight	May Occur	MODERATE	

Impact 4.2: Pollution of water resources and soil

Cause and Comment:

The release of hazardous chemicals such as paraffin to the environment will result in the pollution of soil and water resources (including surface and groundwater), which are used by local communities in the proximity of the project area. Pollution may arise from the accidental release of stored chemicals or uncontrolled storage and disposal of empty chemical containers.

Mitigation Measures:

- All chemicals used on site must be stored and disposed of according to the legislation and good practice;
- Chemicals to be stored in secure, bunded and designated areas;
- Material Safety Data Sheets (MSDS) to be readily available for all chemicals at the point of storage and use;
- An Operational Procedure Hazardous Chemical Management to be developed for the facility and will include detailed spill response procedures;
- Chemicals that may react in a dangerous manner are not be stored within the same bunded area;
- The compatibility of chemicals to be confirmed prior to storage and signage showing the chemical names and hazardous properties of the chemicals to be visible in the designated temporary storage area;
- An Emergency Preparedness and Response Operating Procedure to be developed for the facility;
- Any facility for the bulk storage of flammable liquids, including fuels, to be designed and operated according to good practice;
- All hazardous chemicals of a volume equal to or greater than 250 litres to be stored in a bunded facility that complies with the legislative requirement and good practice;
- An Operational Procedure Waste Management to be developed for the facility which includes measures to ensure that all chemical wastes and empty chemical containers are managed and disposed of according to the requirements of legislation and good practice.

Significance Statement

The negative impacts, including death of fauna and flora and, potentially humans, may be long term. With and without mitigation it was deemed to be of MODERATE and VERY HIGH significance, respectively.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long Term	Localized	Severe	May Occur	VERY HIGH	
With Mitigation	Long Term	Localized	Slight	May Occur	MODERATE	

8.4.2 Impacts related to traffic and transport

Impact 1: Increase in traffic frequency through villages

Cause and Comment:

For the construction phase, it was not possible to provide an accurate estimate of vehicle numbers to be generated, but estimates have been made for the operations phase. Vehicle trips are presented in the table below.

Purpose	Vehicle type	Number of trips	Route
Graphite product	Multiaxle articulated	58 per day;	Site to Nacala
transport	trucks	1,740 per month*	(preferred)
			<u>or</u>
			Site to Pemba
Transport of staff	Double cab Toyota	5 per week;	Site to Pemba
	Hilux or similar	20 per month	
Delivery of	2- & 3- axle trucks	±2 per week	Pemba to site
production supplies		<10 per month	
Delivery of domestic	2-axle delivery truck	8 per week;	Pemba to site
supplies		32 per month	

The same potential concerns as are applicable during the construction phase, are applicable during the operations phase. These concerns relate to the movement of a large number of mine vehicles through often crowded and chaotic market villages.

Mitigation Measures:

There is little that can be done to mitigate this impact, as the graphite that is produced needs to be delivered to the port for export.

The potential for accidents will probably be highest during the early stage of mine development and operation, as citizens adjust to the increased traffic flow. The following specific mitigation measures must be implemented:

- Speed limits;
- The scheduling of deliveries so that drivers may drive safely and do not need to exceed speed limits to meet schedules;
- Training of drivers so that they know how to react in the event of an accident.
- Deliveries by heavy vehicles must, as far as possible, be scheduled to avoid the formation of convoys. Sufficient distance must be maintained between heavy vehicles to allow light vehicles to overtake safely.

Significance Statement:

The impact will occur for the entire operations phase of the mine. It will affect the road system and villages between Balama and Pemba, a distance of approximately 270 km. It will be moderately severe impact, due to the additional of significant traffic volume to the roads and the impacts associated with this. The impact will definitely occur, but some thoughtful planning could lessen this possibility.

Impact		Effect	Dick or	Overall	
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Regional	Moderate	May Occur	MODERATE
With Mitigation	Long term	Regional	Moderate	Unlikely	LOW

Impact 2: Increase in traffic frequency through Pemba

Cause and Comment:

It must be noted that the use of Pemba as the port of export is not preferred, but is mentioned in this report for completeness. Heavy transport trucks entering Pemba will need to make their way to a warehouse or the port. The port is situated on the tip of the tongue of land that juts into the Bay of Pemba and it is impossible to access the port without travelling through at least some dense urban areas. One route option is discussed in this report. The volumes of Balama's export will significantly increase port traffic from its current levels.

Mitigation Measures:

Implementation of the following mitigation measures is suggested:

- Heavy vehicles should not travel the road between 10pm and 6am unless it is absolutely unavoidable.
- Within the urban area, trucks should observe appropriate speed limits.
- Drivers should have knowledge of how to react in the event of an accident.

Significance Statement:

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Localised	Moderate	Probable	MODERATE	
With Mitigation	Long term	Localised	Moderate	May Occur	LOW	

Impact 3: Increase in traffic frequency through Nacala

Cause and Comment:

From the perspective of this assessment, the primary advantage of the use of the port of Nacala as the port of export is that the route to the port (within the urban limits) is more direct compared to Pemba and avoids dense urban areas. Deliveries will be to a warehouse, and its location will have an influence on the significance of this impact. It is expected however, that Syrah will seek to establish this warehouse as close to the port as reasonably possible.

Mitigation Measures:

Implement the following mitigation measures:

- Heavy vehicles should not travel the road between 10pm and 6am unless it is absolutely unavoidable.
- Within the urban area, trucks should observe appropriate speed limits.
- Drivers should have knowledge of how to react in the event of an accident.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Localised	Moderate	May Occur	LOW	
With Mitigation	Long term	Localised	Moderate	Unlikely	LOW	

Significance Statement:

Impact 4: Dust Generation

Cause and Comment:

It is probable that, by the time Syrah-Balama enters its operational phase, the unpaved section from Balama to Montepuez will be upgraded and surfaced. As such, there will not be any gravel roads between the mine site and Nacala/Pemba and therefore dust generation during the operations phase will not be applicable to transport traffic. This does not include on-site dust emissions due to processing, handling, site clearing and other activities assessed in the Air Quality study.

8.4.3 Impacts related to noise

Impact 1: Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase

Cause and Comment:

All mining related machinery, tools and vehicles as well as associated ore beneficiation activities may impact on the surrounding ambient noise levels at the noise sensitive receptors near the project area.

Mitigation Measures:

- Implement applicable mitigation measures from the construction phase.
- Construct earth berms around the opencast areas, especially the west pit operations.
- processing plants have been located away from any communities.

Additional mitigation measures include:

- Earth berms to be constructed around the east operations to attenuate the noise towards the villages.
- The noise barrier should be as tall as the line-of-sight between the noise source and the receptor, plus 30%. So for example if the line-of-sight is 10m high, then the barrier should be at least 13m tall for best performance (Sound Fighter Systems, 2007). It is therefore recommended that the berm around the pit operations be constructed to a height of at least six meters.

Significance Statement:

Impacts before mitigation are severe and of long term duration at a regional scale. It is definite that this impact will occur. The impact is considered to be HIGH. After mitigation the residual impact will be of MODERATE significance.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Long term	Regional	Severe	Definite	HIGH	
With Mitigation	Long term	Study area	Moderate	May occur	MODERATE	

8.4.4 Impacts related to air quality

Impact 1: Removal of ore material (opencast mining process) and ROM Stockpile

Cause and Comment:

The excavation, removal and transportation of waste rock and ore material will result in the incessant release of fugitive dust. Diesel trucks will be used to load the graphite ore onto the ROM stockpile. A front end loader is then used to load ore onto the conveyor belts, to the crushers, and then the conveyor will transport the sized ore to the plant for processing. Fugitive dust will be released containing TSP, PM_{10} and $PM_{2.5.}$

Mitigation Measures:

Haul roads will be used for transporting waste rock and ore, therefore there is a need for the application of water or dust suppressant on the well-defined truck routes. Common dust suppressants are calcium chloride and magnesium chloride solutions (75% to 80% of the time). The hygroscopic (water attracting) nature of these suppressants increases the moisture content of the surface by attracting moisture from the atmosphere. It is worth mentioning that different mines follow widely varying maintenance schedules depending upon needs and past experience. The frequency of haul road cleaning/regrading and repairing is mine specific.

This helps form a crust and hold the road fines into the aggregate surface. In addition, calcium chloride retards the evaporation of moisture and tightens the compacted soil, strengthening the road. These inorganic chemicals are environmentally safe and fairly economical. While their performance depends on temperature, relative humidity, and traffic, the effectiveness generally lasts 6 to 12 months. However, calcium chloride has a corrosive effect on vehicles and application equipment, and can create a slippery surface when applied. Because it is soluble in water, it is easily leached away. When dissolving solid calcium chloride to make your own liquid, be very careful of the tremendous heat that is generated.

An independent assessor can do a thorough evaluation of dirt and haul roads within and outside the mine concession area so as to provide a tailored solution with regards to dust suppression. This should then be incorporated into an operational plan that will be adopted by the mine.

Also, reducing average vehicle speeds from 40 mph to 35 mph will result in reduced dust levels. Extremely low volume roads (15 vehicles a day) probably do not justify the costs for dust control. Higher volume roads (i.e. 500 vehicles per day on average) are too difficult to maintain with temporary dust control (Wisconsin Transportation Bulletin, 1997). Since the fleet of haul trucks are operated at the haul speed limit, dust suppressant can be used to ameliorate associated dust generation.

Drop heights when loading or dumping materials should be minimised. Other measures that can be applied include: potential modifications to trucks to reduce wind contact with ore during transport, employ water or air blow-down to reduce parasitic loads on trucks exiting load-out, speed limits need to be observed. The ore surface can also be stabilised using chemical dust suppressants as the loaded trucks exit the pits.

The conveyor belt should ideally be enclosed to avoid contact with wind and the subsequent release of fine material to the atmosphere. Due to the amount of material handled and the operating hours, if not covered, this source can be a substantial contributor of particulate matter to the surrounding atmosphere.

Significance Statement:

Impacts before mitigation are severe and permanent at a localised scale. It is definite that this impact will occur. The impact is considered to be HIGH. After mitigation the residual impact will be of MODERATE significance.

	Effect			Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Local	Severe	Definite	HIGH	
With Mitigation	Permanent	Local	Moderate	Probable	MODERATE	

Impact 2: Operation of surface infrastructure

Cause and Comment:

The surface infrastructure consists of the main offices, change houses, main security, and the electrical facilities and access roads. There are minor impacts on the atmospheric environment from the operation of surface infrastructure; except for vehicles driving on the haul roads.Traffic on haul roads will generate fugitive dust, including PM_{10} and $PM_{2.5}$.

Mitigation Measures:

The dust emissions from vehicular traffic plying the dirt haul roads can be reduced if water or dust suppressants are applied and if speed limits are implemented and strictly enforced.

Significance Statement:

	Effect			Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Local	Slight	Probable	MODERATE	
With Mitigation	Permanent	Local	Slight	May occur	LOW	

Impact 3: Storage, handling and treatment of hazardous products

Cause and Comment:

Most significant wastes are produced from the operational phase as the demand and consumption increases. Hazardous materials and waste impacts are related to the types and amount of equipment and machinery used. Impacts include evaporation of diesel fuel and heavy fuel from temporary tanks and possible spills during loading of fuel from tanks on site that are used for re-fuelling of heavy machinery and trucks. Some of the waste produced

includes waste oils, chemicals and hazardous chemicals.

Mitigation Measures:

A hazardous products and waste management plan should be developed for operations. Hazardous substances should be stored and handled in accordance with the local regulations, with such substances stored in clearly labelled containers. Employees should be well trained on the handling and storing of hazardous chemicals as well as dealing with emergency situations if a spill occurs.

Significance Statement:

Impacts before mitigation are very severe and permanent at a localised scale. It is probable that this impact will occur. The impact is considered to be HIGH. After mitigation the residual impact will be of MODERATE significance.

		Effect		Bick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Local	Very Severe	Probable	HIGH	
With Mitigation	Permanent	Local	Severe	May occur	MODERATE	

Impact 4: Operation of the generator sets

Cause and Comment:

Most significant emissions are produced during the operational phase. Impacts associated with the use of generator sets include releases of NO_2 , CO, HC and particulate matter. Hence, ambient concentration of these pollutants will increase as the generator set will be operational all year round.

Mitigation Measures:

To reduce emission from the diesel generators, mitigation measures i.e. the use of CAT[®] Selective Catalytic Reduction is imperative, a process that removes 90% of NOx emissions from exhaust system. Also, the use of diesel soot filter, designed to reduce emission of particulate matter, carbon monoxide and hydrocarbons from diesel engines will help contain emissions from this source.

Significance Statement:

Impacts before mitigation are very severe and permanent at a localised scale. It is probable that this impact will occur. The impact is considered to be HIGH. After mitigation the residual impact will be of MODERATE significance.

	Effect			Dick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Local	Very Severe	Probable	HIGH
With Mitigation	Permanent	Local	Slight	May occur	MODERATE

8.4.5 Geochemistry related impacts

Impact 1: Moderate potential for Acid Mine Drainage (AMD) formation from Waste Rock Dumps (WRD) and Tailings Storage Facility (TSF)

Cause and Comment:

From the waste rock analysis the following potential impacts were identified:

- A moderate potential exists for AMD formation from the WRD and TSF due to the high S-content and acid generation potential in 4 of the 6 waste rock samples;
- A potential radioactivity risk from the graphite zone with high trace element concentrations of U, Sr, Se and Rb posing a possible human health risk; and
- A potential trace element contamination risk as a result of the WRD seeping into the receiving environment with high concentrations of Mn, Fe, Ni and U.

Mitigation Measures:

The following mitigation measures are proposed:

- Undertaking further test work during the detailed design phase to quantify the potential for the TSF and WRD to generate AMD. Based on these results, a decision to line the WRD and TSF to prevent contaminated seepage entering the groundwater systems will need to be made. This decision will require input from an environmental specialist;
- Storm water runoff management through diversion channels and sedimentation ponds is required around and downstream of the WRD and TSF. Details of this must be included in a Storm Water Management Plan, to be developed during the detailed design phase;
- Monitoring boreholes upstream and downstream of the TSF and WRD;
- Seepage interception boreholes downstream of the TSF, if monitoring determines that this is required, will need to be established to intercept and capture any seepage, which must then should be pumped back into the TSF; and
- Rehabilitation of the TSF and WRD post-closure.

Significance Statement:

The post mitigation impact is rated as LOW, and assumes that either further test work determines a low potential for AMD formation, or that the TSF and WRD are lined in the event that potential for AMD is high.

		Effect	Pick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	Local	Very severe	Probable	MODERATE	
With Mitigation	Long term	Local	Moderate	Possible	LOW	

Impact 2: Potential trace element contamination from the WRD seepage into the receiving environment with high concentrations of Mn, Fe, Ni and U

Cause and Comment:

The same cause and comment as for Impact 1.

Mitigation Measures:

The same mitigation measures as proposed for Impact 1.

Significance statement

The post mitigation impact is rated as LOW, and assumes that either further test work determines a low potential for AMD formation, or that the TSF and WRD are lined in the event that potential for AMD is high.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Local	Very severe	Probable	MODERATE
With Mitigation	Long term	Local	Moderate	Possible	LOW

Impact 3: High potential for AMD formation (Source: ore material) Cause and Comment:

From the graphite analysis the following potential impacts were identified:

- A High potential for AMD formation with high S-concentrations and lower pH values leading to leachate water with a low pH value and high metal concentrations;
- Trace element contamination is possible from stock piles and exposed ore zones with a high potential of metal contamination with high concentrations of Al, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U entering the receiving environment; and
- Potential for radioactivity impacts from the graphite with high trace element concentrations of U, Sr, Se and Rb posing a human health risk.

Mitigation Measures:

The following mitigation measures are proposed:

- Lining of stockpiles with an impermeable clay layer to prevent seepage from the stockpiles in the short term;
- Back-filling of pit post-closure;
- Storm water management to divert water away from stock piles; and
- In-pit sumps to capture seepage and runoff which must be pumped to dirty water dams and treated before being discharged into the environment.

Significance Statement:

Impacts before mitigation are severe and permanent. It is probable that this impact will occur. The impact is considered to be HIGH. After mitigation the residual impact will be of MODERATE significance.

Impact	Effect			Pick or	Overall
	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Probable	HIGH
With Mitigation	Medium term	Study Area	Moderately severe	May occur	MODERATE

Impact 4: Trace element contamination from stock piles and exposed ore zones with a high potential of metal contamination with concentrations of AI, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U entering the receiving environment

Cause and Comment:

The same cause and comment as for Impact 3.

Mitigation Measures:

The same mitigation measures as for Impact 3.

Significance statement

Impacts before mitigation are severe and permanent. It is probable that this impact will occur. The impact is considered to be HIGH. After mitigation the residual impact will be of MODERATE significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	Study Area	Severe	Probable	HIGH
With Mitigation	Medium term	Study Area	Moderately severe	May occur	MODERATE

8.4.6 Radiation related impacts

A screening level radiological contamination and dose rate survey was performed on site in May 2014. The purpose of the survey was to determine whether certain areas may exhibit enhanced radiation levels, and what risks these might pose to staff and the public.

Measurements were taken at the core shed, Balama East and Balama West. The measurements taken indicated enhanced levels of radioactivity (in the order of 3 to 10 times the background level) across all field locations where measurements were taken, with a core originating from 18 metre depth (drill hole BMDD0123) exhibiting a contamination value about 30 times background. It must be noted that these were only spot measurements taken at randomly selected positions, and are not representative of the different areas. Also, these measurements and findings do not factor in exposure time. If the vegetation were cleared, and all sites were accessible, a properly constructed grid survey of selected areas would provide a better overview of the radiation status of the site.

The measurements exhibiting enhanced levels of radioactivity indicated that the drilling, mining, processing, storage, transport and handling of the material currently and into the future, can pose a radiation exposure risk to workers and members of the public. However, due to the limited amount of time that workers currently spend in areas where enhanced levels of radioactivity was found, and their proximity to those materials, it is unlikely that the radiation exposure of workers currently would exceed radiation dose limits.

From the measurements taken on the cores, a significant variance in the radioactivity levels on the same type of materials at different depths was noticeable. For example, the radioactivity levels in fresh high grade graphite varied by almost a factor of 5.

Enhanced levels of radioactivity were also observed on only a section of a specific core piece (originating from drill hole BMDD0123 at a depth of 18m) and again on only one side of a piece of material that forms part of a thin horizon between other layers.

Samples are currently being analysed at a laboratory to determine their radioactive properties. If the results indicate that the radiological status of the samples is above the safe threshold indicated by the International Atomic Energy Agency (IAEA), then a baseline survey should be conducted.

The following mitigation measures are suggested:

- 1. A comprehensive radiation baseline survey should be conducted to address all the mining and associated aspects prior to the commencement of any mining operations on the site, but subsequent to the clearance of the vegetation on these areas, to allow easy access;
- 2. Prior to the commencement of mining and processing activities on site, a prospective worker safety assessment should be performed to identify the potential radiation exposure to workers, and to establish and implement appropriate mitigation measures. This assessment should be repeated once operations have commenced;
- 3. All redundant equipment (valves, pipes, pumps, flanges, etc. to be generated during mining operations) should be identified and monitored, specifically on the inside, for any concentrations of radioactive material. Should any contamination above background be detected, the equipment should be isolated from the rest and be stored in a dedicated and secured storage area, such as a dedicated container. The container should be signposted with radiation signs and access must be controlled. Records should be kept of all items stored inside the container. Items that had been exposed to the process and which will need to be repaired in future, could also be contaminated, and need to be identified and handled in the same way as contaminated redundant scrap;
- 4. Core samples that exhibit enhanced levels of uranium should be stored separately from the rest of the cores to prevent access to such cores and the unauthorized removal of such cores;
- 5. Provide a Radiation Protection Officer and Radiation Protection Monitor training to specific individuals, and alternates, to perform the duties in their absence. Appropriate courses are presented in South Africa. It would be beneficial to have mine staff available to be able to monitor for radiation once mining operations commence, and to establish and implement a suitable radiation protection programme;
- 6. Appropriate radiation monitoring instruments should be purchased. These instruments should be able to monitor all the potential pathways of exposure that would be encountered at the mine, e.g. alpha, beta contamination, long-lived alpha and dose rate.

The possible radiation exposure of members of the public living adjacent to the site should also be assessed. Only a few laboratories worldwide, including one in South Africa have been accredited to do full spectrum radio analytical analyses. The same samples that would be taken for ground and surface water, foodstuff and dust fallout, could be used for these analyses.

Mitigation Measures:

- 1. Various strategies, as described above, will need to be implemented to ensure that exposures of the public by the mine are limited to a level of 1 milli Sievert (mSv) per annum from all sources, as recommended by South African radiation legislation. To allow for the possibility of exposure from other sources, operators are required to apply constraints to the exposure levels and limit the annual public exposure to 0.25 mSv per annum from their operation.
- 2. A Radiation Management Plan is required, and must prescribe the conditions to be followed to ensure that work force exposure does not exceed national limits. Depending on the results of further data collection and analyses, the plant may require a Certificate of Registration (COR) and the completion of hazard assessments at various stages of the project, leading to a formal radiation protection program might be required.

Significance Statement (Public Exposure):

Impacts before mitigation are moderate and of long term duration at a localised scale. They will definitely occur, and result in a MODERATE impact. After mitigation the residual impact will be of LOW significance.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Local	Moderate	Definite	MODERATE
With Mitigation	Long term	Local	Slight	Probable	LOW

Significance Statement (Worker Exposure):

Impacts before mitigation are moderate and of long term duration at a localised scale. It is currently uncertain whether this impact will occur. The impact is considered to be MODERATE. After mitigation the residual impact will be of LOW significance.

	Effect			Pick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Local	Moderate	Definite	MODERATE
With Mitigation	Long term	Local	Slight	Unsure	LOW

8.5 Impacts resulting from the decommissioning phase

8.5.1 Impacts related to waste and wastewater

Issue 1: Management of non-process general and hazardous waste (construction, operation and decommissioning)

Impact 1.1: Pollution of land and water

Cause and comment, mitigation measures, and significance statement already discussed under construction phase impacts.

Impact 1.2: Nuisance impacts (odours visual, pests)

Cause and comment, mitigation measures, and significance statement already discussed under construction phase impacts.

Issue 2: Disposal of domestic wastewater and sewage sludge (construction, operation and decommissioning)

Impact 2.1: Pollution of soil and groundwater

Cause and comment, mitigation measures, and significance statement already discussed under construction phase impacts.

Impact 2.2: Health impacts to employees and communities

Cause and comment, mitigation measures, and significance statement already discussed under construction phase impacts.

Impact 2.3: Nuisance impacts

Cause and comment, mitigation measures, and significance statement already discussed under construction phase impacts.

<u>Issue 3: Disposal of run-off / storm water</u>

Impact 3.1: Pollution of land and water

Cause and comment, mitigation measures, and significance statement already discussed under construction phase impacts.

8.5.2 Impacts related to traffic and transport

Impact 1: Mine decommissioning

Cause and Comment:

Mine decommissioning would essentially be the construction phase in reverse, but on a lesser scale and over a longer time period which would result in less significant impacts. It would be on a lesser scale because infrastructure components may, in the future, be refurbished and sold to another similar development in the region, should one come into existence. Otherwise steel would be scrapped and transported to Pemba/Nacala, from where it would be exported to ready markets in Asia (in current economic conditions). But the transport of aggregates and cement would not be a feature of the decommissioning phase. It would be on a lesser timescale, because it is expected that as the mine's operations taper down, infrastructure will be disassembled in phases and scrapped or sold. So the decommissioning phase would be spread out over a longer timeframe than the construction phase.

Mitigation Measures:

The mitigation measures associated with product transport, and general road safety (as applicable to the construction and operation phase) will be sufficient to mitigate any impacts associated with decommissioning.

Significance Statement:

The impact will be of short term duration (less than 5 years). It will affect the road system and villages between Balama and Pemba. It could have a moderately severe impact if mitigation measures are not applied, and these will only be slight if mitigation measures are applied. The mine will definitely need to be decommissioned, so the likelihood of the impact occurring is definite.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Regional	Moderate	Definite	MODERATE
With Mitigation	Short term	Regional	Slight	Definite	LOW

8.5.3 Impacts related to noise

Impact 1: Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the decommissioning phase Cause and Comment:

Cause and Comment:

The equipment and machinery involved such as excavators, pneumatic tools, bulldozers and haul trucks may impact on the surrounding ambient noise levels at the noise sensitive receptors near the project area.

Mitigation Measures:

Decommissioning activities should be undertaken in daylight hours only.

Applicable mitigation measures, suggested for the construction and operation phases, should continue to be implemented during decommissioning.

Significance statement

Increased noise levels will occur for a short time period while the mine is decommissioned. Only the local area will be impacted. It is unlikely to be severe.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Localised	Slight	Unlikely	LOW
With Mitigation	Short term	Localised	Slight	Unlikely	LOW

8.5.4 Impacts related to air quality

Impact 1: Demolition and removal of all infrastructure

Cause and Comment:

This activity will involve the removal of buildings and foundations, cleaning-up of workshops, fuels and reagents, removal of power and water supply networks (unless an alternative arrangement is made that may be beneficial to the community), and removal of haul and access roads. Potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during closure. The impacts on the atmospheric environment during the decommissioning phase will be similar to the impacts during the construction phase. The process includes dismantling and demolition of existing infrastructure, and the transporting and handling of topsoil on unpaved roads in order to bring the site to its initial/rehabilitated state. Demolition and removal of all infrastructure will cause fugitive dust emissions. The impacts will be short-term, localised, with low impact. These will cease once the activities are finalised.

Mitigation Measures:

Demolition should not be performed during windy periods, as ambient particulate loading will increase. The area of disturbance must be kept to a minimum. Drop heights when tipping soil into trucks or on the ground should be minimised.

Significance Statement:

Increased dust levels will occur for a short time period while the mine is decommissioned. Only the local area will be impacted. It is unlikely to be severe.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Local	Slight	Probable	MODERATE
With Mitigation	Short term	Local	Slight	May occur	LOW

Impact 2: Rehabilitation (spreading of soil, re-vegetation and profiling/contouring)

Cause and Comment:

This activity involves the reshaping and restructuring of the landscape. The soil from the topsoil stockpile will be used to reconstruct the soil structure. There is more transfer of soil from one area to another and therefore high chances of fugitive dust generation through wind erosion.

Mitigation Measures:

Reshaping and restructuring of the landscape and spreading of soil must be performed on less windy days to avoid wind erosion. Additional mitigation measures include mulching of surfaces with biomass. Keeping the soil moist using sprays or water tanks – the amount of water and duration of watering is dependent on the season.- The best time to re-vegetate rehabilitated areas is during the wet season.

Significance Statement:

Increased dust levels will occur for a short time period while the mine is decommissioned. Only the local area will be impacted.

		Effect	Pick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Local	Severe	Probable	MODERATE
With Mitigation	Short term	Local	Slight	May occur	LOW

Impact 3: Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discard)

Cause and Comment:

This includes explosives, chemicals, solid waste and associated storage facilities. Activity 10 would encompass removal of these facilities from site for safe disposal at a recommended waste disposal site.

Mitigation Measures:

The hazardous substances should be disposed of in accordance with local regulations. The hazardous substances to be disposed must be clearly labelled before and during transport. Employees should be trained on the safe disposal of hazardous substances.

Significance Statement:

Production of hazardous wastes will occur for a short period of time during the decommissioning phase. It will impact the local area only. If not managed correctly, the impact will be very severe. With mitigation measures applied, it will be moderate.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Short term	Local	Very Severe	Probable	HIGH
With Mitigation	Short term	Local	Moderate	May occur	LOW

Impact 4: Post-closure monitoring and rehabilitation

Cause and Comment:

Re-vegetation of the remaining footprint of the mine must be done after the reclamation. The impacts on the atmospheric environment during rehabilitation will be limited to the vehicular activity during spreading of soil and profiling/contouring. The impact will be very limited on spatial scale, with a limited damage to the area in term of severity.

Mitigation Measures:

It is recommended that the rehabilitation by vegetating should begin during the operational phase. The objective is to minimise the area subjected to wind erosion, and to re-instate productive ecosystems.

Significance Statement:

A short term impact, localised and of slight significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Medium term	Local	Slight	Probable	MODERATE
With Mitigation	Short term	Local	Slight	Probable	LOW

8.5.5 Geochemistry related impacts

Chemical reactions will inevitably occur between the pit lake water and the (relatively) freshly exposed rocks of the pit walls. Products of these reactions will enter the pit waters. Fracturing in the pit walls will result in an increased reactive surface area. This could significantly increase the mass of acidity produced by AMD processes. Thermal processes resulting from seasonal temperature variations might lead to "turn-over" of the water in the pit lake, thereby thoroughly mixing it. Evaporation of pit water might lead to increased concentration of chemicals in the pit lake water. This impact has already been discussed in detail in Chapter 6, Section 6.5.4. Mitigation measures are provided in that section too.

The impact is considered to be long term, localised, severe and probable, thus resulting in an impact of MODERATE significance. With mitigation measures in place this impact can be reduced to an impact of LOW significance.

		Effect	Dick or	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long Term	Localised	Severe	Probable	MODERATE
With Mitigation	Long Term	Localised	Moderate	Unlikely	LOW

8.5.6 Radiation related impacts

Mitigation measures already suggested for the construction and operation phase will continue to be implemented, until all radioactive material has been exported or disposed of appropriately.

8.6 Cumulative Impacts

8.6.1 Impacts related to waste and wastewater

Issue 1: Regional waste profiles and community awareness

In addition to consideration of direct impacts associated with the production of waste streams by the proposed development, it is also necessary to consider the cumulative impacts which may manifest as a consequence of multiple large-scale commercial developments within the region. With respect to waste management, key considerations are the change in the profile of waste streams produced by local communities and awareness of local community members about the management wastes. Each of these is discussed in more detail below.

Impact 1.1: Local knowledge of waste management practices

Cause and Comment:

Based on available information, there appears to be a lack of well-designed and operated waste management infrastructure, including disposal facilities, and recycling initiatives in the Cabo Delgado Province. The knowledge amongst local community members of the need for and best practice regarding management of waste streams is expected to be limited. While a limited knowledge of waste management may not pose a significant risk while communities subsist largely off agriculture and use of natural resources, the potential risks to environmental and human health are expected to increase as communities become more affluent and densely populated and the waste profile changes to resemble those more commonly associated with urban societies. In particular, the quantity of waste may increase and waste streams may start to include a greater proportion of non-biodegradable materials and even small quantities of hazardous wastes (e.g. batteries).

It is expected that a significant proportion of the employees at the developer's mine will come from local communities. In addition, other individuals from the same villages may be employed at other large-scale developments proposed for the area. Through their employment at such operations, these local community members will be trained on a range of environmental issues, including the correct management of waste. This knowledge may then be transferred to other members of the local communities, thus resulting in a general increased awareness of the importance of waste management, and potential opportunities for recycling, within the local communities.

Mitigation Measures:

- Train all employees on the importance of proper management of waste streams and sanitation;
- Consider options to facilitate improved management of solid waste in local communities. This may include allowing local communities to dispose of their solid wastes at the new landfill facility or training local communities on composting techniques. This may be incorporated into an urbanisation plan for the area.
- Consider involving local communities in waste recycling initiatives if these are considered practical within the context of the project.

Significance Statement:

The development of knowledge and appreciation of the need for sound waste management amongst employees, and subsequent informal dissemination of this knowledge into local communities may ultimately, together with the provision of waste management infrastructure such as formal temporary storage areas or a landfill (perhaps through an urbanisation plan), result in an improved management of waste streams within the local communities. As one of the positive impacts would be an enhanced local knowledge, the impact may be considered permanent. Without mitigation the impact would possibly be considered to be *slightly beneficial* and of LOW significance. However, with mitigation, the impact could be considered *beneficial* and of MODERATE positive significance.

		Effect	Dick or	Overall		
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance	
Without Mitigation	Permanent	District	Slightly Beneficial	Definite	LOW	
With Mitigation	Permanent	District	Beneficial	Definite	MODERATE	

Impact 1.2: Change to waste profiles in the local communities

Cause and Comment:

The proposed development, together with others in the region, will elevate the economic profile of the local communities and will result in a change in the profile of community waste streams, both in terms of quantity and the nature of the wastes. If existing waste management practices are not adapted, this could result in potential visual impacts as well as health, safety and environmental impacts around the communities.

Mitigation Measures:

- The mine could assist in the facilitation the development of an urbanisation plan for the local communities;
- Consider options to facilitate improved management of solid waste in local communities. This may include allowing local communities to dispose of their solid wastes at the new landfill facility, training local communities on composting techniques or investigating and, if considered feasible, supporting recycling initiatives.

Significance Statement:

The impact would probably be of MODERATE negative significance without mitigation and LOW negative with mitigation.

		Effect	Diek er	Overall	
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Permanent	District	Slightly Beneficial	Definite	MODERATE
With Mitigation	Permanent	District	Moderate	Slight	LOW

8.6.2 Impacts related to traffic and transport

Impact 1: Cumulative traffic impacts

Cause and Comment:

CMC Africa Austral Lda is currently upgrading the 135 km stretch of road from the border of Niassa and Cabo Delgado Province, the crossing of the Ruaça River, to the southwest part of Montepuez town. This is part of the route that will be utilised by the mine. With the improved road, it is expected that traffic volumes on the road will increase as access becomes easier. This may facilitate economic development of the region. Although the development of the mine is unrelated to the road upgrade, it is a possibility that the improved road will increase non-mine related traffic, which would result in risks associated with the mine's operations i.e. potential accidents involving mine vehicles and other road users, which wouldn't have been using the road if it was not in good condition.

Mitigation Measures:

Mitigation measures applicable to construction and operation phase impacts will also be applicable here.

Significance Statement:

This impact will be long term (the mine life). It will impact the roads and villages between Balama and Montepuez. It will be moderately severe but with mitigation measures applied, only slight.

	Effect			Dick or	Overall
Impact	Temporal Scale	Spatial Scale	Severity of Impact	Likelihood	Significance
Without Mitigation	Long term	Regional	Moderate	May occur	MODERATE
With Mitigation	Long term	Regional	Slight	Unlikely	LOW

8.6.3 Impacts related to noise

The proposed Balama Graphite Mine will significantly contribute to the existing ambient noise levels at the surrounding villages due to the expected cumulative noise contribution from the haul roads, east and west pit as well as the processing plant. Impacts and associated mitigation measures are assessed under the construction and operation phase.

8.6.4 Impacts related to air quality

The project will add to air pollution already being generated by farming activities on site. However there are no projects of a similar nature in the area so cumulative impacts are not applicable.

8.6.5 Geochemistry related impacts

As there are no other mines in the area (or planned for the near future), there will be no cumulative geochemical impacts.

8.6.6 Radiation related impacts

The severity of radiation impacts is determined not only by the radioactivity of the source minerals, but also by exposure to these minerals (in terms of both time and proximity). For this reason, impacts are generally site specific and cumulative impacts are irrelevant.

9. EFFECTS OF THE PROJECT ON GLOBAL CLIMATE CHANGE

9.1 Introduction

This chapter deals with climate change as it relates to the Balama Graphite Mine Project. Climate generally induces change to physical and biological systems and the adverse change in the global and regional climate scenarios can exert considerable stress on a country and region's vulnerable sector, specifically those who rely heavily on ecological resources. This chapter will describe the climate change scenario in Mozambique and assess the potential contribution of the project to climate change.

9.2 Climate Change: Cause and Effect

Climate and weather are very closely intertwined. While weather refers to short term variations of the state of the atmosphere (include changes in air temperature, cloudiness, precipitation and wind), according to Battan (1974), climate is the long term manifestations of the weather. In general the climate of a region will be described in terms of the average temperature, precipitation, atmospheric humidity and wind velocity over periods of approximately 30 years. Climatologists are confident that over the past century, the global average surface temperature has increased by about half a degree Celsius (IPCC, 1995a). This warming is thought to be at least partly the result of human activities, such as the burning of fossil fuels and the clearing of forests for agriculture.

According to the Intergovernmental Panel on Climate Change (IPCC), climate change refers to any change in climate over time, whether due to natural variability or as a result of anthropogenic activity. Climate change is thus a long-term change in the statistical distribution of weather patterns over long periods of time. Fluctuations in the weather patterns in periods shorter than a few decades, such as El Niño, do not represent climate change (UNFCCC) where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (IPCC Summary for Policymakers, 2007).

The change in climate is generally attributed to the change in the atmospheric gaseous composition and this could be enhanced by anthropogenic sources of greenhouse gas (GHG). The increased concentrations of GHG (including water vapour, carbon dioxide, methane, nitrous oxide, and ozone) produce global warming that affects long-term climate, with potential impacts, both negative and positive, on humanity in the foreseeable future (IPCC Summary for Policymakers, 2007).

Climate change is one of the most important environmental issues facing humankind. Concern over the anthropogenic factors relates to the increase in atmospheric CO_2 and its equivalents due to emissions mainly from fossil fuel combustion and the removal of vegetation due to land use change. Understanding the potential impacts of climate change on natural ecosystems is essential in order to manage the environment to minimize the negative consequences of climate change and maximize the opportunities that it may offer. According to the IPCC (1995a) report the global average temperature is expected to continue increasing by an additional 1.0 to 3.5° C by the year 2100 while the IPCC (2013) report shows the global mean surface temperature change for the period 2016–2035 relative to 1986–2005 will likely be in the range of 0.3° C to 0.7° C. Global emissions of greenhouse gases have risen to unprecedented levels despite a growing number of policies to reduce climate change and emissions have increased more rapidly between 2000 and 2010 than in each of the three previous decades. The report concludes that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase. It is very likely that heat waves will occur with a higher frequency and duration, with occasional cold winter extremes (IPCC, 2013).

Climate change may affect natural ecosystems in a variety of ways. In the short term, it can alter the mixture of plant species in land ecosystems such as grasslands while over the long term, climate change has the potential to dramatically alter the geographic distribution of major vegetation types. Climate change can also potentially alter global ecosystem processes, including the cycling of carbon, nitrogen, phosphorus, and sulfur. All of the climate change-induced alterations of natural ecosystems affect the services that these ecosystems provide to humans. However, not all impacts related to climate change are negative and adverse. While droughts, floods and sea level rise can be frequent and significant in some places, other areas such as the sub-arctic, may experience and increase in crop yields due to the fertilising effects of CO_2 and longer growing seasons. This may however have a negative effect on natural resources, ultimately resulting in infrastructure damage and extinction of indigenous life forms with slow adaptation rates.

Globally, the implementation of a low-carbon economy is proposed as a means to avoid catastrophic climate change. This will involve stabilizing greenhouse gas concentrations in the atmosphere by reducing emissions of GHGs from energy production and use, transport, buildings, industry, land use, and human settlements. Furthermore, it will be necessary to find ways to decouple greenhouse gas emissions from the growth of economies and population (IPCC, 2013).

9.3 Mozambique and the Cabo Delgado Province

9.3.1 Geographical Context

Mozambique is located on the Southern half of South Africa bordering the Mozambique Channel, between South Africa and Tanzania. This country covers a total area of approximately 800km² and is characterized mainly by flat Coastal Plains along the Indian Ocean and high plateaus and mountains more inland towards the Western and Northern borders of the country. The lowest elevation point is the Indian Ocean (0m), while the highest elevation point is Monte Binga at 2,436 masl. A number of important rivers occupy this country such as the Zambezi and the Limpopo Rivers. Climate in Mozambique varies from tropical to sub- tropical with climate of the coastal region being largely determined by the offshore warm waters of the Agulhas current and the close proximity of tropical cyclones which pass mostly from the north to the south of the country (INGC, 2009).

Cabo Delgado Province has a tropical climate with two distinct seasons. The wet season occurs from November to March and the dry season from April to November. Specific weather data for the project area is not available. Climate data for Montepuez, the nearest town to the project site (93km away), was therefore used. Montepuez has a tropical climate and is also a summer rainfall region. The average annual rainfall is approximately 942.3 mm. The driest month is August/September with 0 mm - 2 mm. Most precipitation falls in January, with an average of approximately 246.4 mm (http://www.weatherbase.com).

The average annual temperature in Montepuez is 24.2 °C. The warmest month of the year is November with an average temperature of 26.7 °C. In July, the average temperature is 21.1 °C making it the coolest month in the year. The average temperatures vary during the year by 5.6 °C. The highest recoded temperature was a maximum of 50 °C, recorded in November, while the lowest recoded temperature was a minimum of 5 °C, recorded in May (http://www.weatherbase.com).

The Balama Graphite Project is situated 140km west of Solwezi within the Northern region of Cabo Delgado Province and in the District of Balama. The Mehucua River flows through the southern section of the project site in a South-west to North-east direction. A few small wetlands occur in the project area, the most notable being a swampland located approximately 2 km south west of the proposed site and a wetland located approximately 7 km east south-east. The largest water body in the area, but outside of the project area, is the Chipembe Dam which is located 13 km northwest of the site.

Soils are low to moderately fertile, with inland land being stonier with moderate to strong erosion. Land use in the area is primarily for subsistence agriculture. Main crops are groundnut, cassava, maize, rice, sorghum and cotton (INGC, 2009). Crops are grown on the flat areas which are cleared using slash and burn techniques. Some small livestock is reared in the area although these animals were only noted near the villages and are not abundant in the project site. Almost all households within the project area and immediate surrounds are heavily reliant on the natural resources for their livelihoods. Natural resources are used for construction, medicinal use, consumption and to supplement their food. Charcoal production was also evident in the project site. Produce that is not consumed is traded informally, the verges of the main road to Montepuez providing the primary market place.

The proposed project's area of influence encompasses four villages (Ntete, Nquide, Maputo and Pirira) and approximately 11,048 people. No basic services exist, with water for domestic use pumped by hand from at least one well per village while self-constructed pit latrines are utilised in most households. In general, skill levels are low with high levels of unemployment.

Two boreholes currently supply the site and are capable of delivering 10 000 ℓ and 3 000 ℓ every 24 hours. Two additional 3000 ℓ boreholes have been provided to surrounding villages. Operational requirements have been estimated to peak at 2 million m³ per annum and it is anticipated that this water will be supplied from the Chipembe Dam via a 13 km pipeline.

9.3.2 **Projected Climate Fluctuations**

In order to understand the likely biophysical and socio-economic impacts of climate change, it is necessary to first examine the likely climate change scenarios of the areas of interest. Tandross (2009) examined Global Circulation Models (GCM) and Mozambican climatic data for the period 1960-2005 in order to identify trends in climate patterns. This research revealed the following with respect to climate change in Mozambique:

- There has been an increase in the number of hot days and hot nights;
- There will be a general increase in temperature of up to 3°C in certain areas;
- There are indications of a later start to the wet season and an increase in dry day persistence and dry spell length in the north of the country, including Cabo Delgado;
- The dry season is expected to become drier across the whole country as the rate of evaporation is likely to be greater than the increase in rainfall during winter and early summer;
- There is expected to be a delay in the end of the dry season;
- The winter season will become drier across the whole country; and
- There will be increased variability in rainfall for June, July and August.

One of the key conclusions of this study was that "cropping / farming systems are already close to critical thresholds of either water availability or seasonal duration (for growing specific crops). Increase in temperature alone (with no significant change in rainfall) could make cultivation of particular crops unviable." This is of concern in an area where livelihoods

are reliant on rainfed agriculture. The specific manifestations of climate change within the context of Mozambique are discussed in more detail below.

9.4 Climatic Hazards

Historically, Mozambique has been exposed to droughts and floods but recent decades have seen the frequency and severity of these climatic hazards increase together with a change in climate trends (INGC, 2009). The shifts in climatic patterns ranges from increased or decreased average precipitation; shifts in rainfall patterns; and increasing average and maximum temperatures. Due to these shifts in climate, the frequency and severity of extreme natural disasters have also increased, including tropical cyclones, floods, droughts (MICOA, 2007). The La Niña and El Niño phenomena have also contributed to climate-related challenges (INGC, 2009). Mozambique has experienced a frequence of floods between 1977 and 2005. The country has regularly suffered from drought events, resulting in extreme negative impacts, which have halted efforts towards sustainable development.

The government of Mozambique recognizes that the country is vulnerable to catastrophes and that the hazards resulting from climate change are some of the factors that aggravate the situation of absolute poverty in Mozambique. The Governments Five Year Plan (2005-2009) was developed with those challenges in mind, and includes the following priority objectives to:

- Reduce the number of human victims and the loss of properties;
- Promote a culture of prevention; and
- Provide the country with the means for prevention and mitigation.

Arndt *et al* (2010) used an integrated modelling framework to translate a set of climate predictions into biophysical and economic impacts for the Mozambican context. In general, their predictions in terms of climate change matched that of Tandross (2009), specifically increased temperatures, variability and uncertainty. The specific impacts that they considered covered four key sectors:

- Infrastructure (such as damage to roads)
- Hydropower production
- Agriculture
- Coastal zones and sea level rise

The results of the analysis suggested that Mozambique would continue to generate surplus hydropower and while climate change posed a significant threat to the coastal zone, this is of limited relevance to the proposed inland development. Infrastructure such as roads and bridges are expected to be vulnerable to the effects of climate change, not only as a consequence of flood-related damage but also more rapid deterioration under warmer conditions. In addition to the general short-term disruption of economic activities associated with temporary severe damage to transport routes, there are likely to be longer-lasting economic implications related to increased maintenance efforts. More specifically, funds that are used for the repair and maintenance of roads will not be available for other development and support initiatives.

Of particular relevance to the proposed project is the expected impact of climate change on agricultural productivity. The crop model employed by Arndt *et al* (2010) indicated that crop yields would be worst under the local dry scenario but that certain crops would actually benefit under other possible climate scenarios. There is therefore expected to be variability in terms of the response of crop yields. For example, under certain scenarios, cassava yields are expected to decline while that of maize will increase.

Sacramento *et al.* (no date) investigated climate-related hazards and impacts on small scale farmers and livelihood systems in the Chicualacuala District of Mozambique. This study included the identification of adaptation options and/or coping strategies currently being employed. The findings revealed that the main climate hazard that affecting all interviewed communities is drought, although extreme heat, desertification and strong winds (for tree communities) were also mentioned. Coping strategies employed by local communities to mitigate the impacts of these climate-related hazards are listed in Table 9-1.

HAZARD	COPING STRATEGIES			
DROUGHT	Consumption of wild tubers and fruits			
	Selling of firewood and charcoal			
	Selling of wild fruits and vegetables			
	Sale of livestock			
	Small business			
	Digging deeper wells and walking long distances to fetch water			
	Travelling long distances in search of pasture and water for livestock			
	Purchasing water for animals and humans			
	Practice of agriculture using irrigation systems			
	Selling traditional alcoholic drink from the forest			
	Open borehole for livestock			
	Designating new grazing areas			
	Digging deeper wells			
	Opening new fields			
	Grazing livestock in the morning and evening			
	Planting shed trees			
EXTREME HEAT	Working early in the mornings			
	Move the livestock to places with shadow trees			
	Feed the animals close to the river and/or lagoon			
	Sensitize and awareness the community to reduce firewood			
	Firebreak			
	Health post			
	Use of animal manure to improve soil fertility			
	Migrating to towns for employment			
DESERTIFICATION	Digging deeper wells			
	Cultivating along the river			
	Selling of fire wood and charcoal			
	Building strong structures			
STRONG WINDS	Rebuilding the structures damaged			
	Planting wind breaks			
	Protective measures			

Table 9-1: Current Stra	egies to Cope with the	Main Hazards (Sac	cramento et al., N.D).

It is important to note that not all current local strategies to cope with hazards are efficient or appropriate for long term adaptation. Some strategies, based on short-term considerations, survival needs, lack of information or imperfect foresight, can worsen environmental degradation and thereby diminish future adaptive capacity and livelihood options. The sustainability of different coping strategies also depends on the intensity, duration and frequency of the hazard. The major threat to most of the coping strategies is their lack of sustainability in the face of current and projected climate change impacts which will lead to ecosystem degradation and loss of goods and services from the natural resources on which this community depends on (Sacramento *et al.*, N.D).

Arndt *et al* (2010) also stressed the importance of addressing the challenges associated with climate change and advocated agricultural intensification through technical advancement combined with enhanced education to facilitate rapid economic development.

9.5 Climate change-related impacts of the proposed project

The purpose of this section is to comment on the extent to which the proposed project will potentially contribute to climate change and, more importantly, to examine the extent to which the project activities could exacerbate expected climate change-related impacts.

9.5.1 Contribution to climate change

The proposed project may contribute directly to climate change through consumption of non-renewable energy sources and associated CO_2 emissions and indirectly through reduction of local carbon stock.

Issue 1: Loss of Carbon Stock

In addition to its direct importance for the maintenance of ecological systems and provision of food, material for housing, medicine and energy, vegetation can act as an important carbon sink. If cleared vegetation is either burned or allowed to decompose, the carbon stored within the plant material will be released as carbon dioxide, thereby eliminating any future carbon storage potential of these plants while at the same time, releasing additional carbon dioxide to the atmosphere.

The primary actions required to mitigate for the disruption of the natural habitat have been described in detail in Chapter 6 of this report. Regarding the loss of carbon stock and offset of CO_2 emissions, the developer will implement best practice training programmes. These programmes will be designed to teach farmers how to farm more efficiently and thus reduce reliance on the slash and burn farming technique practiced in the project area as well as the ability to live off smaller pieces of land. The techniques to be improvised will adopt carbon capture and storage techniques as part of the soil conservation practice and soil improvement programmes. This is in line with the suggestion of Arndt *et al* (2010).

In addition, the following mitigation measures will be implemented by the Balama Graphite Mine Project to mitigate against the climate change impacts of the loss of habitat:

- As far as possible, minimise clearing of woodlands which are in a mature or climax state;
- As an offset, consider facilitating alternatives to the charcoal industry in the local economy to reduce reliance on harvesting of woodlands for energy;
- Where feasible, implement carbon emissions offsets elsewhere. This may include long-term preservation of mature forest and other vegetation types with high carbon stock;
- Educate employees about conservation of vegetation resources (in the hope that unsustainable harvesting is decreased);
- Maintain vegetation in drainage lines to reduce loss of soil by erosion in the event of increased rainfall;

• Prepare a detailed rehabilitation strategy that takes into consideration the likely impacts of climate change. This could include selection of more drought-tolerant species.

Issue 2: Energy Consumption

In addition to the potential climate change-related impacts associated with the clearing of vegetation, the consumption of fossil fuels, whether directly as fuel or indirectly through the use of electricity from non-renewable sources, may also contribute to climate change.

According to the IFC's Performance Standard 3 (2012), the production of more than 25 000 tonnes of CO^2 -equivalents annually by a development should be regarded as significant. The predicted annual diesel consumption for the first five years of the mine's operation ranges from 18 354 014 litres in 2017 up to 24 443 799 litres in 2021. Based on an emissions factor of 2.63 kg CO^2 e/L diesel, CO^2 -equivalents per annum from diesel consumption will be at least 48 271 tons (increasing to 64 287 tons/annum in 2021) which exceeds the IFC's threshold. Consequently, CO^2 emissions from diesel consumption alone would be regarded as significant. Please note that these calculations are based on 100% diesel power generation and thus represent the worst case scenario.

Considering that ~90% of electricity generated in Mozambique is via renewable hydropower, it is unlikely that direct power consumption will influence the annual CO² emissions of the project significantly. However, the above estimation does not include direct loss of carbon as a consequence of land use change. According to the IFC's Performance Standard 3 (IFC 2012), "project-induced changes in soil carbon content or above ground biomass, and project –induced decay of organic matter may contribute to direct emissions sources and shall be included in this emissions quantification where such emissions are expected to be significant." Ideally, calculation of the GHG emissions associated with change in land use should incorporate a carbon stock assessment. Although default carbon content values for different vegetation types have been published, the accuracy of the calculations will be improved by direct measurements from the site itself prior to initiation of vegetation clearing.

Based on the above, a comprehensive GHG Assessment ("carbon footprint") will be established for the facility within the first year of operation. In addition to consideration of GHG emissions associated with consumption of fuel, it will also need to take into consideration the loss of vegetation and off-site generation of energy used by the project. For those projects where GHG emissions are expected to be significant, it is a requirement of the IFC (Performance Standard 3) that quantification of GHG emissions will be conducted annually in accordance with internationally recognised methodologies and best practice. Furthermore, it is also a requirement that technically and financially-feasible and cost-effective options to reduce project-related GHG emissions be implemented by the proponent.

Potential mitigation measures include:

- Quantify GHG emissions annually in accordance with internationally recognized methodologies and good practice;
- Commit to efficient use of energy through the environmental policy;
- Size motors and pumps to the applied load and use adjustable speed drives in applications with highly variable load requirements;
- Consider and, where practical, implementing measures to reduce energy consumption of the development. This may include the installation of solar water heaters;
- Ensure that all machinery, including vehicles, are well maintained;

- Design and implement an operating procedure for carbon management, that includes key performance targets. This will include the management of re-vegetated areas (as carbon sink) for carbon offsetting measures;
- Develop and implement of an Energy Management Plan for the facility;
- Minimizing the clearing of vegetation; and
- Consider carbon sequestration potential when developing the rehabilitation strategy for the facility.

9.5.2 Exacerbation of climate change impacts

Issue 1: Reduced availability of water

The findings of the climate change predictions are that Mozambique will experience longer drier periods and that there may be a delay in the start of the wet season. It is therefore possible that local communities, in particular those that rely on natural water resources for their water supply may experience challenges with access to water during dry periods. Mining activities could affect both the quantity and quality of local water resources which could pose significant challenges to local communities during periods of water stress. For example, mining activities could affect local groundwater flow due to minor groundwater abstraction activities which could lower the water table, and make it more difficult for local communities to access drinking water from groundwater wells, particularly during the dry season. However, competition between the proposed mine and communities for water is not expected to be a significant risk as water for the project will be obtained from the Chipembe Dam which is located 13 km northwest of the site. The Mozambique Water Authority is responsible for the management of Chipembe Dam and has confirmed that there is suitable available capacity and allocation for Syrah to obtain over 2 000 000m³ annually for use in the processing of graphite (EBS, 2012).

There is, however, a risk of contamination of water resources in the vicinity of the mine and this would be a significant issue for communities, particularly during dry periods.

Measures aimed at minimising impacts to the quality and quantity of local water resources have been addressed in Chapter 6 of this report.

Issue 2: Loss of ecosystem goods and services

Change in climate may result in the change of vegetation types and abundance of fauna and flora. The biophysical environment, of which various vegetation types are a key component, has been shown to be of great importance to local human and animal communities, particularly in rural areas where these resources provide a measure of insurance in times of hardship. For example, in times of drought and associated failure of crops, communities may become highly reliant on local ecosystems for food. The loss of vegetation as well as ecosystem services currently provided within the 350 ha project area is likely to further increase use and pressure on the natural resources of the surrounding area to sustain local communities.

Measures aimed at minimising impacts to the availability of ecological goods and services have been addressed in Chapter 6 and Chapter 7 of this report.

Issue 3: Reduced food security

The predicted change in rainfall, temperature and length of dry periods is expected to impact negatively on food security of the area. These factors may also contribute to greater erosion of top soil with subsequent reduction in availability of arable land. The vulnerability of water supplies to climate change translates to the vulnerability of growing crops and the production of food in those areas without access to formalised irrigation schemes. The yield and survival of food crops may also be reduced. The proposed development may exacerbate this risk of food insecurity through:

- Competition for limited water resources;
- Conversion of existing agricultural land for mining; and
- Loss of natural habitat for wild food plants and game.

Mitigation measures aimed at reduction of soil erosion, loss of vegetation and food security have been addressed elsewhere in this report. In line with recommendations by Arndt *et al* (2010), the developer will investigate opportunities to enable local communities to intensify agricultural production using technical advancements. This may include assistance with the development of irrigation or training or soil management.

<u>Issue 4: Health Impacts</u>

It has been predicted that climate change will influence the prevalence of certain diseases and susceptibility of local communities to disease may be increased as a result of reduced food availability and subsequent reduction in immunity as well as a loss of access to medicinal plants. Certain vectors may be able to extend their ranges and changes to climate may influence vector populations. Change to rainfall patterns (such as shorter periods of more intense rainfall) may provide additional breeding areas (such as temporary puddles / ponds) for vectors such as mosquitos (which transmit malaria). In the event of climate change impacting on rainfall patterns, the proponent will take measures to assist with food security and access to medical plants, and ensure that the project does not further contribute to the increase in numbers of disease vectors.

Potential mitigation measures could include:

- Take steps to improve awareness of vector-borne health risks amongst employees and local communities;
- Develop an integrated pest management plan for the facility that includes vectors for disease;
- Consider engaging with and assisting relevant authorities to develop and implement malaria reduction programmes in local communities;
- Implement necessary procedures to minimise the presence of stagnant water on the site;
- Through consultation with local communities, establish an inventory of key ethnobotanical resources in the area of the mine and, as far as practical, develop a nursery for cultivation of these species (such as medicinal plants); and
- Take reasonable efforts to rescue key ethnobotanical species from the mine path.

9.6 Conclusions

Based on various studies on the likely climate change scenarios for Mozambique and the associated biophysical and socio-economic impacts, it is likely that the area will become hotter and that rainfall will become more variable. The GHG emissions associated with the mine is likely to exceed 48 000 tons CO_2 -equivalents per annum and in terms of the IFC's Performance Standards, would be regarded as significant. Without mitigation, the mining operation will have the potential to exacerbate impacts of climate change. The impacts on local communities that rely on natural resources, particularly in times of drought, may be particularly vulnerable. The developer will implement various mitigation measures aimed at reducing this vulnerability, including provision of assistance to improve agricultural yields and the reliability of water supply.

10. ALTERNATIVES

10.1 Introduction

One of the objectives of an EIA is to investigate alternatives to the proposed project. There are two types of alternatives - Fundamental Alternatives and Incremental (or development) Alternatives.

10.1.1 Fundamental Alternatives

Fundamental alternatives are developments that are totally different from the proposed project and usually involve a different type of development on the proposed site, or a different location for the proposed development. Since the core business of the project developer is mining, the fundamental alternative of a development other than the proposed mine and associated infrastructure is therefore technically not feasible in this instance. For this reason no fundamental alternative to mining has been considered in this ESHIA. Furthermore, since mining is a "locality bound" industry (it has to take place where the resources are) no alternative locations for the mine can be assessed. However, alternative locations for infrastructural components of the project that are not locality bound are considered in section 10.3, except for the location of the pit. This is because the pit is locality bound, as its location is entirely dependent on the resource being mined.

10.1.2 Incremental Alternatives

These are alternative designs, plans, technologies, operational options and layouts for which options are available, and which were investigated in this ESHIA. They are considered further in Section 10.3.

10.2 No Development Alternative

The removal of vegetation during the mining process and construction of associated infrastructure will cause the loss of important vegetation communities as well as habitat fragmentation. These are dynamic ecosystems that provide the habitats to support all forms of life, which will be lost during construction and operation of the mine. Based on the sensitivity analysis undertaken during the vegetation assessment, the majority of the area is considered to be of low sensitivity (refer to Figure 10.1 below). This is due to the fact that extensive areas have been cleared for agricultural fields through mainly slash and burn practises. Under the "no-go" scenario the current disturbance caused by the locals will remain, and may even expand, resulting in more undisturbed areas becoming fragmented. Thus, compared to the current land use which is presently having a large impact on the wegetation both within the proposed mining area as well as within the wider region, the impacts associated with the mine site and associated infrastructure are comparatively low when viewed at a broader scale.

In addition to the above, no socio-economic benefits would accrue to the nearby communities and the government. If the proposed project is not implemented benefits such as the opportunity to increase revenue capacity at local and regional levels, as well as the creation of employment will be lost, resulting in unimproved living conditions of the population in the project area. Furthermore, there will be a loss in the general upliftment of the area that may result from the implementation of social programmes (as part of social corporate responsibility) and the secondary impacts that stem from higher income earnings (such as support for local businesses).

Due to the fact that the majority of the area to be developed is of low sensitivity and that existing practises by local communities may result in further degradation of the area, the social benefits of the proposed project outweighs the potential negative ecological impacts and thus the "no-go" option in this case is not considered feasible.



Figure 10.1: Sensitivity of the project area

10.3 Design and Layout Alternatives

10.3.1 Location of the haul road

Road Option 1 would connect to the Pirira-Ntete Road, which runs in a north-south direction. From there the haul trucks would turn left onto the Pemba-Lichinga Road which runs in a west-east direction to Pemba, from where product will be exported. This route would result in road-trains travelling through the villages of Pirira and Maputo. There is little that can be done to mitigate this impact, as the graphite that is produced needs to be delivered to the port for export. The busiest section of the route is the last 3 kilometers of the double lane

EN106, before it reaches the Avenida Eduardo Mondlane. This intersection is shown in Plate 10.1 below. The best that can be suggested is that trucks attempt to turn left off the EN106 before this stretch of the road, drive south and then turn right on the Rua No. III, a relatively quiet road which will take the trucks to the port. Whichever route within Pemba is decided upon, it will be necessary to consult with local traffic authorities. Deliveries to the Port should also be scheduled to avoid typical peak traffic times of 7 - 8:30 am and 5 - 6 pm. All drivers must observe all traffic regulations in terms of speed limits and should be trained in defensive driving techniques. If these mitigation measures are adhered to the impact on this road is considered to be of moderate significance (please refer to Traffic and Transport Assessment in Part V of this document).

Ecologically road Option 1 and road Option 3 is preferable to Option 2 for the following reasons:

- Road Option 2 is positioned close to the head of a stream which is ecologically sensitive. Impacts on this could have further impacts downstream.
- Option 2 also passes close to a small grove of *Sterculia appendiculata* which are listed as Vulnerable on the Mozambique Red Data List and transects an area of high sensitivity, which has been identified in the vegetation assessment as an area that should be set aside for conservation purposes.
- A portion of Option 2 where it goes around the western end of the Mount Coronge is relatively steep, which increases the cost of construction, but my also result in increased erosion and sedimentation of the stream and the Mehucua River downstream.

For the reasons listed above, Options 1 and 3 are the preferred options from an ecological point of view. Both these options pass through an area of medium sensitivity, however this is along the outskirts of these sections, which are already fragmented by agricultural activities and thus further fragmentation is not anticipated. Road Option 3, however, passes through the proposed corridor identified in the vegetation assessment, which is intended to provide a link between Mount Coronge and the patch of intact woodland to the east of Nquide village. However, this corridor passes through areas that are fairly degraded. Although not ideal, a haul road crossing through this corridor will not contribute to further fragmentation, but it is preferable that no further infrastructure is located within the corridor.

Based on this, road Option 1 is preferred from an ecological point of view and road Option 3 from a social perspective. However, the transport of construction material during the construction phase requires immediate access to the site, and this can only be obtained from the exiting Pirira-Ntete Road. It is therefore recommended that a combination of Option 1 and Option 3 be utilised for the project. Option 1 is utilised for the construction and initial operational phase of the project, and once production has been ramped up Option 3 is implemented and utilised for the remainder of the project. This will result in a reduction of the temporal scale and the impact on the villages along this road will thus be short term. Impacts associated with 45 vehicles passing per day through these rural villages are considered very significant.



Plate 10.1: The intersection of the Avenida 25 de Septembro and the Avenida 16 de Junho



Figure 10.2: Haul road options

Coastal & Environmental Services

10.3.2 Location of the tailings storage facility

Four options were considered for the position of the tailings storage facility (refer to Figure 10.2). These options were assessed on financial and technical aspects by Knight Piesold Consulting, which concluded that either Option 3 (lowest cost prior to start-up) or Option 1 (lowest cost up to end of Year 1), would be preferred.

From an ecological perspective, it is important to note that both Option 1 and Option 3 are located within areas classified as low ecological sensitivity (refer to Figure 10.3). These areas are covered in Miombo Plains that are highly degraded. A small section of intact Miombo Plains occurs within TSF Option 3 crossing the southern border. This intact section of Miombo Plains is classified as having medium sensitivity as it still has a relatively high species richness and forms an important ecological process area for small mammals and birds. Areas of medium sensitivity can withstand a limited loss of, or disturbance to, natural areas. No protected areas or areas of high sensitivity will be directly affected by either of these two options. So, from an ecological perspective Option 1 is preferred, followed by Option 3 as a close second.

From a social perspective, Option 3 would be the preferred option as this option will allow for the expansion of Ntete Village beyond its current borders, noting that the village already seems to be expanding in a southern direction. In addition to this, Option 3 also provides for a reasonable buffer area between the TSF and Nquide Village. A number of *machambas* and new village infrastructure could possibly be affected should the TSF be positioned closer to Ntete Village. Option 1 was initially not preferred as it will definitely affect the current economic displacement process and possibly elevate it into a full-scale resettlement project, as dwellings are situated on the border of Ntete Village, which is rapidly expanding southwards, resulting in possible physical displacement in close proximity to Ntete Village. However, this Option has been revised (refer to Figure 10.4) and has been located further south, below the Ntete / Nquide Road, thus eliminating the social impact associated with this option.

In summary, from a social perspective Option 3 / Option 1 is preferred, and from an ecological perspective Option 1 is preferred. Thus, it is concluded that modified **Option 1 is** *the preferred option for the TSF* (Figure 10.4).



Figure 10.3: Options for the tailings storage facility Source: Knight Piesold Consulting






Figure 10.4: Comparison of the four TSF alternatives

10.3.3 Location of the mine camp

Two alternatives were considered for the location of the mine camp (construction and operation accommodation). These are depicted in Figure 10.5. The majority of Option 1 is situated in a vegetation type identified as Miombo woodland: Granite. This vegetation type was identified as an area of high sensitivity due to the fact that these areas are all relatively intact and have high species diversity. They also contain species of special concern such as *Sterculia appendiculata* (listed as Vulnerable on the Mozambique red Data Lists). A number of these species were noted to occur on the slopes of the Granite Inselberg (Mount Coronge). According to the vegetation assessment the impact on this vegetation type were considered to be high negative and it was recommended that this area should be left intact and non-essential infrastructure, such as the mine camp, be moved to a less sensitive area.

Option 2 is situated in an area that has been transformed from its natural state to agricultural land. This has resulted in a reduction of the overall impact on Miombo woodland: Granite to that of moderate significance, since no infrastructure or project activities (other than the pit) will impact this vegetation type. With mitigation measures in place, this impact could be reduced to that of low significance.

Thus, based on the above, **Option 2 is the preferred site for the mine camp**.



Figure 10.5: Alternative locations for the mine camp

11. DECOMISSIONING AND CLOSURE PLAN

11.1 Introduction

11.1.1 Background

In accordance with the Mozambican legislation (Environmental Framework Act (Law No. 20/97, 1 October 1997)) as well as in compliance with the International Finance Corporation (IFC) Environmental, Health and Safety Guidelines for Mining, a Mine Closure and Rehabilitation Plan is required for the Syrah Balama Graphite project. The activities associated with mine closure and rehabilitation are designed to prevent or minimise adverse long-term environmental impacts, and to create a self-sustaining natural ecosystem or alternative land use based on an agreed set of objectives associated with mine closure and rehabilitation. This plan must support the operation in achieving a post closure status that leaves behind a positive legacy in the community. Health, safety, social, environmental, legal, governance and human resource aspects will need to be considered and addressed.

The long term nature of the proposed operations (25 years) places limitations on the amount of detail that can be included into this current draft closure plan and it should therefore be regarded as being 'conceptual'. This current version of the closure plan would therefore need to be reviewed regularly to keep in line with legislation, environmental, technological and socio-economic changes over the operational period.

11.1.2 Development of a preliminary mine closure plan

Mine rehabilitation is an on-going programme designed to restore the physical, chemical and biological quality or potential of air, land and water regimes disturbed by mining to a state acceptable to the regulators and to post-mining land users. Rehabilitation can take place throughout the life of mine, whereas mine closure by definition refers to those activities that take place after production has ceased.

The developed world (especially Australia and United Kingdom) have been among the leading countries on mine closure and rehabilitation, with the International Council on Minerals and Metals (ICMM) Planning for Integrated Mine Closure: Toolkit produced in London, being amongst the most widely used international guideline documents for mine closure. The recommendations included in this report will need to comply with ICMM Guidelines which is explained in more detail below (Figure 11.1).

As mentioned above, the closure plan should be viewed as a process which begins during the planning phase of a mine's development and continues throughout the operation phases. Central to the closure plan is the development of a progressive rehabilitation plan (prior to mining). This approach encourages planning for closure becoming part of the design of a mine operation in order to facilitate closure. The Mine Closure and Rehabilitation plan will be initiated at this early stage as a Conceptual Closure Plan. The comprehensive information that is required for the detailed closure and rehabilitation plan will be developed during the mine operational phase which will assist in compiling a detailed closure and rehabilitation plan. This rehabilitation plan will ensure:

- That the post-mined landscape is safe and stable from a physical, geochemical and ecological perspective;
- The quality of the surrounding water resources is protected;
- The agreed sustainable post-mining land use is established and clearly defined to the satisfaction of the community and government; and

• Success criteria are agreed with relevant stakeholders, monitored, and reported to stakeholders.

The Mine Closure and Rehabilitation plan will be reviewed and updated annually in preparation for potential events such as material changes in operating parameters. Ultimately, closure must ensure that the site is stable and safe in the long-term.



Figure 11.1: The integrated mine closure planning approach as recommended by the ICMM (2008)

11.1.3 Applicable legislation and international standards

This Preliminary closure report has been compiled in fulfilment of the relevant Mozambican legislation. The overarching item of environmental legislation is the Environmental Framework Act (Law No. 20/97, 1 October 1997) which governs the use and correct management of the environment and its components, and to ensure sustainable development. It is the foundation for the legal instruments for the preservation of the

environment. According to the Environment Act, the mining operation is liable for the costs of rehabilitating the degraded environment or restoration thereof.

In addition to compliance with Mozambican Legislation, the development is expected to adhere to the following:

- Equator Principles (2013);
- International Finance Corporation's Standards on Environmental and Social Sustainability (IFC, 2012);
- International Finance Corporation's Environmental, Health and Safety General Guidelines (IFC, 2007); and
- International Finance Corporation's Environmental, Health and Safety (EHS) Guidelines for Mining (IFC, 2007).

According to the requirements of these international standards, the mining operation should plan for the following:

- A Mine Reclamation and Closure Plan in draft form prior to the start of production, clearly identifying allocated and sustainable funding sources to implement the plan;
- The incorporation of both physical rehabilitation and socio-economic considerations in the mine closure plan;
- The duration of post-closure monitoring should be defined on a risk basis taking site conditions into account. Monitoring is typically required for a period of five years or longer; and
- The financial feasibility of mine closure and post-closure activities, including postclosure care should be included in the business feasibility analysis during planning and design stages.

In terms of the IFC requirements for closure and the Equator Principle guidelines, pollution prevention is the main driving factor. The IFC guidelines specify that a mine closure plan should incorporate both physical rehabilitation and socio-economic considerations as an integral part of the project life cycle and that a mine be designed so that:

- Future public health and safety are not compromised;
- The after-use of the site is beneficial and sustainable to the affected communities in the long term;
- Adverse socio-economic impacts are minimized and socioeconomic benefits are maximized.

Furthermore, it is specified that the objectives for closure need to be considered as early in the life cycle of the mine and that a draft closure plan should be compiled prior to the start of production or operation. This plan needs to indicate funding requirements (anticipated closure costs) and to achieve this, a Mine Works Program would be required and be updated on an on-going basis. For short life of mines a fully detailed plan is required and the longer the life of mine the more conceptual the plan can be. However, it will need to be updated regularly. The timing and finalisation of a final plan is site specific, however all mines need to demonstrate some form of progressive rehabilitation as necessary during the operational and construction phase. Lastly, during the last five years of forecasted operations, a final closure plan needs to be developed with the objective of leaving the mine area in a ecological functioning condition (to the extent possible).

In summary, if the life of mine is longer than five years then a draft / conceptual plan is acceptable but it will still need to contain an estimate of the cost for rehabilitation. Importantly, the IFC guidelines require that funds are available, through "appropriate

financial instruments, to cover the cost of closure at any stage of the mine life, including provision for early, or temporary closure".

11.1.4 Social components of closure

Post closure the mine should ensure that the communities impacted and dependent on the mine are suitably catered for. Social risks must be identified, and goals need to be defined and set for, inter alia, the following: Poverty alleviation, education, health care, employment and employability, reducing child mortality, improving social infrastructure.

Engagement with affected communities throughout the life of the project is essential and to this end, the company will be guided by the approach recommended by the ICMM. It is recognized that to achieve effective closure that is beneficial to the operating company and the community that hosts it, the views, concerns, aspirations, efforts and knowledge of various internal and external stakeholders must be brought together. For the Balama mine this will involve:

- Incorporating closure planning into the early stages of project development and operations;
- Collating the goals and views of various stakeholders (project owner, local community, government, and non-governmental organizations (NGOs)) at the early feasibility (ESIA) stage of project development to inform closure and post closure goals;
- Acting to meet the goals by working with the relevant stakeholders within and outside Syrah Resources;
- Using the concepts of risk and opportunity to both minimize liability and maximize benefits to all relevant parties; and
- Using multidisciplinary expertise and multi-stakeholder processes to ensure that mitigation of risk in one area does not increase risks in another.
- Ensuring that the social closure phase ties in with the infrastructural and environmental closure phases.

Thus, engagement with internal and external stakeholders will be undertaken throughout the life cycle of the project, and to achieve lasting benefits at a local and regional level, Syrah Resources appreciates that the views of external stakeholders must be understood. To ensure that these benefits are delivered, Syrah Resources will identify key external stakeholders and engage with them to foster a two-way understanding of mutually beneficial outcomes. These outcomes will be explained and presented in the Comprehensive Closure Plan and disclosed to stakeholders in a manner consistent with the requirements of the applicable standards referred to above.

11.2 Decommissioning, rehabilitation and closure of specific components

A number of closure requirements have been identified for this specific mine, relating to an opencast operation, with associated waste rock dump, overburden, topsoil, wash plant, discard and tailings facilities. In terms of rehabilitation it is important to note the following:

- The "roll over" method of progressive rehabilitation will not be suitable given the structure of the resource mined;
- The cost associated with the treatment of decant water for a period of 20 year post closure have yet to be determined and have been excluded from the cost estimate in this chapter;
- Monitoring and reporting for a period of 10 years post-closure is required;

• Post closure land use will be grazing and subsistence agriculture, with the general area being returned to a savannah woodland area, dominated by various slow growing Brachystegia (Miombo) and other local species.

11.2.1 Overview of closure activities

The activities that will be carried out for rehabilitation and closure of the proposed project operation include the following aspects:

- Comprehensive characterisation and classification of soils, overburden and mineral processing wastes to determine their capacity to support plant growth and their potential to have adverse impacts on water quality
- Implementing rehabilitation measures during the construction and operational phases of the mine (wherever possible). As areas become available in their final closure form, they will be rehabilitated during the operational phase, rather than the decommissioning phase;
- Ensuring that rehabilitated areas are left free draining and well vegetated (whether through re-vegetating or natural plant colonization) and the plant cover is self-sustaining;
- Ensuring that the Pits, TSF and WRD slopes are designed with topographies to minimise future potential for erosion;
- To ensure that the Pits, TSF and WRD are rehabilitated in such a way as to prevent erosion and to minimise any potential contamination emanating from them post-closure;
- Maintenance of all disturbed areas and re-vegetated areas until such areas have developed a sustainable and erosion-free cover; and
- Monitoring of key environmental variables such as soils, erosion, vegetation, groundwater, surface water and air quality; in order to demonstrate stability and sustainability of rehabilitated areas.

Further details on each of the above are contained in the full preliminary original closure report (DWE, 2014).

The mine closure and rehabilitation plan will be reviewed and updated annually in response to material changes in operating parameters. Wherever possible and practical, closure planning and closure risk assessments will continue to involve relevant internal and external stakeholders.

11.2.2 Mine void / Pits

Approximately 30ha of land will be disturbed during the first 5 years of the mining operations for the proposed Balama East and Balama West pits. It has been assumed that these pits will not be backfilled with overburden but instead left to fill with water in order to become inpit lakes. The objective of opencast rehabilitation is to ensure that the site is left in a state that poses minimal risk to the health and safety of humans and animals and the health of the environment.

Final pit slopes will be designed for long-term stability. This is normally achieved by sloping the perimeter walls of the open pit at slopes no steeper than 34° to the pit floor or to the stable groundwater level that could establish within a reasonable period. This pit wall sloping renders the pit safe for humans and domestic animals. Where concerns exist regarding the risk that the pit water poses to humans and animals, it will be necessary to implement measures to reduce access to the pit. As fences would be stolen, this may be achieved by

the construction of a sizable berm around the entire perimeter of the open pit to keep domestic animals out and restrict human access. A further option is to plant an impenetrable vegetation barrier around the pit, using a spiny, fast growing but non-invasive species such as sisal. Prior to making a choice about a suitable species, a risk assessment to determine the potential for the species to become invasive will be undertaken.

Signs will be erected around the open pit and on all approach roads warning the public of the potential dangers of falling or drowning. These signs will be in English, local languages and symbols for illiterate people. Access ramps to the open pit will be closed off to prevent vehicle access. In addition, as part of the closure process, local communities will be informed directly of the potential hazards and precautionary measures to be observed around the pit.

The mine closure plan and, in particular, the costing, will need to be updated to include these measures if they are considered necessary.

11.2.3 Waste Rock Dump

The Waste Rock Dump (WRD) will be established between Balama East and Balama West. The WRD will consist of all overburden and waste material generated during mining. To significantly reduce the costs of rehabilitation, the slope angle of the WRD will not exceed 1:5 and topsoil and vegetation will also be added to these areas. This angle will also be maintained for WRD areas that have reached final profiling. Upon closure the WRD sides and tops will be covered with soil, and vegetated with indigenous species during the wet season.

In addition to the above mentioned objectives, the shaping of the WRD slopes will be undertaken during the operational phase of the mine and that if acid generating waste rock has been identified, that this be separated from non-acid generating waste rock. Acid generating waste rock can be encapsulated within non-acid generating waste rock in order to prevent/minimise the risk of acid mine drainage formation.

11.2.4 Tailings storage facility (TSF)

The TSF will be located north of the proposed plant location. The TSF is expected to cover a total footprint area of approximately 94 ha over the 25 year Life of Mine (LoM).

Post closure, the TSF may be a potential source of sulphide minerals (pyrite and chalcopyrite, sphalerite and pyrrhotite). Should acid rock drainage from tailings impoundments occur, it is likely to reduce groundwater quality. However, the TSF will be clay lined and the potential for ARD generation is therefore unlikely. Furthermore the effects of the sulphides can be effectively mitigated through lime injection and or floatation of the sulphides from the tailings before depositing in the tailings dam. The other minerals present will most probably be inert and although they are not expected to contribute significantly to groundwater pollution, they may contribute to elevated metal and trace element concentrations in the groundwater.

To minimise the potential negative environmental impacts (both chemical and physical) of the TSF at closure and post-closure, the following is proposed for the TSF:

• During the construction phase the upper dandy silt layer classified as topsoil must be stripped (depth ranges from 100mm to 600mm – Knight Piesold Consulting, Internal

Memo, October 2014.) before the TSF is constructed. These materials will be used to cover the WRD and TSF post closure;

- Construct a permanent spillway to ensure physical stability of the facility during storm events. This will be done during the construction phase of the dam;
- Fill the tailings pond area to eliminate water ponding on the surface of the TSF post closure. This will be done during the final stages of the mine's operation;
- Cover the TSF with the sandy silt topsoil layer (contoured to ensure free drainage of surface runoff post-closure), and then establish vegetation; and
- Monitoring of groundwater and surface water qualities around and downstream of the TSF area.

The rehabilitation of the TSF mentioned above is the procedure that will be done to rehabilitate the tailings during the LoM (include the first 5 years). It is estimated that only 30ha will be covered with tailings during the first 5 years.

11.2.5 Roads

The proposed access roads around the site will be ripped, except those needed to access the facilities for inspection after closure. Roads that can and will be used by other users post closure will, however, be left, provided this is agreed upon by all parties concerned.

11.2.6 Ore processing plant and other infrastructure

It is assumed that some of these buildings and infrastructure will remain to support post closure use. Once closure is complete, a decision to either demolish remaining facilities or hand them over to Government for conversion into social infrastructure (e.g. schools, clinic) will need to be made using a consultative process.

All other infrastructure will be decommissioned as follows:

- Any surface buildings and infrastructure which are no longer required will be demolished, unless specific directives to the contrary are received from the authorities. Such directives may result from communities' requests. This will need to be confirmed through a stakeholder engagement process undertaken as part of the closure plan goal refinement exercise.
- Foundations will either be removed or will be covered with a layer of soil, or soil forming material, the depth to be determined following trials to be undertaken.
- Non-re-useable materials including rubble and waste will be disposed of at suitable sites in accordance with the waste management and disposal plan that will be developed. It may be acceptable to dispose of certain bulky inert items in the mine void but this will need to be confirmed as the closure plan is refined.
- Following the removal of the infrastructure a soil contamination assessment will be undertaken by an independent specialist and remediation and re-vegetation activities implemented where necessary.
- Support infrastructure buried underground such as tanks and their pipes, other pipes and service tunnels will, depending on the proposed future use of the site, either be kept as is or be unearthed and removed from the site. If they are to be left in-situ, the integrity of all underground pipes and tanks will be assessed by an independent expert. If the integrity of sub-surface infrastructure is compromised, it will be removed.
- Remaining openings and access ways of support infrastructure will be blanked.

- A detailed plan indicating the location of any remaining infrastructure will form part of the closure plan.
- Any roads which will no longer be required will be rehabilitated. The details of such rehabilitation will be outlined in the Ecological and Rehabilitation EMPs, but in general the following will be undertaken:
 - Bridges, culverts and ducts will be removed where they are no longer required.
 - The natural water flow will be restored and any disturbed section of the watercourse will be stabilised and revegetated.
 - The road surface, shoulders and embankments will be graded to a slope suitable to prevent erosion. Cuttings will be assessed and where necessary measures to improve safety and erosion stability will be implemented.
- Electrical equipment and infrastructure such as transmission towers, electric cables and transformers which are no longer required will be demolished and removed from the site. The soils in the vicinity of transformers will be assessed for contamination and appropriate decontamination measures will be implemented, in accordance with Zambian regulatory requirements.
- All disused mining plant and equipment such as winches, pumps and conveyors, concentrator equipment such as thickeners, and heavy machinery will be removed from the site. It is not anticipated that any of this machinery or equipment will be contaminated. However, the mine will confirm this before any machinery or equipment is removed from the site. If any of the machinery or equipment is found to be contaminated it will be appropriately decontaminated before being removed.
- During the mitigation and rehabilitation works, particular attention will be paid to the places where equipment will be parked. The mine will assess these sites and if the soils are contaminated appropriate remedial measures will be taken in compliance with Mozambican regulatory requirements.
- The closure plan for the mine will include details for the closure of the landfill and will ensure that the closure of these specific facilities meets the requirements of Mozambican legislation and international best practice. Post-closure monitoring of these facilities may be required.

11.2.7 General Surface Rehabilitation

General surface rehabilitation will ensure the surface topography emulates the surrounding area, is free draining, has a "neat" appearance and is re-vegetated. Special attention will be given to shaping and removal of heaps of excess material, scrap and waste. The entire area is to be ripped, covered with topsoil and vegetated. The details of the revegetation will be documented in a comprehensive rehabilitation plan.

11.3 Post closure mine site inspection, environmental monitoring and reporting

The purpose of monitoring is to ensure that the objectives of the rehabilitation programme are met and that the progressive rehabilitation process is followed as planned during the life of the mine. More specifically, the post closure environmental inspection and monitoring will enable Syrah Resources to assess the success of mine reclamation and verify that the various components of the closed mine are not adversely impacting water resources and do not pose a potential health risk and/or danger to the public.

Detailed tracking of the progress of progressive rehabilitation will also permit the annual review of the closure plan to reflect this progress, thus reducing or increasing the quantum required for final closure costs. The physical aspects of rehabilitation should be carefully

monitored during the operational phase as well as during the progress of establishment of desired final ecosystems, so that deviations from expectation can be catered for in subsequent versions of the mine closure plan and costing.

The following items should be monitored continuously:

- Alignment of actual final topography to agreed planned landform;
- Depth of topsoil stripped and placed;
- Chemical, physical and biological status of replaced soil;
- Erosion status, including the waste rock dump upper surface and sidewalls;
- Surface drainage systems and surface water quality;
- Groundwater quality and quantity at agreed locations;
- Vegetation basal cover;
- Vegetation species diversity;
- Faunal re-colonisation;
- Proportion of mined land that has been fully rehabilitated;
- Pit wall stability;
- Condition of site access roads, culverts and bridges;
- Community health and safety;
- Radiation levels; and
- Socio-economic status of affected communities.

Consultations will be held with local community leaders to listen to and record any issues of concern pertaining to the closed mine site.

An external consultant will produce an annual post-closure environmental monitoring report. These post closure environmental reports will be submitted to the MICOA and made available to all stakeholders. The reports will present the findings of the mine site inspections/walkovers and the results of the environmental monitoring programmes. Where reclamation activities have not obtained the desired result, the consultant will make recommendations on what additional reclamation work is required to achieve full reclamation. Any areas of concern will be highlighted. The reports will include a post closure photographic record of mine reclamation.

Further details of the post-closure monitoring are presented in the ESMP and monitoring programme.

11.4 Closure cost estimates

The costs reported in this section are an estimate based with an assumption that progressive rehabilitation will occur during the mine operation. The cost estimate is also only valid for the first five years of operation, assuming that the mine would be closed after then. The costs will therefore be reviewed at least every five years.

Assumptions

The following assumptions were used for the closure cost calculations:

- 1 Costs have been calculated for the first 5 years (Table 11.1) of mining and 25 years of mining (Table 11.2);
- 2 It is assumed that the total disturbed (during the first 5 years of mining) area for both Balama East and Balama West pit is 30 ha and this will need to be rehabilitated. The

cost does not include shaping that may be required and it is assumed that this will be done as an operational cost during the life of mine;

- 3 The WRD (slope) will be maintained at 1:5 slope during the LoM hence, there will be no need to cost for shaping the side of the WRD at closure. The covering of the WRD with topsoil, vegetation and monitoring of groundwater and surface water has been costed;
- 4 The rehabilitation procedure for the TSF will be done on the areas deposited with tailings (30ha) within the first 5 years;
- 5 Costs associated with bringing in topsoil (transportation) have been excluded thus far, until the distance for the transportation of topsoil from outside of the mining area is determined. The costs provided are based on placement of topsoil. The cost assumes that enough topsoil is available within the current mining footprint, thus placement of topsoil on rehabilitated areas is costed for. Should additional topsoil be required, this will result in additional costs which will need to be included during the operational phase to ensure that the financial provision is adequate for the decommissioning phase;
- 6 All roads associated with the mine are assumed to be gravel roads and 8 m wide;
- 7 Eight groundwater monitoring points were assumed adequate to monitor groundwater quarterly (i.e. 4 times a year) for 10 years after the mine has closed. The groundwater monitoring boreholes will be drilled during the operation of the mine, hence drilling costs have not been included in the groundwater monitoring costs;
- 8 Calculations do not account for any value recovered from the sale of plant or other material;
- 9 The actual placing of saprolite and topsoil cover might start a few years after deposition on tailings has ceased and the feasibility of placing the cover on the TSF should take advantage of the dry season in the project area; and
- 10 A contingency of 15% has been included to cover areas that may have been overlooked, or costs that have been underestimated. A 12% allowance has been included for project management fees. These fees account for the costs required to manage the closure and rehabilitation phase.

The estimated total cost for the closure of the Balama Graphite Mine operation is \$6 237 915.61 for the first five years of mining and \$10 309 154.40 after 25 years of mining. Table 11.1 and 11.2 provide a summary of the costs; refer to the full preliminary closure plan for a detailed cost breakdown.

Table 11.1: Summary of Closure costs for the first five years of mining

Summary - Balama Graphite Project		
Balama East and Balama West Pit	Total	
Topsoil spread	\$ 319 396.17	
Vegetation Establishment	\$ 104 475.38	
	\$ 423 871.56	
Waste Rock Dump (WRD)	Total	
Topsoil spread	\$ 803 813.70	
Vegetation Establishment	\$ 262 929.72	
	\$ 1 066 743.42	
Tailings Dam	Total	
Tailings deposited area- Saprolite spread	\$ 319 396.17	
Tailings deposited area- Topsoil spread	\$ 319 396.17	
Vegetate	\$ 104 475.38	
	\$ 743 267.73	
Linear Infrastructure	Total	
Rip Road	\$ 315 217.16	
Vegetation Establishment	\$ 110 326.01	
	\$ 425 543.16	
Plant Area	Total	
Rip Plant area	\$ 439 194.61	
Vegetation Establishment	\$ 153 718.11	
	\$ 592 912.73	
Total	\$ 3 252 338.60	
Monitoring Ground & Surface water	\$ 1 422 080.00	
Monitoring Aquatics	\$ 24 296.00	
Monitoring Rehabilitated Areas	\$ 40 318.40	
	A 000 754 40	
Maintenance of Rehabilitated Areas	\$ 620 751.18	
	A	
Project Management (12%)	\$ 390 280.63	
	¢ 407.050.70	
Contingency (15%)	φ 487 850.79	
	* 0.007.045.04	
GRANDIOTAL	\$ 6 237 915.61	

Table 11.2: Summary of Closure costs after twenty five years of mining

Summary - Balama Graphite Project		
Pits	Total	
Balama West		
Topsoil spread	\$ 654 549.23	
Vegetation Establishment	\$ 214 104.89	
Balama East		
Topsoil spread	\$ 612 176.00	
Vegetation Establishment	\$ 200 244.49	
	\$ 1 681 074.60	
Waste Rock Dump (WRD)	Total	
Topsoil spread	\$ 803 813.70	
Vegetation Establishment	\$ 262 929.72	
	\$ 1 066 743.42	
Tailings Dam	Total	
Tailings deposited area- Saprolite spread	\$ 998 645.37	
Tailings deposited area- Topsoil spread	\$ 998 645.37	
Vegetate	\$ 326 659.70	
	\$ 2 323 950.44	
Linear Infrastructure	Total	
Rip Road	\$ 315 217.16	
Vegetation Establishment	\$ 110 326.01	
	\$ 425 543.16	
Plant Area	Total	
Rip Plant area	\$ 439 194.61	
Vegetation Establishment	\$ 153 718.11 • • • • • • • • • • • • • • • • • • •	
	\$ 592 912.73	
Total	\$ 6 090 224.35	
Monitoring Ground & Surface water	\$ 1 422 080.00	
Monitoring Aquatics	\$ 24 296.00	
Monitoring Rehabilitated Areas	\$ 58 652.00	
Maintenance Rehabilitated Areas	\$ 1 069 541.47	
Project Management (12%)	\$ 730 826.92	
Contingency (15%)	\$ 913 533.65	
GRAND TOTAL	\$ 10 309 154.40	

11.5 Conclusions

The following actions will be taken prior to the update of the annual Closure and Rehabilitation Plan:

- As the knowledge base develops, a more detailed closure risk assessment will be built up (in the annual reviews) with input from representatives of the design team, operational personnel and environmental specialists. This will enable the development of solutions to key issues that are both acceptable to the technical specialists concerned while at the same time being practically implementable;
- Continue with detailed modelling of the impact from various TSF cover configurations on the rate of generation of pollution plumes, together with modelling of the long-term impact of those plumes on downstream water users and modelling a feasible way to place the saprolite and topsoil covers on the TSF, post-closure;
- Implement the measures as outlined in the specialist studies to minimise the risk to surface water contamination from the operations during rehabilitation and closure;
- Research trial work during the operational phase to determine other rehabilitation options that could be considered for the closure and rehabilitation of the TSF;
- Additional research (by field testing) to identify the average depth of topsoil available, and the potential for use of topsoil covers of less than 300mm for sustainable rehabilitation. Although conventional wisdom is that 300mm is the minimum, it is possible that insufficient topsoil will be available on site. Investigations to determine if a lesser quantum may be satisfactory for the plant species naturally occurring under the Mozambican environment is therefore required. Options of mulching and composting could also be explored;
- Refine the cost model by verifying the various cost rates for the Mozambican environment;
- Actively consult with key stakeholders, including affected communities, throughout the life of the mine;
- When the closure and rehabilitation plan is updated ensure that community related issues are fully covered in the plan; and
- Ensure that the Environmental Management Plan is aligned to the Closure and rehabilitation plan

12. FINAL CONCLUSIONS AND RECOMMENDATIONS

This chapter discusses the key issues which have been identified by the various specialist assessments and the proposed key mitigation and management actions which will be required in order to reduce all risks associated with the project to an acceptable level. In addition to this, this chapter also summarizes the residual impacts that may occur as a result of the construction, operation and decommissioning phases of the proposed development.

12.1 Key findings of specialist assessments:

12.1.1 Vegetation Assessment

Impacts were identified and assessed for each phase of the mine. The largest number of HIGH impacts were noted to occur during the construction phase. This phase will have the highest impact on the vegetation communities and floral biodiversity followed by the operational phase. It is imperative that mitigation measures suggested for each identified impact are implemented to reduce the effects of the mine. These include (but are not limited to) the following:

- i. Reduce the number of crossings through the riparian woodland;
- ii. Use bridge designs that afford the lowest impact on riparian vegetation;
- iii. Locate bridges and river crossings at existing crossings and in areas that are already impacted;
- iv. Rehabilitate all vegetation types that are impacted on during the construction phase but that are no longer required during the operation phase;
- v. In areas of high sensitivity, demarcate restricted go areas and ecological corridors to facilitate their continued functioning;
- vi. Avoid locating unnecessary infrastructure in areas of high sensitivity or areas demarcated as no-go areas;
- vii. Set aside key representative portions of each vegetation type as conservation areas within the mining concession area;
- viii. Prevent employees from harvesting plants for personal use, firewood or charcoal;
- ix. Avoid locating infrastructure such as the TSF and mine camp in areas with high concentrations of species of special concern;
- x. Where feasible relocate samplings of species of special concern;
- xi. Use existing roads where feasible;
- xii. Align roads and pipelines along a single corridor and keep this as narrow as possible;
- xiii. Avoid locating linear infrastructure (such as roads and pipelines) through areas of high and moderate sensitivity;
- xiv. Move infrastructure out of areas of high sensitivity;
- xv. Wetlands and rivers are important ecological process areas, with a high sensitivity, that form corridors for plant and animal dispersal. Therefore, a 50 meter "Restricted-Go" buffer on either side of all water bodies (rivers, streams, wetlands and tributaries) should be implemented. In addition, drainage lines should be rehabilitated and revegetated. Where feasible, infrastructure occurring in these areas should be moved to less sensitive zones.
- xvi. Habitat fragmentation creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity for both flora and fauna. Ecological corridors, designated as "RestrictedGo", areas should therefore be set aside within the project site to facilitate the movement of faunal species, seed dispersal and the expansion of existing vegetation types.

- xvii. It is recommended that areas of Mount Nassilala unaffected by mining are left intact so that it may continue to function as a "stepping stone" for the dispersal of animal and plant species. Management intervention by the mine will be required to avoid community exploitation of the resources by local communities, and a community based natural resource management strategy should be developed.
- xviii. It is recommended that an **Ecological Management and Monitoring** Plan is designed and implemented.
- xix. Proposed corridors have been recommended in the vegetation assessment.
- xx. Rehabilitation of the project site should include restoration of the inselberg where feasible. The conservation of these areas will be dependent on the co-operation "buy-in" of the local communities. Educating communities on the sustainable use of natural resources in these areas is imperative as well as why poaching shouldn't occur in these areas. Additionally, improved agricultural practices that are more intensive as well as alternative sources of construction materials through the creation of woodlots will aid in conserving these areas.
- xxi. Unlike the graphite resources, which are located in an ecologically sensitive area and cannot be relocated, the mine camp need not be located in an ecologically sensitive area. It is therefore recommended that it be moved 400 metres north into less sensitive disturbed Miombo woodland (this has been done and the mine camp has been relocated, please refer to Chapter 10).
- xxii. It is recommended that a botanist/ecologist be on site to determine if any of the species of special concern or protected species occur where the mine and associated infrastructure are positioned. Plants can be removed and placed in a nursery for use for rehabilitation purposes where appropriate. If a species is identified for relocation, individuals will need to carefully uprooted and removed by a skilled horticulturist. Prior to removal, however, suitable relocation host areas need to be identified, either within the site or in other disturbed areas on the property, preferably in the ecological corridor and conservation areas. Individual plants that cannot be relocated at the time of removal should be moved to the nursery, although this is less preferable due to associated costs and low survival rates. It is recommended that the Ecological and Management and Monitoring Plan include details on *Plant Search and Rescue*.
- xxiii. It should be noted that many critical species of special concern are plants that will not be able to be successfully uprooted and replanted at all, or at best may have a low survival rate. In all cases the species will require very careful treatment to give them the best chances of survival, and specialist horticultural knowledge will be needed.
- xxiv. It is recommended that an Environmental Control Officer (ECO) is employed to ensure that construction and operation activities are undertaken in accordance with the recommendations contained in the vegetation assessment and the Environmental and Social Management Plan, and to monitor that no unauthorised activities are occurring.
- xxv. Not only is rehabilitation considered "good practice" but it is important in the prevention of soil erosion and alien species invasion; and it returns the land to a functional state that can be used by future land owners. A **Rehabilitation Management Plan** for the mining site must therefore be created and implemented. This should include a rehabilitation plan for any extra land that was needed for the construction phase of the development but will not be used during the operation phase of the development, as well as suggestions on how best to rehabilitate the waste rock dump, and other strategies to make the pits safe.
- xxvi. Any form of disturbance to the natural vegetation provides a gateway for alien species to invade the site of disturbance. In this regard, it is recommended that a strict *Alien Management and Monitoring Plan* is implemented to prevent the spread of any alien species and to remove alien species already present at the site.
- xxvii. The spread of the existing bamboo should be monitored and mitigation measures implemented where necessary.

12.1.2 Faunal Assessment

The following conclusions were reached with regards to fauna in and round the project area:

- i. The Faunal Assessment identified and listed all species of terrestrial vertebrates occurring in the mining area; identified SSC using reference to the IUCN Red Data List and CITES; defined and mapped faunal habitats that are sensitive and require conservation; described current impacts on faunal groups and identified any impacts that mining will have on the different faunal groups and specific species that would be significantly affected by the mining proposal.
- ii. The area is predominantly covered by various forms of Miombo woodland, much of which has either been removed or degraded due to human land use impacts. The proposed mine site lies in the Chipembe River catchment, but without extensive riparian vegetation or wetlands.
- iii. Faunal diversity was historically high, but certain groups (large mammals and birds), have been depleted or locally extirpated. Thirty nine amphibian species may occur in Cabo Delgado Province, of which 20 were observed during the faunal surveys. No amphibian SSC or endemic species, or specimens of problematic taxonomic status, were recorded, and the amphibian fauna is not obviously impoverished from that expected to have historically occurred in the region.
- iv. During the faunal surveys only 22 reptiles were observed, and another seven were reported to occur in the region. This number is relatively low compared with the +60 species that can be expected for the region. No reptile SSC or endemic species or specimens of problematic taxonomic status were recorded in the region, although a number of species do occur on CITES appendices, and their international trade is either banned or subject to strict control. It is probable that the low number of reptiles recorded during the survey reflects the shortness of the survey period and reduced reptile activity at the time. Due to persecution, the density of the larger, more conspicuous reptiles (e.g. pythons, cobras, mambas) may be impoverished from numbers expected to have historically occurred in the region. It is likely that the overall reptile diversity remains relatively intact.
- v. Although the incidence of snakebites in the region is reported to be low, at least 12 venomous snakes occur in the region, bites from the majority of which have caused fatalities. In addition, three fatal attacks from crocodiles in Chipembe Dam were reported in 2012.
- vi. One hundred and thirty six (136) bird species were observed during the faunal surveys. Although the number of birds recorded is low relative to the possible 430+ bird species that may occur in the study area, it is a good reflection of the common bird fauna of Miombo woodlands. This number can be expected to increase with long-term observations, especially as many intra-African and Palaearctic migrant birds had already migrated northwards during the time of the field surveys.
- vii. No bird IUCN threatened bird species were recorded on site. However, several (11) CITES listed species were recorded. The recorded SSC include mainly the Falconiformes species (e.g. eagles, buzzards, goshawks, sparrowhawks etc.), and Strigiformes species (owls). Of the Tauraco species that also fall under CITES, the purple-crested turaco was the only species observed on site.
- viii. Of the possible 145 mammal species which may occur in Cabo Delgado Province; only 14 were recorded during the wet season survey. A further 20 mammal species are reported to occur in the area, while a further 96 could possibly also occur in the area. Most of these are small mammals, such as rodents, bats and shrews. Eighteen large to medium-sized herbivores and carnivores that historically occurred in the area are now either locally extinct or very rare vagrants.
- ix. Eight mammal SSC were identified for the study area: three of these occurred in the area during historical times but are highly unlikely to still occur; two mammal SSC (elephant and hippo) are still reported by local villagers to occur, at least seasonally,

in the area.

x. The most sensitive habitats utilized by the surviving fauna include: 1) the Riparian zone and wetlands; 2) Steep slopes and rocky ridges. None of these habitats are specific to the project area and are well represented in the Balama Province. The Chipembe River and its associated drainage lines represent particularly sensitive habitats, especially from an amphibian and bird perspective. Similarly, the rocky ridges of Mts Nassilala and Coronge represent a sensitive habitat for the maintenance of reptile, bird and mammal diversity.

The following recommendations were made by the specialist, incorporated in the ESMP and are endorsed by Syrah Resources:

- i. River drainage and small associated wetland areas should be avoided if possible as these are sensitive areas for amphibians and associated reptiles and birds.
- ii. Ecological corridors need to be maintained between all identified areas of high sensitivity. For birds and some reptiles and small mammals the primary target habitat is Mature (Intact) Miombo woodland. Complete severance of this currently largely intact habitat by means of transport links, tailings and waste sites, and the mine pits, will further exacerbate existing impacts. Thus an ecological corridor between the major fragments on the mine site needs to be developed and protected. The riparian zone draining south from the East Pit, and between the two major rock areas of the mine site, also forms an important corridor for natural faunal movement. Due to its proximity to the mining activities it has increased susceptibility to hydrological impacts, and its condition needs careful monitoring to maintain its functionality.
- iii. The recommended conservation areas serve as small local refugia from existing land use impacts, and also those that will occur from the construction and operation of the proposed mine. In a regional context they are small, and their greater efficacy depends upon their incorporation into regional planning for conservation and ecosystem services. These currently have low priority as the country and province recover from past conflict. However, with burgeoning provincial growth local developments such as the proposed mine must be integrated into regional environmental planning.
- iv. An Environmental Management Plan (EMP) is essential. A qualified ecologist, familiar in both vegetation and fauna, should be on site during the construction phase, and to monitor environmental impacts during the operational phase. For faunal SSC (threatened, endemic or cultural important species), the EMP should include guidelines for the safe capture and relocation of SSC to suitable, safe habits. During all phases of significant habitat loss trained observers should be present to identify, capture and relocate SSC.
- v. Any form of disturbance to the natural habitats provides an opportunity for the invasion and colonization of alien species. The EMP should contain a strict monitoring plan that can be implemented to prevent the spread of alien species, and to identify and remove alien species when encountered.

12.1.3 Aquatic Assessment

Based on the survey of aquatic ecosystems the following conclusions were reached with regard to the present state of rivers and ecosystems within and around the project area::

- i. *In situ and ex situ* water quality indicated that in general the water quality was good when compared to the various relevant water quality guidelines.
- ii. The moderate / high percentage contribution (25 30%) of Ephemeroptera, Trichoptera and Plecoptera (EPT taxa) to the overall invertebrate assemblage in the general area indicates that biotic integrity remains high despite the impacts of riparian zone clearance and sediment load increases due to local farming practices.

- iii. The main existing negative impacts on the aquatic habitats are associated with clearing of riparian vegetation to cultivate crops and the construction of roads and river crossings. These activities have resulted in localised river bank instability, soil erosion and elevated sediment input, the filling in of deeper refuge pools and also higher than normal turbidity in the rivers after rainfall events.
- iv. Field observations indicated that the aquatic habitat integrity in the project area has been moderately modified. Here a loss and modification of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. These river reaches, which would fall into a Habitat Integrity of Category C after Kleynhans (1996) and Kemper (1999), are representative of most of the mine project area.
- v. However, in the upper tributaries of the Mehucua River, where human population densities are low, environmental impacts on aquatic habitat quality, diversity, size and variability are present at a relatively low number of sites and are also limited in severity. In terms of significance, the modifications to habitat integrity in these upper catchment streams are considered small to moderate and would fall into a Category B after Kleynhans (1996) and Kemper (1999). In this category the habitat integrity is described as largely natural with few modifications and a small change in natural habitat and biota may have taken place, but the ecosystem functions are essentially unchanged.
- vi. In addition to the direct environmental impacts due to the construction and operation of the proposed mine, the indirect impacts associated with the inevitable increase in the local population due to the influx of job-seekers and families to the study area should also be considered. The increased population will place more pressure on natural resources, resulting in increased environmental degradation of the catchment and the associated aquatic habitats. These negative impacts on biodiversity in the vicinity of the mine project area, including aquatic biodiversity in local rivers, will be difficult to adequately mitigate.

Recommendations

It is essential to prevent sediment-laden run-off from all cleared areas, or areas associated with the mining activities (open pits, WRD and TSF sites, etc.) from entering drainage lines and adjacent rivers. The following actions are recommended:

- The TSF and WRD sites should be located in suitable areas away from drainage lines or rivers and best industrial practices put in place in terms of design and operation.
- Mine-water and surface run-off from the mining areas should be detained in sedimentation ponds before the clear surface water (if uncontaminated) is allowed to flow into the adjacent drainage lines or streams.
- Contaminated water from the process plant should be stored in the tailings storage facility (TSF) and the supernatant or decant water from the TSF will be fed back to the process water reticulation.
- Details of mitigation measures for full containment and treatment (if feasible) of contaminated waters should be clearly stipulated in the EMP document.
- Strict management of hazardous chemicals.
- Prevention of hydrocarbon spills from machinery and vehicles.
- Domestic effluent from the mine camps should be treated in an on-site waste water treatment works and final effluent should be of high quality and used for irrigation or mining purposes.
- Containment and treatment of all contaminated water from mine and associated infrastructure.
- Strict control of workers movements and behaviour

- All water contaminated by sulphide bearing ores from the mining operations and WRD sites should be retained and pumped to the TSF.
- All low pH water should be treated appropriately.
- All effluent from the mine should be subjected to regular chemical analyses, including for vanadium and uranium concentrations.
- Industry best practice to prevent pollution from the TSFs and WRDs should be strictly implemented to ensure full containment and treatment of contaminated run-off, as well as anti-pollution management practices during mining operations, as well as during decommissioning/closure – as set out in EMP.
- surface run-off within the project areas is kept as natural as possible and natural drainage lines remain functional.
- Road and causeway construction should incorporate specific impact assessment studies to ensure eco-friendly designs incorporating bank stabilization structures, as well as the development and implementation of very strict construction environmental management plans (CEMPs).
- Riparian buffer zones (no-development areas) of 30 to 50m on both banks should be demarcated on all watercourses within the project area where possible (and adjacent areas if feasible).
- Ensure the provision of suitably designed bridges across rivers in the Study Area that allow free movement of fish and other aquatic biota.
- Incorporate suitably designed fishways on any in-stream dams or weirs, as required.
- A series of practical, common sense rules and restrictions to regulate fishing activities could be developed in consultation with the local Chief, village elders and local fishermen. If these rules are in place before the population increases, it will go a long way to help manage the fisheries resources in a sustainable way.
- The fisheries potential of Chipembe Dam should be investigated and possibly enhanced and developed. This could create work opportunities and catches from Chipembe Dam could provide a more sustainable all-year round source of fish for the local villages.

12.1.4 Hydrogeology Assessment

The following conclusions were reached:

- i. A total of ten boreholes were surveyed during the hydrocensus:
 - There are two water supply boreholes at the Balama camp; Camp BH1 and Camp BH2;
 - Boreholes BM-DD-001, BM-DD-005, BMRC 003 and BMRC 005 are old exploration boreholes
 - Boreholes Pirira BH1, Pirira BH3, and Maulia BH1, are equipped with hand pumps. The Maulia BH1 hand pump is no longer in use. Pirira BH1 and Pirira BH3 are used by the locals for domestic water supply; and
 - Pirira BH2 is a recently drilled borehole. It will be used to augment water supply.
- ii. The Balama hills form part of the Mt Nassilala range of hills which are headwaters of local river systems in the project area. Groundwater discharge from the hillside supports perennial base flows in streams originating from the range. The Mualipue River drains the study area to the west and joins the northwest flowing Naconha River in the south.
- iii. Groundwater occurrence in the project area is associated with weathered and fractured graphitic schist, granites and pegmatites. The aquifer associated with the weathered bedrock varies in thickness throughout the area, but it can extend to depths of about 40 mbgl. Fifty one per cent of the fractures in the study area occur in the upper 60 m of the geological succession. Up to 27 % of the fractures occur

between 140 and 180 mbgl. However a majority of the deeper fractures are unweathered. The fractures in the upper 60 m are mostly moderate to highly weathered. Therefore fracturing is relatively common in the upper 20 m of the fractured aquifer and groundwater flow is well interconnected. At greater depth groundwater flows may be associated with individual disconnected water bearing fractures.

- iv. All major water strikes intercepted during drilling were between 40 and 60 mbgl. The major water strikes had yields between 0.78 and 9 L/s. Besides the fault gouge at Balama East, all major water strikes were associated with fractured intrusive areas at contact zones. Groundwater levels in the project area range between 2 mbgl at Pirrira BH3 (Balama west) to 33 mbgl in BH8 (Balama east).
- v. Analysis of hydraulic head and aquifer tests show the Mualipue River recharges the fractured aquifer system. The weathered aquifer system is recharged directly from rainfall. A transmissivity value (T-value) of 7.7 m³/d is estimated for the fractured aquifer system in borehole BBH3. The relatively high yielding fractured granites at Maulia have a T-value between 5 and 6 m³/d as analysed from BBH6.
- vi. Groundwater from water supply boreholes Pirira BH2 and Pirira BH3 are not fresh due to elevated TDS values above 1000 mg/L.
- vii. Acid mine drainage (AMD) processes have taken place due to oxidation of exposed pyrrhotite in the dug trenches. As such BMRC 005, BBH2, BBH3 and BBH7 have AMD signatures due to their proximity to the trenches.
- viii. The only common heavy metals that have been significantly mobilised are iron, manganese, nickel and zinc.
- ix. Although all major and minor ions in BBH1 are within guideline values, its alkalinity has been depleted. The pH of BBH1 will further decrease due to seepage of AMD water from the nearby trenches.
- x. BBH6, BBH8, Camp BH1, Pirira BH1 and Pirira BH3 are relatively unpolluted water with calcium-magnesium-bicarbonate signatures.
- xi. The chloride enrichment in Pirira BH2 is associated with seepage from the sewage disposal at Pirira village.

The following recommendations were made by the specialist, have been incorporated in the ESMP and are endorsed by Syrah Resources.:

- i. It is recommended that the mine should supply an equal/better amount of water to affected communities that rely on groundwater in the receiving environment, if proven that there is impact on specific users. The baseline water quality of private boreholes in and around Balama has been analysed and is discussed in Section 3.6 of the Hydrogeology Assessment. These results could be used for future comparisons to evaluate if the proposed mine has impacted the groundwater.
- ii. Diesel and other chemicals must be handled properly and not spilled. If a considerable amount of fluid is accidentally spilled, the contaminated soil should be scraped off and disposed of at an acceptable dumping facility.
- iii. Storm water and runoff management through diversion channels and sedimentation ponds, required to be built around and downstream of the waste stock pile and TSF is recommended.
- iv. Seepage interception boreholes downstream of the TSF should be drilled to intercept and capture any seepage that may enter the groundwater system. Any captured contaminated water should be pumped back onto the TSF.
- v. Monitoring of groundwater quality and water levels is recommended up gradient and down gradient of the TSF, waste rock dump and particularly down gradient of the mine site with continuous refining and updating of the monitoring network based on the results obtained.
- vi. The conceptual and numerical models should be refined every six months in the first four years and thereafter every five years based on groundwater monitoring results.

- vii. Annual audits of monitoring and management systems should be conducted by independent environmental consultants
- viii. No decant mitigation is required, since no decanting is expected to occur. Should decanting occur, passive or active treatment plans should be considered for treatment before the decant joins the streams.
- ix. Since significant sulphide oxidation in the post closure environment at Balama is unavoidable, the most cost effective control of oxidation would be to reduce oxygen availability of the waste rock dump and the TSF. A low oxygen permeability (diffusion) clay cover would be ideal for the encapsulation of the waste rock dump and TSF to inhibit water and oxygen ingress thus reducing both oxidation rate and product transport.
- x. The establishment of a permanent wetland on the TSF may be used to cover the reactive materials in the post closure environment. Once the available oxygen in the water is consumed, the rate of reaction is reduced and the rate of oxygen replacement will be relatively slow. The resultant diminished availability of oxygen is the single most effective inhibitor to sulphide oxidation.
- xi. Backfilling the pits with reactive materials may be the best available option to manage sulphide oxidation in the post closure environment. The backfilled pits should be completely flooded with water to at least 15 m depth. The resulting pit lake will render the reactive materials chemically inert by diminishing the available oxygen

12.1.5 Geochemistry

The following conclusions were reached:

- i. The mineralogy of the Balama deposit is dominated by metamorphic minerals with high clay mineral, amphibole and garnet content within a silicate matrix;
- ii. The enriched formations are high in Au, Ag, As, Ba, Fe, Cu, Cr, Zn, U, Co, Cs, Mo, Ni, V, W, Y and Pb with these elements well above the crustal averages observed around the world. This is however no indication of whether they do pose an environmental risk with the bio-availability determined through the leachate tests;
- iii. ABA and NAG results show that the Balama waste rock and mineralised material is acid generating and a potential for AMD and high metal contaminant seepage exists; and
- Parameters with concentrations above the recommended domestic water limits are aluminium (AI), cadmium (Cd), iron (Fe), copper (Cu), nickel (Ni), vanadium (V) and uranium (U) and these concentrations will increase if AMD formation does occur. These concentrations will however be diluted to much lower concentrations once mixing and reacting with the receiving groundwater and surface water volumes.

The following recommendations were proposed:

- i. Due to the waste rock and ore material being heterogeneous in mineralogy with enriched formations along with a possibility of acid formation it is recommended that an intensive sampling campaign is done allowing the ABA evaluation of at least 50 samples to have a statistical distribution of the acid producing potential of the Balama geology;
- ii. It is also recommended that 3 hanging wall samples, 3 footwall samples and 3 mineralised zone samples are submitted for long term kinetic tests (22 week Column leach or humidity cell tests) to evaluate the long term behaviour of the system and to see whether some of the elements of concern will not precipitate out once equilibrium is reached;
- iii. Radio activity evaluations and tests should be done on the waste and ore material to evaluate the sources of possible contaminants (these tests are underway);

- iv. Lining of the TSF and WRD as currently planned with clay material; and
- v. A monitoring program should be designed and implemented to monitor both surface water and groundwater in and around the area where mining activities such as WRD, TSF and open pit mining will occur.

12.1.6 Radiation

To manage naturally occurring radioactive material (NORM) it is recommended that Syrah adopt the NORM guidelines as published by the Government of Western Australia, Department of Mines and Petroleum. As stated in the guideline NORM 1 the purpose of this set of guidelines is to summarise the system of radiation protection as recommended by the International Commission on Radiological Protection (ICRP), International Atomic Energy Agency (IAEA) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The guidelines illustrate how the system of radiation protection may be practically applied in the mining and mineral processing industry and in particular:

- Implementing best practicable technology to reduce exposure and contamination levels. For example, ensuring suitable engineering controls are used to the extent feasible;
- Classifying employees, work conditions and workplaces on the basis of measured or predicted radiation levels. For example the classification of designated employees, restricted areas, controlled areas and supervised areas; and
- The establishment of contamination levels that trigger radiation protection responses. For example, defining special exposures and setting investigation and reporting levels.

Measurements taken (sampling points shown in Figure 4.8 and Figure 4.9), indicated the levels of radioactivity naturally occurring in radioactive materials. The readings were in the order of 3 to 10 times the background level, and generally across the field locations where measurements were taken. One test at location number 35 exhibited a value about 30 times background. Measurements on core samples at the core shed also followed the same trend, although one specific piece of core from drill hole BMDD0123 at a depth of 18m exhibited a value about 30 times background.

Calculations based on the field measurements indicate the dosage level encountered by personnel working in these areas will be less than 5mSv per year. The NORM guidelines provide classifications of work conditions and at dosage levels less than 5mSv the work area would be classified as a supervised area. The ARPANSA definition of a supervised area is "an area in which working conditions are kept under review but in which special procedures to control exposure to radiation are not normally necessary". As the project progresses to production, on-going monitoring will be conducted and any actions and mitigation measures required will be determined by the NORM guidelines.

12.1.7 Socio-Economic Assessment

The proposed mining operation is being developed in an area that is poor and faced with limited economic opportunities at present. Living a predominantly subsistence agricultural lifestyle, most villagers are self-employed farm workers, supporting large and extended families. The largest industry in the area is Plexus, a cotton producer which supports many farmers in the area with cotton production. In addition to large-scale maize productions, some farmers do receive agricultural support either from companies such as Plexus, but also the government through seed provision and support.

i. Land is under the traditional jurisdiction of the Macua Tribe, and the area and its people are male-dominated and very patriarchal. In consequence, any development in the area has the potential to reinforce this system, which disempowers and

marginalises vulnerable groups such as women, the elders and the youth. Coupled with the extended civil war, it is fair to argue that these villagers are vulnerable to development, especially since they are so heavily dependent on their land and agricultural harvests.

- ii. The SIA identified several impacts which need to be mitigated. Most of these issues revolve around a central theme of *land and food security*. The mining operation will affect a large area which is currently extensively utilised by almost all the households for agricultural production. Nearly all the households have large farms or *machambas*, many of which will either be affected or lost during the mine development.
- iii. The extent of economic displacement is significant (more than 200 *machambas* will be lost), for which purposes the most important mitigation measure is the development and implementation of a resettlement action plan (RAP) and the development of associated procedures to guide compensation (which has already been drafted).
- iv. The most significant issue that needs to be addressed through this RAP is future food security, especially since the mine is not permanent. Affected villagers should be empowered and provided with the capacity to continue with their preferred livelihoods after a mine has closed, which should not leave them being worse off. Large areas to be mined are also used by most villagers for natural resource harvesting, whilst small areas used for cultural and religion practices will also be lost or affected by the development.
- v. The SIA concludes that the development is needed in the area, especially since the villagers suffer from food insecurity and severe poverty. It is difficult to believe that the villagers' socio-economic status would improve or sustain itself without an external economic intervention. Preserving the environment for cultural reasons will not alleviate any resident from his or her poverty and food insecurity, whilst employment will. Local employment opportunities will be created, and the impact of even providing one household member with employment cannot be overemphasized. The income dependency is very high, which means that even one regular income stream in one household might sustain a series of households in these villages. The development could create an economic opportunity which can, in the long-term, boost and empower the villagers with education, skills, training and agricultural productions.
- vi. The RAP report will be referred to and implemented which details the entitlement frameworks for the possible disturbance of graves/cemeteries, such as exhumation and reburial procedures);
- vii. The established Grievance Mechanism will be used for members to lodge any complains with regard to the disturbance of graves/cemeteries to mine management. Corrective action will be taken, as described in the mechanism (refer to Chapter 7 of the RAP); and
- viii. A Cultural Heritage Management Plan will be drafted and implemented (as explained).

12.1.8 Land, Natural Resource Use and Agriculture Assessment

The Land, Natural Resource Use and Agriculture Assessment concluded that the impacts of all the aspects of the proposed Balama Graphite Mine were considered and deemed to be acceptable, provided that the mitigation measures presented below are implemented:

- i. All topsoil should be stockpiled and replaced as a final graded layer over the subsoil.
- ii. An Environmental Control Officer (ECO) should monitor all excavations to ensure backfilling with subsoil first and then topsoil afterwards takes place.
- iii. In accordance with the IFC PS 5, a RAP needs to include a detailed agricultural

valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes; and

- iv. Livelihood restoration strategies need to be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options include supporting the cotton and maize production capacity of the area by investing in market access, seed provision and agricultural training programmes. A key focus of such programmes needs to be the empowerment of vulnerable children and youth, as well as women (especially female-headed households).
- v. The new haul road contouring should assist in dispersing water run-off instead of concentrating it and increasing the risk of erosion.
- vi. Disturbed areas should be rehabilitated as soon as construction has been completed. Rehabilitation should be undertaken progressively.
- vii. The amount of runoff crossing exposed areas must be controlled by using berms or temporary or permanent drainage ditches to divert water flow around the cleared areas.
- viii. The access road should be designed no wider than necessary to accommodate the immediate anticipated use.
- ix. Rivers should be kept in a natural state as far as possible.
- x. Minimise the alteration to topography.
- xi. Minimise the area of impervious surfaces.
- xii. Grade impervious surfaces to drain into vegetated areas.
- xiii. Ensure fine materials being transported are covered with tarps or equivalent material.
- xiv. A Hydrocarbon Management Operating Procedure should be designed and implemented. Copies of this document should be made available at designated facilities where hydrocarbons are used or stored. The purpose of this procedure is to provide for the proper storage and handling of hydrocarbons, including waste hydrocarbons, on site and hence prevent any form of contamination.
- xv. It is recommended that soil contaminated with hydrocarbon should be immediately removed and disposed of at a soil bioremediation facility on site.
- xvi. All staff must be trained on the correct management of bunded facilities, including the discharge of collected liquids.
- xvii. Spill kits must be readily available at strategic points throughout the site and staff must be trained on the correct use of these kits.
- xviii. Spillage and seepage of contaminants should be prevented at all times through the implementation of good housekeeping and management procedures.
- xix. A monitoring program must be defined in the EMP.
- xx. In the case of accidents immediate remedial measures should be implemented.
- xxi. Storage facilities should be adequately bunded and inspected on a regular basis.
- xxii. The tailings storage facility must be designed and operated to prevent infiltration of toxic leach into groundwater through the provision of appropriate liners and subdrainage systems to collect or recycle water.
- xxiii. Leak detection equipment should be installed with an appropriate Leak Response Plan.
- xxiv. A conservation agriculture approach is recommended. This can be achieved through basic training to ensure the affected communities become self-sufficient in generating high protein foods as well as cash liquidity. The traditional slash and burn practices that depletes soil nutrition can be cancelled while less land could be used more efficiently. Agriculture could then, with correct rotations and cropping programmes ensure more stable employment conditions for the local farmers.
- xxv. The following crops are recommended (All these crops can be grown through multicropping with more traditional crops like cassava and maize):
- Peanuts high protein and a legume crop.

- Beans & peas (Sugar beans, Pigeon Pea and Cow Peas) high protein and a legume crop.
- Sesame cash crop that is drought resistant and grows well in most soil types.

12.1.9 Health Assessment

Table 12.1 below summarises the key findings and recommendations provided in the Health Assessment. These have been incorporated in the ESMP and are endorsed by Syrah Resources.

KEY FINDINGS	RISK FACTORS	RECOMMENDATIONS
EHA 1 – Communicable diseases	linked to housing design and o	vercrowding
 Most households are large, with several polygamous families. There is enough housing and adequate access in five out of the six villages – overcrowding was reported in only one of the villages. Tuberculosis is widespread in Mozambique. There is poor case detection in the district. Acute respiratory infections are a major cause of morbidity especially in children under five years of age. Poverty, poor environmental health conditions and poor nutrition play a role in community susceptibility to infectious diseases. 	 The overall development may trigger in-migration to the project area and the risk of overcrowding and housing inflation exists, which may in turn increase the risk of transmission of communicable diseases. Increased traffic load may lead to exposure from dust and air pollution which has the potential to negatively impact acute and chronic respiratory tract diseases. This is likely to be minimal in the operational phases if appropriate exclusion zones are maintained and dust management principles followed. 	 Support TB knowledge campaigns related to awareness and health seeking behaviour. Influx management and advice with regards to town planning to prevent overcrowding. Health service planning and strengthening to ensure adequate health service capacity for TB diagnosis and management in the project area. These should always be performed in partnership with the local authorities and focussed on prevention and early recognition.
EHA 2 – Vector-related diseases	lonowed.	
 Malaria is a major public health challenge in the project area and is regarded as the biggest concern related to burden of disease. It accounts for a significant portion of consultations at the local level. Community knowledge on transmission and prevention of malaria is good. Ownership of insecticide-treated nets is good, although it is difficult to assess proper utilisation. There are a number of interventions in the area to reduce the burden of disease from malaria but monitoring and evaluation activities are limited. 	 The project may influence malaria through changes to the environment and demographics in the area linked to influx. There is stakeholder concern that vector breeding and thus densities will increase with the project and may create focal high risk areas for malaria transmission. The health of the workforce also needs to be considered, especially as some of them might be from the local community. 	 Support malaria awareness campaigns in the communities. This can be done in collaboration with the local health authorities. Health systems strengthening with regards to malaria reporting to obtain accurate longitudinal data on malaria incidence.

Table 12.1: Key findings and recommendations

KEY FINDINGS	RISK FACTORS	RECOMMENDATIONS
EHA 3 – Sexually transmitted inf	ections, including HIV/AIDS	
 HIV/AIDS remains an increasing public health challenge in the area. HIV prevalence is about 6-8% in the general population. Although commercial sex work is not common in the area, there is a potential for this to increase. Knowledge and awareness related to HIV appeared good. However, this does not translate into behaviour change and high risk practices are reported. Stigma was still high within the communities. Comprehensive knowledge of HIV prevention and transmission is low due to the belief of some misconceptions within the community. There are frequent HIV campaigns in the area. However, the limited functionality of the community health worker units may affect the deliver of some maximum and a transmission is not a the area. However, the limited functionality of the community health worker units may affect the deliver of some maximum and the some and the area. 	 The project development has potential to further raise the risk of HIV/AIDS and STI transmission in the local population as a result of a number of factors. These are often as an indirect effect of the project, but may also be associated with more direct influences such as: Money: Increased disposal income; Men who may be away from the family unit with income; Mobility: access to rural communities. Transport workers are a high risk group; and Mixing: in-migration and as a result of improved access. Different viral strains can also be transmitted. 	 Support information & education campaigns as well as peer educator programs in both the workforce and in the community. Develop a HIV/AIDS strategy at workplace and community level. Support health systems strengthening in the area to enhance the work performed by the local health authorities and their partners. This can have a specific focus on the community health worker units. Support projects that can serve as indicators for HIV and other STI prevalence. The VCT and antenatal clinics that function in the area should be supported and used as a source of data to monitor HIV prevalence.
The delivery of services. FHΔ 4 – Soil- water- and waste-	related diseases	
 Generally poor access to drinking water sources. Water is generally available during wet and dry seasons.Improved water sources, such as water pumps are common in some communities while others rely on non-improved water sources. Very few improved sanitation facilities within the communities. The vast majority of households throughout the villages do not have access to their own improved sanitation facility. Diarrhoeal diseases are common. Intestinal parasites and urogenital schistosomiasis are also common. 	 There is a heavy reliance on non-protected sources of water in the area. Moreover, water microbial quality has not yet been assessed. The presence of the Chipembe Dam in the project area will potentially influence the risk of water borne diseases, particularly schistosomiasis. 	 Support the provision of safe and clean water in the communities. Establishm institutional arrangements and mechanisms to ensure the sustainability of community- managed rural water supplies. Assess the quality of available drinking water at source and end user to ensure that the project does not have any detrimental effects on community water sources. Support information and education campaigns that promote community water use, hygiene and general sanitation. Immediate prioritization of sanitation through the adoption at scale of total sanitation marketing approaches for rural areas, and the strengthening of private and public sector capacities to

KEY FINDINGS	RISK FACTORS	RECOMMENDATIONS
		participate successfully in
EUAE Food and putrition role	tod ioouoo	these approaches.
• Malputrition and microputrient	• The poor socio economic	• Support putritional and
 Maintuition and micronutrient deficiencies are challenges in the project area. These are generally linked to food shortages and poor feeding practices. However, active surveillance of nutritional indicators is limited, due to the fact that some of the health facilities do not have height and weight scales. Anaemia is a major concern in the area although the true burden is not known. It is mainly linked to malnutrition, intestinal parasites and malaria. 	 The poor socio-economic status of some families living in the wider project area is a significant risk factor for malnutrition. Food security in Mozambique is currently a national challenge. Moreover, most women are poorly educated on proper feeding practices. Food inflation will also need to be considered, itself consequent upon in-migration and changes to supply and demand. 	 Support inditional and anaemia programs in the area to enable the collection of indicators that can be used to monitor the nutritional situation in the area. Equip local health facilities with height and weight scales and provide training for the implementation of a basic nutritional program, which targets children under the age of five years. This will not only serve as a community intervention per se but will support accurate longitudinal data surveillance on the nutritional status of children. This can be performed in association with existing local programs. Support agricultural programs that teach the community members proper farming practices. This will help increase their food yields.
EHA 6 – Accidents and injuries	The Drained mean load to	Develop a sloop valiev for the
 Road traffic accidents (RTA) are the most common form of non-accidental injury in the area. Gender-based violence and crime related injuries such as assault are less common. 	 The Project may lead to increased traffic loads in the local area and has the potential to increase the number of traffic accidents. This is particularly relevant for small children and domestic animals. Alcohol plays a significant role in most forms of accidents and social influences may increase local alcohol abuse. 	 Develop a clear policy for the management of emergencies or accidents in the community as a direct result of the project. These should consider awareness and education programs, and schools can be a good target. Mitigation measures should be developed as part of a traffic and vehicle management plan.
EHA 7 – Exposure to potentially	hazardous materials, noise and i	malodours
 Communities residing in the Project area live in close contact to their environment and are thus vulnerable to any changes in water and air quality, as well as to noise pollution. There have been no cases of heavy metal pollution or toxicity in the project areas. 	 The project has the potential to create environmental health concerns if such areas are not well managed. Concerns relate mainly to noise, water and air quality. There is a general lack of knowledge and understanding related to mining. This may pose a risk related to perceptions once the project moves into operations as factors and rumours that have no human 	 As per all and hoise quality specialist reports. Develop clear and proactive communication strategies for potential environmental health risks that can possibly impact on human health.

KEY FINDINGS	RISK FACTORS	RECOMMENDATIONS
	health risks may flourish and create reputational risks. The company may then spend an extraordinary amount of time allaying these fears and misconceptions.	
EHA 8 – Social determinants of r		
 Very good health-seeking behaviour in the project area. Very few people consult traditional healers. However, most communities do not have easy access to a health facility. Affordability is an issue as not all health services are free. Transportation to health care facilities is a major determinant in evaluating affordability. Education is an existing need. 	 Various social-determinants may be impacted by its development. Although few people admitted to seeking treatment from a traditional healer, the importance of traditional medicine must not be discounted. The resettlement process may also influence general well-being and sense of place. Migration may influence social determinants especially in centres where unplanned growth may occur without the provision of commensurate services. 	 Understand the drivers for health seeking behaviour so that these can be used to support specific health interventions which require mitigation. For example HIV education programs will not be effective if the way the community forms opinions or behaves towards the disease is not understood. In addition, develop good programs to support good health seeking behaviour. Programs and interventions should support vulnerable groups as required, both in terms of impact mitigation and community development. Most other elements will be addressed in the social management plan. Information and education programs on substance abuse to prevent the problem manifesting at local level.
EHA 10 – Health systems issues		

KEY FINDINGS	RISK FACTORS	RECOMMENDATIONS
 KEY FINDINGS The capacity and quality of health care services is limited in the project area. There are only two health facilities in the immediate project area. Not all communities have immediate access to a health facility, with accessibility and affordability the main issues. The Mozambican health system has a good structure and the ability to partner for health systems strengthening appears receptive. There is a functioning health information management system in place in the district but it has a few limitations: Data is recorded manually from local health facilities with the risk that there is an error in capturing; The information is maintained on a spreadsheet but no proactive trends are drawn; and Limited diagnostics and human resource skills at the health centre level reduced the fidelity of data around the DACe 	 RISK FACTORS The project has the potential to increase the burden on the already limited health care infrastructure in the area. This is especially a risk in the rural communities where influx to an area may mean that the available services are rapidly outstripped by an increased population. The health information management system has considerable gaps especially at the local health facility level which limits the longitudinal monitoring of health data and these impacts. 	 RECOMMENDATIONS Develop a plan to support the health infrastructure in the project area. This strategic investment should consider the existing health needs of the community. Initiate health service planning with local authorities so that health services can manage any influx into area. Improve and support health information management systems to generate longitudinal data sources and thus support the monitoring of management/mitigation plans.
EHA 11 – Non-communicable dis	eases	
• Non-communicable diseases are not well documented in the area due to limited capacity in the local health facilities.	 With improved economic status and organised settlement a degree of urbanism may result with associated changes in lifestyles and related diseases such as obesity, diabetes, hypertension and dental caries. The health care facilities in the rural areas do not have a focus on the management of these diseases, nor do they have the diagnostic capabilities to appropriately recognise and manage these conditions. 	 Support health education programs as part of a community health program. These should focus on lifestyle risk factors like diet, exercise, smoking and alcohol consumption. Develop wellness programs in the workforce, with the aim that these are extended to the family unit. Consider health systems strengthening to support improvement of local diagnostics for non-communicable diseases.

12.1.10 Air Quality Assessment

The conclusions reached with regards to the various pollutants modelled are reported below:

Dust Deposition:

- i. The actual dust monitoring results are reported, but should be viewed with caution as the exposure periods are not within the recommended 30±2 days stipulated in South African National Standard (SANS 1137:2012) "Standard Test Method for Collection and Measurement of Dustfall" (Settleable Particulates Matter).
- ii. It is worth mentioning that the September 2013 sampling window (34 days) recorded dust deposition rates at two sites Nquide and Piriri of 1061 mg/m²/day and 850 mg/m²/day. The dust deposition measurements at both locations are in violation of the residential threshold as stipulated in NDCR 2013 of 600 mg/m²/day. Although the sampling was not compliant with the 30±2 window, the elevated level of dust observed during the dry season might not be far from the actual ambient dust deposition rates in the area. Since background levels are reaching values above thresholds, it is an indication that specific management practices, operational controls and mitigation measures should be implemented if the mine starts operation to minimise dust and air quality impacts.
- iii. The predicted dust deposition rates are high without mitigation and in violation of the NEMAQA-NDCR, 2013 standard. The highest deposition rates at the mine boundary of 1742 mg/m²/day is in violation of the standard. The predicted dust deposition rates at the different sensitive receptor sites in the vicinity of the proposed Balama Graphite Mine are below the recommended standard (600 mg/m²/day), except at Malipuli (2005 mg/m²/day) and Nquide (2179 mg/m²/day).

Particulate Matter:

- i. The highest PM_{10} daily concentrations predicted at the Balama Graphite Mine boundary exceeded the recommended WHO standard. The concentration in excess of 150 µg/m³ exceeded the WHO 24-hour guideline of 50 µg/m³. For residential settlements i.e. sensitive receptors in the vicinity of the proposed operation will be exposed to concentrations above 50 µg/m³. At some sites, the WHO Interim target-2 and Interim target-3 of 100 µg/m³ and 75 µg/m³ are exceeded.
- ii. The particulate matter PM_{10} annual concentrations predicted for the Balama graphite mine boundary exceeded 20 µg/m³. Residential settlements i.e. sensitive receptors in the vicinity of the proposed operation are exposed to concentrations below 20 µg/m³, except at Piriri (34 µg/m³).
- iii. For PM_{2.5}, the daily highest concentrations predicted at a point on the proposed Balama Graphite Mine boundary exceeded 50 μ g/m³. This value is in violation of WHO 24-hour guideline of 25 μ g/m³, with two receptor sites Malipuli (27 μ g/m³) and Piriri (57 μ g/m³) exposed to concentrations higher than the standard.
- iv. Annual $PM_{2.5}$ concentrations predicted at the mine boundary were below the recommended WHO standard of 10 μ g/m³. This value is not in violation of WHO annual guideline value. Sensitive receptors in the vicinity of the proposed operation are exposed to concentrations below the standard.

Gaseous Emissions:

- i. The predicted 1-hourly NO₂ ground level concentrations at the proposed Balama Graphite Mine boundary are in excess of the recommended standard of 200 μg/m³. The predicted levels at the surrounding sensitive receptor are three times higher than the recommended WHO guideline value without mitigation. However, with mitigation measures in place i.e. the use of CAT[®] Selective Catalytic Reduction – an effective way to remove nitrogen oxide emissions (NOx) from engines - more than 90% of NOx is eliminated by injecting urea, a non-hazardous solution into the exhaust system. At temperatures above 300°C, urea decomposes to form nitrogen and water, eliminating most exhaust emissions in the process. It is recommended that ambient monitoring be conducted to establish actual measurements to which future perturbation can be compared.
- ii. The predicted CO ground level concentrations generated for the proposed Balama mining area, both 1-hourly and 8-hourly were all within the SANS 1929:2012 limit. Values were several orders of magnitude lower than the limit. Thus, CO concentrations predicted for the area are not in violation of the recommended standards.
- iii. The predicted HC ground level concentrations generated for the proposed Balama mining area 3-hour average is within the 160 μ g/m³ standard.
- iv. The predicted pollutants signature presented in this AQIA report focused on the ground level concentrations with and without mitigation measures in place. Fugitive emissions from the sources will result in offsite impacts. NO₂, CO, HC and particulates PM_{10} and $PM_{2.5}$ emissions are assessed and with adequate mitigation measures in place can be contained to the mine project area. The latter often results in marked reduction in emissions and less impact on the ambient atmosphere.

Based on these results, the recommendations to be taken into consideration are as follows:

- i. **Dust generation -** Wind erosion from exposed areas has the potential to generate dust. Dust deposition results from the Balama mining areas are discussed in this report and viewed with caution. However, it is worth mentioning that the September sampling window (34 days) recorded dust deposition rates at two sites (Nquide and Piriri) of 1,061 mg/m²/day and 850 mg/m²/day, respectively. Interestingly, both locations are downwind. These values are in violation of the residential threshold as stipulated by SANS (1929:2005). Although the sampling was not compliant with the 30±2 day window, the elevated level of dust observed during the dry season might not be far from the ambient dust deposition rates currently in the area. Background levels reaching values above residential thresholdsis an indication that specific management practices, operational controls and mitigation measures should be implemented when the mine starts operating.
- ii. The current dust deposition measurement should be continued and aligned to the SANS (SANS 1137:2012) sampling window. This will provide long term continuous monitoring historical data to which future levels can be compared.
- iii. It is anticipated that the dust impacts during operation of Balama Graphite mining can be controlled by adopting practical mitigation measures i.e. use of water to dampen dust generating from areas such as stockpiles, haul roads, exposed soil, housing of crushers, screens, conveyor belt, wind breaks and rapid re-vegetation of exposed areas.
- iv. Good housekeeping practices to minimise the accumulation of loose dust piles.

- v. It is recommended that ambient air quality monitoring for criteria pollutants, such as NO₂, SO₂, CO, CO₂, TSP, PM₁₀, and PM_{2.5} be conducted in the proposed project area prior to the commencement of operations.
- vi. Establish an on-site meteorological station that measures hourly values for wind speed and direction, ambient temperature, relative humidity, barometric pressure, solar radiation and precipitation.

12.1.11 Noise Assessment

- i. In terms of the baseline conditions, existing ambient day and night time noise levels in the surrounding villages are mostly below the IFC EHS noise rating limit for residential districts.
- ii. The findings have indicated by means of dispersion modeling that the noise levels from the proposed construction phase, especially the haul road development, will measure above the existing ambient noise levels at the village of Piriri. During the operational phase the proposed mining activities are expected to measure between 10dBA and 20dBA above the current ambient levels at Nquide and Maputo during the day and night time, but only during the night time at Piriri.
- iii. The overall pre-mitigation significance of the noise impact from the proposed Balama Graphite Mine is moderate to high during the construction and operational phase and drops to a low significance during the decommissioning phase.
- iv. The noise contributions can be reduced through the implementation of the recommended mitigation measures, especially the construction of the earth berms around the pits, which will help with the noise attenuating towards the villages. Depending on the general construct of the earth berms, an effective noise contribution decrease of between 5dBA and 10dBA can be achieved. The postmitigation significance of the noise impact is considered to be moderate to low.

12.1.12 Waste Assessment

A total of 15 impacts were identified and of these, with mitigation, 11 were considered to be of LOW negative significance and three of MODERATE negative significance.One impact was considered beneficial and of moderate significance with mitigation. However, due to the potential long-term nature of waste-related impacts, it is essential that the developer adhere to national legislative requirements and international best practice with regards the management of all waste streams.

It is recommended that:

- i. All waste streams should be managed according to the waste management hierarchy and according to Decree 13/2006, of 15 July: Regulation of Waste Management. This specifies that wherever possible, production of wastes should be prevented or minimised at source.
- ii. Where prevention or further minimization is not possible, wastes should be re-used, recycled and then disposed of responsibly so as to minimise impacts to the environment. Further guidance on the management of waste streams is provided in the IFC General EHS Guidelines (2007) and the IFC EHS Guidelines for Mining (2007).
- iii. In the event that there are no national standards available, the proponent must comply with internationally recognised standards developed by international organisations such as the IFC. In the case where there are several standards available for use, the proponent must provide justification for the choice of use, other than the use of the most stringent.
- iv. Due to the remote location of the project site and relevant legislation, it is recommended that the proponent establish a non-hazardous waste disposal facility on the site.

v. Practical options will need to be considered for the management and disposal of hazardous wastes. These would be to either develop a dedicated and specially-designed hazardous waste cell within the new on-site landfill or, alternatively, to construct a bunded and secure facility for temporary storage of hazardous waste on site until such time as it can be transported off-site for safe disposal.

12.1.13 Traffic and Transport Assessment

- i. The most significant contribution to traffic during the operational phase will be from the transport of graphite concentrate from the mine site to the Port of Pemba. Assuming the base case of 2,000,000 metric tons of RoM ore being processed annually, it will take 45 trucks per day to deliver the product to the port in payloads of 20 and 26.7 metric tons. Delivery will take place 360 days per year.
- ii. From the mine site to Pemba or Nacala, trucks will need to pass through a number of settlements, some of which have markets along the roadside. Pedestrians and shoppers frequently cross the road, or the sheer number of people present spill into the road. Additional hazards are caused by taxis, vehicles and bicycles pulling off and pulling onto the road. Drivers of trucks will need to be vigilant in these areas and will need to exercise caution.
- iii. There are also bridges along the route which need to be structurally assessed by a competent professional prior to having trucks pass over them. This may not be required for the bridges on the paved and good quality road from Montepuez to Pemba, but for the road from Balama to Montepuez this will be necessary. The second bridge along this route is in very poor condition, with the underside beginning to fall away.
- iv. The passing of traffic along the unpaved road will generate large amounts of dust if the road is left untreated. The dust will affect local residents who have their houses and stalls built immediately on the road side. Their houses and merchandise will be coated with dust. Measures have been suggested to reduce dust emissions.
- v. Operational phase traffic will also be due to transport of skilled employees to and from the site and the airport in Pemba, buses transporting locally sourced labour from surrounding villages to the mine site, and the delivery of supplies and consumables to the mine site.
- vi. In the absence of a detailed Bill of Quantities for the construction phase, it has not been possible to calculate traffic quantities during this phase, however many of the expected impacts have been identified and discussed. Many of the plant components will be manufactured outside of Mozambique, and be delivered to the ports of either Nacala or Pemba. Some of these will be abnormally sized, and will need special transport arrangements that will need to be made in consultation with local traffic authorities.
- vii. To reduce transport and logistics costs, the EPCM contractor is likely to attempt to source as much construction material locally as possible. The area is very rural and all traffic, regardless of its source, will concentrate on the EN242 from Montepuez to site. Construction will take approximately a year to complete. Delivery of the bulk of construction materials is likely to take place within the first few months, with deliveries tapering off as construction activities are completed.
- viii. The most pressing issue, from a traffic and transport perspective, is the storage and distribution arrangement within Pemba town. The layout of the town is such that traffic to the port has relatively few options available to it, and is restricted to roads which lead through a busy town centre. Calculations have shown that if a constant daily delivery schedule to the Port is followed, a truck will be passing through the busy town centre every 8 minutes. As suggested in the Snowden Draft Scoping Report it might be worth considering the purchase or rental of warehousing on the edge of Pemba, and the transport of graphite to the Port as the need arises. This will avoid high port fees but will take an even and constant traffic flow and concentrate it
on days immediately prior to export. More thought and planning is required in this respect. These concerns become irrelevant if Nacala is selected as the preferred port option, which is currently the case.

ix. Impacts that have been identified and assessed relate to: safety of other road users, the generation of dust, and the transport of abnormal loads. Mitigation measures have been suggested which will significantly relieve the seriousness of these impacts. Many of the impacts identified will no longer be applicable if the upgrade of the EN242 is completed prior to the initiation of construction. Unfortunately, construction activity appears to be minimal, with partial upgrades completed and little evidence that work is on-going.

12.1.14 Mine Closure Report

The Mine Closure Report forms part of Part V (Specialist Volume). In addition to this, a summary of this report is available in Chapter 12 above.

It is recommended that the following actions are taken prior to the update of the annual Closure and Rehabilitation Plan:

- i. As the knowledge base develops, a more detailed closure risk assessment should be built up (in the annual reviews) with input from representatives of the design team, operational personnel and environmental specialists. This will enable the development of solutions to key issues that are both acceptable to the technical specialists concerned while at the same time being practically implementable.
- ii. Continue with detailed modeling of the impacts from various TSF cover configurations on the rate of generation of pollution plumes, together with modeling of the long-term impacts of those plumes on downstream water users and modeling a feasible way to place the saprolite and topsoil covers on the TSF, post-closure.
- iii. Implement the measures as outlined in the specialist studies to minimise the risk to surface water contamination from the operations during rehabilitation and closure.
- iv. Research trial work during the operational phase to determine other rehabilitation options that could be considered for the closure and rehabilitation of the TSF.
- v. Additional research (by field testing) to identify the average depth of topsoil available, and the potential for use of topsoil covers of less than 300mm for sustainable rehabilitation. Although conventional wisdom is that 300mm is the minimum, it is possible that insufficient topsoil will be available on site. Investigations to determine if a lesser quantum may be satisfactory for the plant species naturally occurring under the Mozambican environment is therefore required. Options of mulching and composting could also be explored.
- vi. Refine the cost model by verifying the various cost rates for the Mozambican environment.
- vii. When the closure and rehabilitation plan is updated ensure that community related issues are fully covered in the plan.
- viii. Ensure that the Environmental Management Plan is aligned to the Closure and Rehabilitation Plan

12.2 Residual Impacts

Table 12.2: Residual impacts as a result of the construction phase

	Withou	t Mitigation	With Mitigation			
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance
		BIOPHYS	ICAL IMPAC	TS		
Impacts on topography and geology	Long Term	Localised	Slight	LOW -	N/A	N/A
Removal of topsoil and soil erosion	Short Term	Study Area	Severe	MODERATE -	Moderate	LOW -
Soil contamination	Short Term	Study Area	Severe	MODERATE -	Slight	LOW -
Disturbance to existing soil profile will result in a decrease in agricultural capability	Permanent	Study Area	Severe	HIGH -	Slight	MODERATE -
Loss of agricultural land due to establishment of mining infrastructure	Permanent	Study Area	Very Severe	VERY HIGH -	Moderate	MODERATE -
Loss of subsistence crops due to establishment of mining infrastructure	Permanent	Study Area	Very Severe	VERY HIGH -	Moderate	LOW -
Sedimentation and elevated turbidity levels	Medium Term	Study Area	Severe	HIGH -	Moderate	MODERATE -
Contamination of non- ore pollutants	Medium Term	Study Area	Severe	MODERATE -	Moderate	LOW -
Aquatic habitat modification	Permanent	Study Area	Severe	HIGH -	Moderate	MODERATE -
Loss of aquatic species of special concern	Long Term	Study Area	Severe	HIGH -	Moderate	MODERATE -
In-stream structures blocking migrations (bridges, causeways)	Long Term	Study Area/ Regional	Severe	HIGH -	Low	LOW -
Over-utilization of fish resources	Long Term	Study Area/ Regional	Severe	MODERATE -	Low	LOW -
Loss of riparian woodland	Permanent	Study Area	Moderate	MODERATE -	Slight	MODERATE -
Loss of Miombo woodland: graphite	Permanent	Study Area	Severe	HIGH -	Severe	HIGH -
Loss of Miombo woodland: granite	Short Term	Study Area	Moderate	MODERATE -	Moderate	LOW -
Loss of intact Miombo woodland: plains	Permanent	Study Area	Severe	MODERATE -	Slight	LOW -
Loss of degraded Miombo woodland: plains	Permanent	Study Area	Moderate	MODERATE -	Moderate	MODERATE -
Loss of biodiversity (general)	Permanent	Study Area	Severe	HIGH -	Moderate	MODERATE -
Loss of floral species of special concern	Long Term	Study Area	Moderate	MODERATE -	Moderate	MODERATE -
Fragmentation of vegetation and edge effects	Permanent	Study Area	Severe	HIGH -	Moderate	MODERATE -
Disruption of ecological systems and functions	Short Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Loss of amphibian diversity	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Loss of reptile diversity	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Loss of bird diversity	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -

			Withou	t Mitigation	With I	Vitigation
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance
Loss of mammal diversity	Medium Term	Study Area	Severe	MODERATE -	Moderate	MODERATE -
Loss of faunal species of conservation concern	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Faunal impact of habitat fragmentation and loss	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Ecological impacts from dust	Short Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Disruption to fauna from increased noise levels	Short Term	Study Area	Moderate	MODERATE -	Slight	MODERATE -
Chemical pollution	Short Term	Study Area	Moderate	MODERATE -	Slight	LOW -
		SOCIO-ECO	NOMIC IMPA	ACTS		
Reduced access to productive land and economic displacement	Long Term	Study Area	Very Severe	VERY HIGH -	Severe	MODERATE
Increased Food Insecurity	Permanent	Regional	Very Severe	HIGH -	Moderate Beneficial	LOW +
Reduced access to Natural Resources	Short Term	Study Area	Severe	HIGH -	Moderate	MODERATE -
Loss Sacred and culturally significant sites	Permanent	Study Area	Severe	HIGH -	Slight	LOW -
Loss of graveyards/sites	Permanent	Study Area	Very Severe	VERY HIGH -	Moderate	LOW -
Community safety risk	Short Term	Study Area	Severe	MODERATE -	N/A	N/A
Employment, Skills training and Scholarshops	Short term	Study area	Moderate Beneficial	MODERATE +	Very Beneficial	HIGH +
In-migration in search of job opportunities	Short term	Study area	Very Severe	HIGH -	Slight	LOW-
Stakeholder and community engagement	Short Term	Localised	Severe	MODERATE -	Beneficial	MODERATE +
Road traffic accidents and other accidental injuries	Long Term	Localised	Severe	MODERATE -	Moderate Beneficial	MODERATE +
Air pollution, noise and mal-odours	Long Term	Localised	Moderate	MODERATE -	Moderate Beneficial	LOW +
Chemicals, pesticides and heavy metals	Long Term	Localised	Severe	MODERATE -	Slight	LOW -
Gender-based violence, alcohol and drugs	Long Term	Localised	Very Severe	HIGH -	Very Beneficial	MODERATE +
Social cohesion and well being	Long Term	Localised	Very Severe	HIGH -	Very Beneficial	MODERATE +
Health system strengthening	Long Term	Study Area	Severe	HIGH -	Very Beneficial	HIGH +
Non-communicable diseases	Long Term	Study Area	Moderate Severe	MODERATE -	Moderate Beneficial	MODERATE +
Permanent loss of fruit trees, wood sources and other natural resources	Long Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Increasing demand for natural resources	Long Term	Study Area	Severe	HIGH -	Moderate	MODERATE -
IMAPCTS ASSOCIATED WITH WASTE INFRASTRUCTURE AND PROCESS RELATED ISSUES						
Pollution of land and water (general waste)	Long Term	Study area	Moderate Severe	MODERATE -	Slight	LOW -
Pollution of land and water (hazardous waste)	Permanent	District	Very Severe	VERY HIGH -	Moderate	MODERATE -
Nuisance impact (production of odours, visual impact and attraction of pests and vermin) from solid waste	Long Term	District	Moderate Severe	MODERATE -	Slight	LOW -

			Withou	Without Mitigation		With Mitigation	
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance	
Pollution of soil and water from domestic wastewater and sewage sludge	Long Term	Study Area	Moderate Severe	MODERATE -	Slight	LOW -	
Health impacts to employees and communities	Long Term	District	Severe	MODERATE -	Slight	LOW -	
Nuisance impact (odour and flies) from domestic wastewater and sewage sludge	Short Term	Study Area	Moderate Severe	MODERATE -	Slight	LOW -	
Pollution of land and water from disposal of run-off / storm water	Long Term	Study Area	Moderate Severe	MODERATE -	Slight	LOW -	
Increase in traffic frequency through villages	Short Term	Regional	Severe	MODERATE -	Severe	MODERATE -	
Transport of abnormal loads	Short Term	Regional	Slight	LOW -	Slight	LOW -	
Dust generated from traffic	Short Term	Regional	Severe	MODERATE -	Slight	LOW -	
Impact of traffic noise on surrounding noise sensitive receptors in terms of annoyance during the construction phase	Short Term	Study Area	Severe	MODERATE -	Moderate	LOW -	
Impact on air quality as a result of site clearing (removal of topsoil and vegetation and stockpiling of overburden topsoil)	Short Term	Local	Slight	MODERATE -	Slight	LOW -	
Impact on air quality as a result of the construction of any surface infrastructure	Short Term	Local	Slight	MODERATE -	Slight	LOW -	
Impact on air quality as a result of the transportation of materials and workers on site	Short Term	Local	Slight	MODERATE -	Slight	LOW -	
Impact on air quality as a result of temporary storage of hazardous products	Short Term	Local	Slight	MODERATE -	Slight	LOW -	

Table 12.3: Residual impacts as a resu	It of the operational phase
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			Without Mitigation		With Mitigation	
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance
		BIOPHYSI	CAL IMPAC	rs		
Impacts on topography and geology	Permanent	Localised	Moderate	MODERATE -	N/A	N/A
Soil contamination	Long Term	Regional	Moderate to Severe	HIGH -	Slight	LOW -
Possible contamination of groundwater through leaching of toxic materials from tailings storage facility	Permanent	Regional	Very Severe	VERY HIGH -	Moderate	LOW -
Sedimentation and elevated turbidity in rivers	Permanent	Regional	Very Severe	HIGH -	Moderate	MODERATE -
Contamination from non- ore pollutants	Permanent	Regional	Very Severe	MODERATE -	Moderate	LOW -
Ore contamination	Permanent	Regional	Very Severe	MODERATE -	Moderate	LOW -
Alteration of river flow- dynamics	Permanent	Study Area	Moderate	MODERATE -	Slight	LOW -
Mine dewatering	Long Term	Localised	Severe	MODERATE -	Moderate	LOW -
Mine water contamination	Long Term	Localised	Severe	MODERATE -	Moderate	LOW -
Hydrocarbon spillage	Long Term	Localised	Moderate	MODERATE -	Slight	LOW -
Aquatic habitat modification	Permanent	Study Area	Severe	HIGH -	Moderate	MODERATE -
Loss of aquatic species of special concern	Long Term	Study Area	Severe	HIGH -	Moderate	MODERATE -
In-stream structures blocking migrations	Long Term	Study Area/ Regional	Severe	HIGH -	Slight	LOW -
Over-utilization of fish resources	Long Term	Study Area/ Regional	Severe	HIGH -	Slight	LOW -
Invasion of floral alien species	Permanent	Regional	Severe	HIGH -	Moderate	LOW -
Loss of ecosystem services provided by the plant communities identified in the project area	Permanent	Study Area	Severe	HIGH -	Moderate	MODERATE -
Disruption of ecological systems and functions	Long Term	Study Area	Severe	HIGH -	Slight	LOW -
Loss of faunal biodiversity	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Loss of faunal species of conservation concern	Medium Term	Study Area	Moderate	MODERATE -	Slight	MODERATE -
Introduction of alien fauna	Medium Term	Study Area	Slight	LOW -	Slight	LOW -
Faunal impact of habitat fragmentation and loss	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Impact of increased dust levels on fauna	Medium Term	Study Area	Moderate	MODERATE -	Slight	MODERATE -
Impact of noise pollution on fauna	Medium Term	Study Area	Moderate	MODERATE -	Slight	MODERATE -
Impact of chemical pollution on fauna	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Threats to animal movements	Medium Term	Study Area	Moderate	MODERATE -	Slight	MODERATE -
	S	OCIO-ECON		CTS		
Temporary or permanent in-migration in search of job opportunities	Long Term	Regional	Very Severe	HIGH -	Severe	MODERATE -

			Without Mitigation			With Mitigation	
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance	
Reduced access to the inselberg's forest cover and small wildlife	Permanent	Study Area	Very Severe	HIGH -	Moderate	MODERATE -	
Personnel safety risk	Long Term	Study Area	Severe	MODERATE -	N/A	N/A	
Health services and water provision	Long Term	Study Area	Moderate	MODERATE -	Moderate	MODERATE +	
Employment opportunities and the stimulation of economic growth in the region	Long-term	Regional	Moderate Beneficia I	MODERATE +	Beneficial	HIGH +	
Stakeholder and community engagement	Long Term	Regional	Moderate	MODERATE -	Beneficial	HIGH +	
Transmission of communicable diseases due to overcrowding	Long Term	Study Area	Severe	HIGH -	Moderate Beneficial	MODERATE +	
Malaria burden	Long Term	Study Area	Severe	HIGH -	Very Beneficial	HIGH +	
Transmission of STIs and HIV/AIDS	Permanent	Regional	Very Severe	VERY HIGH -	Moderate Beneficial	MODERATE +	
Soil, water and waste related issues	Long Term	Localised	Severe	HIGH -	Very Beneficial	HIGH +	
Malnutrition	Long Term	Localised	Moderate	MODERATE -	Moderate Beneficial	MODERATE +	
Road traffic accidents and other accidental injuries	Long Term	Localised	Severe	MODERATE -	Moderate Beneficial	MODERATE +	
Air pollution, noise and mal-odours	Long Term	Localised	Moderate	MODERATE -	Moderate Beneficial	LOW +	
Chemicals, pesticides and heavy metals	Long Term	Localised	Severe	MODERATE -	Slight	LOW -	
Gender-based violence, alcohol and drugs	Long Term	Localised	Very Severe	HIGH -	Very Beneficial	MODERATE +	
Social cohesion and well being	Long Term	Localised	Very Severe	HIGH -	Very Beneficial	MODERATE +	
Health system strengthening	Long Term	Study Area	Severe	HIGH -	Very Beneficial	HIGH +	
Non-communicable diseases	Long Term	Study Area	Moderate Severe	MODERATE -	Moderate Beneficial	MODERATE +	
Increasing demand for natural resources	Long term	Study Area	Severe	HIGH -	Moderate	MODERATE -	
IMAPCTS ASSOCIA	TED WITH W	ASTE INFRA	STRUCTUR	E AND PROCES	S RELATED I	SSUES	
Health and safety of employees and local communities	Long Term	Localized	High	HIGH -	Slight	LOW -	
Disruption of ecological function	Long Term	Localized	Moderate	MODERATE -	Slight	LOW -	
Pollution of soil and water resources as a result of the storage of effluent in the process water pond	Medium Term	Localized	Very Severe	MODERATE -	Severe	LOW -	
Risk to health and safety of employees due to storage of effluent in the process water pond	Medium Term	Localized	Severe	HIGH -	Slight	LOW -	
Risk to health and safety of employees due to disposal of potentially hazardous process chemicals	Long Term	Localized	Severe	VERY HIGH -	Slight	MODERATE -	

		Without Mitigation			With Mitigation	
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance
Pollution of water resources and soil due to disposal of potentially hazardous process chemicals	Long Term	Localized	Severe	VERY HIGH -	Slight	MODERATE -
Increase in traffic frequency through villages and Pemba	Long Term	Regional	Moderate	HIGH -	Moderate	HIGH -
Dust generation as a result of traffic	Long Term	Regional	Moderate	MODERATE -	Slight	MODERATE -
Impact of noise on surrounding noise sensitive receptors in terms of annoyance during the operational phase	Long term	Regional	Severe	HIGH -	Moderate	MODERATE -
Impact on air quality as a result of removal of ore material (opencast mining process) and ROM Stockpile	Permanent	Local	Very Severe	HIGH -	Severe	MODERATE -
Impact on air quality as a result of operation of infrastructure	Permanent	Local	Slight	MODERATE -	Slight	LOW -
Impact on air quality as a result of the storage, handling and treatment of hazardous products	Permanent	Local	Very Severe	HIGH -	Severe	MODERATE -
Impact on air quality as a result of operation of the generator sets	Permanent	Local	Very Severe	HIGH -	Slight	LOW-
Moderate potential for acid mine drainage (AMD) formation from waste rock dumps (WRD) and tailings storage facility (TSF)	Permanent	Local	Very Severe	MODERATE -	Moderate	LOW -
Potential trace element contamination from the WRD seepage into the receiving environment with high concentrations of Mn, Fe, Ni and U	Permanent	Local	Very Severe	MODERATE -	Moderate	LOW -
High potential for AMD formation	Permanent	Study Area	Severe	HIGH -	Moderate Severe	MODERATE -
Trace element contamination from stock piles and exposed ore zones with a high potential of metal contamination with concentrations of Al, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn and U entering the receiving environment	Permanent	Study Area	Severe	HIGH -	Moderate Severe	MODERATE -
Radiation (public exposure)	Long Term	Local	Moderate	MODERATE -	Slight	LOW -
Radiation (worker exposure)	Long Term	Local	Moderate	MODERATE -	Slight	LOW -

			Withou	t Mitigation	With N	litigation
Impact	Temporal scale	Spatial scale	Severity	Significance	Severity	Significance
		BIOPHYSIC	AL IMPACTS	;		
Sedimentation and elevated turbidity in rivers	Permanent	Regional	Severe	HIGH -	Moderate	MODERATE -
Contamination from non-ore pollutants	Permanent	Regional	Severe	MODERATE -	Moderate	LOW -
Ore contamination	Permanent	Regional	Severe	MODERATE -	Moderate	LOW -
Alteration of river flow- dynamics	Short Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Mine water contamination	Long Term	Localised	Severe	MODERATE -	Moderate	LOW -
Mine decant	Permanent	Localised	Severe	MODERATE -	Moderate	LOW -
Aquatic habitat modification	Long Term	Study Area	Severe	HIGH -	Moderate	LOW -
Loss of aquatic species of special concern	Long Term	Study Area	Moderate	MODERATE -	Moderate	LOW -
Over-utilization of fish resources	Long Term	Study Area/ Regional	Severe	MODERATE -	Slight	LOW -
Impact of increased dust levels on fauna	Medium Term	Study Area	Definite	MODERATE -	Slight	LOW -
Impact of chemical pollution on fauna	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -
Impact of noise pollution on fauna	Medium Term	Study Area	Moderate	MODERATE -	Slight	LOW -

Table 12.4: Residual impacts as a result of the decommissioning phase

12.3 Conclusion

It is the opinion of the authors of this ESHIA that the Balama Graphite Mine will result in environmental, social and health impacts that can be managed to levels of significance that would be regarded as acceptable to society and the natural environment, provided the recommendations presented in this report are implemented as part of the social and environmental management programme developed as part of the EIA process (available as Part III of this document).

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APPENDIX 1: MICOA APPROVAL FOR SCOPING REPORT

Based on the above letter please find the requested information included below:

1. The observance of the Regulation on the Procedure of Environmental Impact Assessment approved by Decree 45/2004, of 29 September, the General Directive for the Preparation of the Environmental Impact Assessment Directive and the General for Public Participation Process.

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.

2. The presentation of all content of the document language is Portuguese, given the labelling requirements of the Environmental Legislation.

The ESHIA and all associated documentation has been translated to Portuguese (including maps and diagrams.

3. The inclusion of the curriculum vitae of the members of the technical team of EIA not effective at CES Mozambique, Lda.

The Curriculum vitae of all the technical team members, with the exception of the CES Mozambique, Lda, has been included in Part 2 of the ESHIA Document (ESHIA) in Appendix 3.

4. The indication of the role of each member of the technical team of the EIA.

This section has been completed in Part 2 of the ESHIA Document (ESHIA) in Chapter 1, Section 1.3 (1.3.1, 1.3.2, 1.3.3).

5. Presentation of the objectives / essence of the laws and conventions applicable to the project, as was considered for the Performance Standards of the International Finance Corporation.

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.1 to Section 2.1.15.

6. The specification of the limits of the areas of direct and indirect influence of the activity.

All impacts within the consession license area is considered to be a direct impact

7. An overview of the Mozambican legislation to the project, since part of it was repealed and / or introduced some changes and additions.

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.1 to Section 2.1.15.

8. The presentation of the ecology of the environmental situation of reference, using common, vernacular and scientific names in accordance with the provisions of Directive General for Development of Environmental Impact Assessments This section is included in the ESHIA Document in Chapter 4, Section 4.3. For a detailed description of the ecology of the area please refer to the Fauna as well as Flora Specialist reports.

9. The survey area covered by the project to launch the National Register of Lands;

This section is included in the ESHIA Document in Chapter 5

10. The inclusion in the chapter on the legal framework of the activity:

a) Law of Planning, Law 19/2007, of 18 July, and its Regulation approved by Decree No 23/2008 of July 1, in order to reconcile the project implementation with aspects of spatial planning;

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.12.

b) Decree No 61/2006 approving the technical Regulation on Safety and Health in Mining Activities Geologic;

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.13.

c) Decree No 67/2010 of 31 December amending articles 23 and 24 and Annexes I and V, referred to in Article 7 and Article 16 of the Regulation on Environmental Quality and Effluent Emission 3 approved by Decree No 18/2004 of 2 June and approves attachments 1A and 1B;

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.14.

d) Name of Decree 31/2012, of August 8 and its accompanying description.

This section is included in Part 2 of the ESHIA Document in Chapter 2, Section 2.1.8.

11. The inclusion detailed measures to mitigate the environmental impacts associated with dusts and solid particles in suspension, which may affect the health of workers and the surrounding population.

This issue is assessed and mitigation measures are proposed in Chapter 8, Sections 8.2.4, 8.3.4 and 8.4.4 of Part 2 of the ESHIA. This is also discussed specifically from an occupation health and safety perspective in Chapter 11 (Table 11.5) of Part 2 of the ESHIA.

12. The inclusion of geographical coordinates of the study area.

The tables below provide the geographical co-ordinates of the project boundary as well as the positions of the main infrastructural components:

Project boundary:

North-west corner:	North-east corner:
13°16'45.40"S	13°16'45.14"S
38°37'45.00"E	38°44'45.00"E
South-west corner:	South-east corner:
13°21'30.00"S	13°21'30.00"S
38°37'45.00"E	38°44'45.00"E

Project Infrastructure:

Infrastructure	Latitude	Longitude
Balama East	13°18'38.48"S	38°40'18.59"E
Balama West	13°19'51.19"S	38°38'57.36"E
Camp Site	13°18'24.33"S	38°41'1.11"E
Plant Site	13°18'30.96"S	38°39'41.15"E
Future Plant	13°18'25.37"S	38°39'51.37"E
ROM Pad	13°18'42.24"S	38°39'44.35"E
TSF 1	13°17'42.56"S	38°39'19.83"E
TSF 2	13°17'38.62"S	38°39'50.24"E
TSF 3	13°18'9.38"S	38°39'30.02"E
Waste Dump East	13°18'17.14"S	38°40'8.54"E
Waste Dump West	13°19'22.73"S	38°38'59.87"E

Linear Infrastructure:

	Start		Mic	Idle	End	
Roads	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
New Haul Road	13°19'27.19"S	38°39'2.38"E	13°18'52.14"S	38°39'34.99"E	13°18'41.82"S	38°40'21.16"E
Ntete Road Upgrade	13°18'54.50"S	38°38'40.24"E	13°15'47.09"S	38°38'5.74"E	13°12'58.47"S	38°36'58.85"E
Piriri Road Upgrade	13°20'22.31"S	38°38'10.31"E	13°19'38.04"S	38°38'18.61"E	13°18'59.50"S	38°38'33.77"E
Site Access Road	13°18'59.51"S	38°38'33.63"E	13°18'24.72"S	38°39'32.19"E	13°18'20.71"S	38°40'54.30"E
Ntete-Nquide Road	13°17'18.26"S	38°38'33.48"E	13°17'25.18"S	38°40'10.33"E	13°17'3.68"S	38°41'22.11"E

13. The actual survey in the project area of wetlands, including all systems of depressions and watercourses, with its georeferencing, mapping and description with the definition of specific management measures.

A description of the wetlands and water courses is included in Part 2 of the ESHIA Document in Chapter 4, Section 4.2.7. This is also presented spacially in the map included below. The Mehucua River flows through the southern section of the project site in a south-west to north-east direction. At this point it joins the Montepuez River 25 km downstream of the project site. The Mehucua River has three major tributaries; two of which - the Namiticu and the Naconha rivers - are upstream of the project area, both of which were sampled as part of the aquatic survey. The third tributary joins the Mehucua some distance downstream of the project area. The Namiticu and Naconha Rivers flow parallel to each other, and are both approximately 20 km long from their sources to their confluence, where they join to form the Mehucua River at a point on the southern boundary of the project site. A few small wetlands occur in the project area, the most notable being swampland located approximately 2 km south west of the proposed site and a wetland located approximately 7 km east south-east.



14. The assessment of soil erosion that may arise from implementation of the project, its impacts and their mitigation measures;

This issue is assessed and mitigation measures are proposed in Chapter 8, Sections 6.2.2 and 6.3.2 of Part 2 of the ESHIA.

15. A clear indication of the environmental management plan, mitigation of impacts enrolled in the document, especially regarding the proliferation of respiratory, skin, air pollution and contamination of water intentionally.

Please refer to Chapter 10 of the Environmental and Social Management Plan which details the monitoring which will be undertaking. For specific mitigation measures please refer to Chapter 7 of the ESHIA which deals with the health impacts and provides mitigation measures as well as Chapter 8 of the ESHIA which provides mitigation measures for impacts relating to air quality as well as water resources

16. The preparation and adoption of frames of reference for the management of risks associated with chemical substances to be used

This has been covered in the ESHIA Document (ESHIA), Chapter 2; chapter 6 section 6.5.7, 6.6.3; chapter 7 section 7.4.2 and chapter 8 section 8.4.4

17. The presentation of safety measures for the handling of raw materials and / or products with hazardous chemicals characteristics.

Please refer to chapter 5 of the ESMP which provides details on awareness training as well as Chapter 7 and 8 which provides recommendations on the handling of hazardous substances to prevent injuries and spillages

18. The preparation of Plans for Safety and Health at Work.

This has been covered in the ESHIA Document (ESHIA), Chapter 2, chapter 3 section 3.3; chapter 7 section 7.4.1. Please also refer to the ESMP as it establishes recommendations to ensure health and safety in the work environment

19. The presentation of the design of tailings ponds and an indication of the monitoring points for groundwater throughout all areas susceptible to contamination;

The presentation of the design of the tailings ponds has been included in Part 2 of the ESHIA Document (ESHIA), Chapter 3; also more details about tailings ponds are included in chapter 8 sections 8.3.4, 8.4.1, 8.4.5 and chapter 10 setion 10.3.2 and chapter 11 section 11.2.4

20. The indication of the type of thickening agents for use in thickening of tailings, including their chemical composition.

Details about tailings ponds are included in chapter 8 sections 8.3.4, 8.4.1, 8.4.5 and chapter 10 setion 10.3.2 and chapter 11 section 11.2.4

21. The indication of the fate of sediments to be recovered in the process of settling the effluent resulting from dust suppression in Crushing the ore

This has been covered in the ESHIA Document (ESHIA), Chapters 3 and 6, stions 3.4.9 and 6.3.4 respectively

22. The presentation of the procedures to be used for treatment of effluent from the process.

The has been covered in Part 2 of the ESHIA Document (ESHIA), Chapter 3, Section 3.5.2

23. The indication of the fate of resulting sludge the grinding of graphite.

This has been covered in chapter 8 sections 8.3.1 and 8.5.1

Slurry exits the primary mill and gravitates to a hopper. The mill product is pumped from the hopper to join the primary mill feed screen undersize in the primary classifier. The primary classifier floatation feed product is passed over a trash screen for the removal of oversize, and the undersize discharged into the rougher conditioner tank. Rods will be used as grinding media for the primary mill. A storage area for the rods will be located in close proximity to the mill.

A secondary mill operates in closed circuit with a secondary classifier. The returning coarse stream from the classifier is fed to the secondary mill. The slurry exits the secondary mill and gravitates into a hopper. The mill product is pumped from the hopper to the secondary classifier. Tailings from the third stage cleaning step are recycled back to the second stage regrinding circuit whilst concentrate is fed to the fourth stage cleaner. Tailings from the fourth stage cleaner the stage cleaning step are recycled back to the stage cleaner the fourth stage cleaner. Tailings from the third stage are recycled back to the third stage cleaner.

24. A careful assessment of the negative impacts that may be caused by the project on the fauna and flora.

This section has been completed in Part 2 of the ESHIA Document (ESHIA) in Chapter 6, Section 6.2.4, 6.2.5, 6.2.6, 6.3.4, 6.3.5, 6.3.6, 6.4.5, 6.4.6, 6.4.7, 6.5.5, 6.5.6, 6.6.7 and 6.6

25. The presentation of specific mitigation measures for socio cultural impacts and monitoring program and water sources that supply the communities around the project.

Mitigation measures related to Socio cultural impacts has been completed in Part 2 of the ESHIA Document (ESHIA) in Chapter 7, Section 7.4.1, 7.4.2, 7.5, 7.6

Mitigation measures related to water sources supplying communities has been completed in Part 2 of the ESHIA Document (ESHIA) in Chapter 6, Section 6.3.3, 6.4.3, 6.4.4, 6.5, 6.6. Impacts on the use of natural resources have also been completed in Chapter 7.

26. Description of the conditions for the involvement of a greater number of stakeholders and affected by the project, government institutions, civil society, NGOs, and other

This has been covered in the Public Participation Report

27. This evaluation of the impacts on the mobility of the population in relation to its activities

This issue is assessed and mitigation measures are proposed in Chapter 7 section 7.4.1. impact 6.1. For Detailed information please refer to the SIA

28. The assessment of the impacts of population dynamics in the study area and its surroundings, during and post project,

These social impacts are descripted in Chapter 7 of the ESHIA, but for a more detailed understanding please refer to the SIA.

29. The effective survey of households affected by the project and improvements;

This has been completed as Part 5 of the ESHIA Document (Specialist Volume) particularly in the Social Impact Assessment (SIA) and the Resettlement Action Plan (RAP), Chapter 5 of both reports.

30. The massive involvement of the population directly affected by the project, the local administrative authorities, relevant government institutions and civil society in the design of proposed resettlement and compensation measures;

This has been completed as Part 5 of the ESHIA Document (Specialist Volume) particularly in the Resettlement Action Plan (RAP), chapters 4, 7 and 8.

31. The inclusion in the resettlement plan, alternative ways of survival of communities who for some reason cannot continue to develop livelihood activities in the project area;

This has been completed as Part 5 of the ESHIA Document (Specialist Volume) particularly in the Resettlement Action Plan (RAP), chapters 4, 7 and 8.

32. The observance of all requirements for the preparation of the resettlement plan said by Regulations on Resettlement Process Resulting from Economic Activities, approved by Decree No 31/2012 of 8 August;

This has been completed as Part 5 of the ESHIA Document (Specialist Volume) particularly in the Resettlement Action Plan (RAP).

33. Compliance with Environmental Regulation for Mining Activities, Decree No. 26/2004, in the drafting of the Mine Closure and Rehabilitation

Please refer to chapter 11 section 11.4

34. The presentation of the Report of Use and Land (DUATs) and the Mining Concession License









 e) Demarcar a área de concessão por meio de marcos de betão facilmente identificáveis no prazo de 90 (noventa) dias a partir da data de emissão de concessão mineira ou alteração da área;

f) Prestar informação estatística regular sobre a produção e exportação realizadas;

 g) Fornecer informação mensal, relatórios trimestrais e anuais das actividades desenvolvidas, nos termos do artigo 55 do RLM;

 h) Submeter até 31 de Maio de cada ano, um programa de trabalho adequado e despesas mínimas a realizar no ano seguinte, bem como o plano de venda de produtos minerais;

 Manter a área e as operações mineiras em estado seguro, em cumprimento dos regulamentos de gestão, saúde e de segurança técnica mineira;

 cumprir com as exigências de protecção, gestão e restauração ambiental nos termos da legislação ambiental e Regulamento Ambiental para Actividade Mineira;

 k) Permitir o acesso, através da área mineira, a qualquer terra contígua, desde que tal não Interfira

na actividade mineira;

 Permitir a construção e utilização, na área mineira, de condutas, gasodutos, esgotos, drenagens, fios, linhas de transporte de energia eléctrica, estradas e infra-estruturas públicas, desde que não interfiram com a actividade mineira;

m) Constituir seguro contra todos os riscos, em conformidade com a capacidade instalada na mina

ou volume de investimento, nos termos do disposto nos nºs 6 e 7 do artigo 50 do RLM;

n) Pagar uma caução financeira equivalente a um valor entre 10% e 20% do montante definido no

plano de investimentos ou programa de trabalhos, de acordo com o disposto no artigo 111 do RLM.

3 - Responsabilidade por Perdas e Danos

a) O titular da concessão mineira que por força do exercício dos direitos mineiros cause, nas áreas sujeitas ao respectivo título, prejuízos a culturas, solos, construções e benfeitorias ou determine a transferência dos utentes ou ocupantes da terra da respectiva área de ocupação, incorre na obrigação de indemnizar o titular dos referidos bens e os reassentados;

 b) Igualmente incorre na obrigação de indemnizar respondendo solidariamente com o titular mineiro, o operador mineiro ou qualquer subcontratado.

4 - Outros Termos e Condições

Para além dos direitos e obrigações aqui constantes e decorrentes da Lei de Minas e seus regulamentos, são fixados outros termos e condições seguintes:



35. A clear description of the Programme of Corporate Social Responsibility to the communities directly affected project.

This has not been finalised yet as discussions are still underway. This will be presented in the final ESHIA

APPENDIX 2: IMPACT RATING METHODOLOGY

Methodology for Assessing the Significance of Impacts

Specialists are required to provide the reports in a specific layout and structure, so that a uniform specialist report volume can be produced. To ensure a direct comparison between various specialist studies, standard rating scales have been defined for assessing and quantifying the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed.

Five factors need to be considered when assessing the significance of impacts, namely:

- 1. Relationship of the impact to **temporal** scales the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- 2. Relationship of the impact to **spatial** scales the spatial scale defines the physical extent of the impact.
- 3. The severity of the impact the **severity/beneficial** scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.

The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.

4. The likelihood of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

Each criterion is ranked as presented in Table A3-1 to determine the overall **significance** of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The overall significance is determined using Table A3-2 and the significance is either negative or positive.

Table A3-1: Ranking of Evaluation Criteria

	Temporal	Scale						
	Short							
	term	Less than 5 years						
	Medium							
	term	Between 5-20 years						
	Long	Between 20 and 40 years (a generation)	and from a human perspective also					
	term	permanent						
	Perman	Over 40 years and resulting in a permane	ent and lasting change that will always be					
	ent	there						
	Spatial Sc	ale						
	Localise							
	d	At localised scale and a few hectares in e	extent					
	Study							
5	Area	I he proposed site and its immediate envi	Irons					
Ш	Regional	District and Provincial level						
Ш.	National	Country						
	Internati							
	onal	Internationally						
	Severity	Severity	Benefit					
		Slight impacts of the affected system(s)	Slightly beneficial to the affected system(s)					
	Slight	or party(ies)	and party(ies)					
	Moderat	Moderate impacts of the affected	Moderately beneficial to the affected					
	e	system(s) or party(ies)	system(s) and party(ies)					
	Severe/							
	Benefici	Severe impacts of the affected	A substantial benefit to the affected					
	ai	system(s) or party(les)	system(s) and party(les)					
	very Sovere/							
	Severe/ Benefici	Very severe change to the affected	A very substantial benefit to the affected					
	al	system(s) or party(ies)	system(s) and party(ies)					
~		The likeliheed of these impacts ecourring	is slight					
D O	Mov	The likelihood of these impacts occurring	is siign					
Η	Nay	The likelihood of these impacts occurring	is possible					
Ē	Prohabl							
Ľ	e	The likelihood of these impacts occurring	is probable					
	Definite	The likelihood is that this impact will defin	nitely occurr					

* In certain cases it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know

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Significance Rate	Description
Low	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment.
Moderate	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
High	A serious impact, if not mitigated, may prevent the implementation of the project (if it is a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe effects or beneficial effects.
Very High	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects, or very beneficial effects.

Table A3-2: Description of Environmental Significance Ratings and associated range of scores

The **environmental significance** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

Prioritising

The evaluation of the impacts, as described above is used to prioritise which impacts require mitigation measures.

Negative impacts that are ranked as being of "**VERY HIGH**" and "**HIGH**" significance will be investigated further to determine how the impact can be minimised or what alternative activities or mitigation measures can be implemented. These impacts may also assist decision makers i.e. lots of **HIGH** negative impacts may bring about a negative decision.

For impacts identified as having a negative impact of "**MODERATE**" significance, it is standard practice to investigate alternate activities and/or mitigation measures. The most effective and practical mitigations measures will then be proposed.

For impacts ranked as "**LOW**" significance, no investigations or alternatives will be considered. Possible management measures will be investigated to ensure that the impacts remain of low significance.

APPENDIX 3: CURRICULUM VITAE

A. Internal Specialists/Consultants

ANTHONY MARK AVIS (DR)

PERSONAL INFORMATION

Name of Staff: Dr Anthony Mark (Ted) Avis Date of Birth: 26 September 1960 Profession: Environmental Consultant and Managing Director of Coastal & Environmental Services Name of Firm: Coastal & Environmental Services Years with Firm/Entity: 24 years Nationality: South African Married since 1986: Wife Cheryl. Two Children. Jonathan - Born 1996; Luke - born 2002

Qualifications

1983: BSc 1984: BSc (Honours) 1992: PhD (Rhodes)

Dissertation

Coastal Dune Ecology and Management in the Eastern Cape

Associations

- Royal Society of South Africa
- Visiting Fellow; Department of Environmental Science; Rhodes University
- Certified Environmental Assessment Practitioner (since 2002)
- South African Association of Botanists (SAAB)
- South African Council for Natural Scientific Professionals
- South African Institute of Ecologists and Environmental Scientists
- International Association of Impact Assessment

COMMUNITY INVOLVEMENT

- MEC Representative on the Board of the Albany Museum of Natural History (2001 2009).
- Member of Grahamstown Round Table service club (1994 -2001)
- Chairman, Grahamstown Trust (1989 1997)
- Member of the St Andrews Preparatory School Board of Governors (2009 present)
- Chairman, St Andrews Preparatory School Board of Governors (2013)

NOTED ACHIEVEMENTS

- Publication of three manuscripts in refereed journals from research undertaken whilst an undergraduate student.
- Involvement as a principal consultant and coordinator of all specialist studies undertaken as part of the St Lucia EIA, being the youngest member of a team of 30 scientists involved in this project.
- Awarded the South African Association of Botanists Junior Medal. This is awarded to the candidate with the best PhD thesis in Botany for the particular year under review (1993).

• Instrumental in establishing the Environmental Science Programme at Rhodes University (in 1996), which later became the Environmental Science Department (2000)

Professional Experience

1998 – present: Full-time Managing Director of Coastal & Environmental Services.

1989 – 1997: Lecturer and Senior Lecturer in Botany at Rhodes University.

Private environmental consultant and partner of Coastal & Environmental Services (CES, established January 1990).

1987 – 1988: Ecological Consultant with Loxton Venn and Associates, responsible for vegetation, soils and land surveys; veld conditions assessments and EIAs.

1983 – 1987: Full time research in ecology, including coastal management studies and Environmental Impact Assessments (EIAs).

Consulting experience

I have consulted in Botswana, Egypt, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mozambique, Mauritius, Namibia, Sierra Leone, South Africa and Zambia. Environmental consulting experience, in no particular order, includes:

SELECTED LARGE Environmental Impact Assessments

- 1. Principal consultant for the specialist studies for the Environmental Impact Assessments of proposed dune mining on the Eastern Shores of Lake St Lucia.
- 2. Overall responsibility as EIA project manager for all environmental aspects of Billiton's TiGen mineral sand mining operations in Mozambique, to produce an EIA that meets international standards.
- 3. EIA project manager for the Corridor Sands mineral sand mining project in southern Mozambique, to produce four EIAs to World Bank standards for the project's bankable feasibility study. EIAs produced for the mine site and smelter, the 400Kv power line, the 87km rail route and a bulk cargo facility at Matola Port. All these EIAs included the preparation of Environmental Management Plans.
- 4. EIA project manager for Tiomin Resources Inc (Toronto, Canada) for their Kwale mineral sands project in southern Kenya. Responsible for producing all six volumes of the EIA, regarded as the most comprehensive in Kenya to date.
- 5. EIA project manager for the EIA to support the rezoning of land to special purposes for the establishment of the Coega Industrial Development Zone (IDZ).
- 6. EIA project manager for the EIA to support the rezoning of land to special purposes for the establishment of the East London IDZ.
- 7. Numerous small-scale Scoping Reports as part of the Environmental Impact Assessment Process and in accordance with the requirements of the Environmental Conservation Act.
- 8. Pre-feasibility Environmental Impact Assessments, including one for BHP's mineral sand mining project in northern Mozambique, and similar projects in south-west Madagascar and Mozambique.
- 9. Study leader for a comprehensive EIA for the World Bank funded 400Kv Mozambique Malawi Interconnector project power line, Malawi sector.
- 10. EIA for a dedicated haul road, material handling facility and jetty near Praia de Xai Xai, Mozambique for WMC Resources, Australia.
- 11. EIA Project Manager for the Nuclear Materials Authority of Egypt, to prepare the EIA as part of the Downer EDI Feasibility Study Team. (2007).
- 12. EIA for a large scale resort development, including two golf courses and three hotels in the Eastern Cape, South Africa. (Ongoing).

- 13. EIA for the Madiba Bay resort development, incorporating the development of various portions of land within a 5000 hectare site for a range of resort type facilities. (2005 2008).
- 14. Study Leader for an EIA for a large heavy mineral mining project in South West Madagascar for Exxaro (2006 2008).
- 15. Study Leader for an EIA for a proposed heavy mineral mine on the shores of Lake Malawi near Chipoka. (2005 2006).
- 16. Study Leader for an ESIA for a proposed large scale integrated tourism resort development in the Eastern Cape (2007 2008).
- 17. Environmental and Social consultants to the International Finance Corporation for the Kafue Gorge Lower Hydropower project, Zambia.
- 18. Study Leader for an Environmental, Social and Health Impact Assessment for a proposed large sugar cane to ethanol biofuel project in Sierra Leone for Addax Bioenergy, Geneva (2009 2010).
- 19. Study Leader for an ESHIA for a proposed large scale Jatropha biofuels project in Mozambique (2009 2010).
- 20. Study leader for Environmental Impact Assessment for a proposed large scale copper and nickel mine in the North West Province of Zambia (2010).
- 21. Lead consultant for an addendum Environmental Impact Assessment for the proposed expansion of a heavy mineral mining project in Nampula Province, Mozambique (2010).
- 22. Quality control reviewer for approximately 8 EIA's for various Windfarm Projects in South Africa (2009 2010).
- 23. Study leader for an ESHIA for a proposed large scale palm oil plantation in Sierra Leone (2010).
- 24. Study leader for ESIA for a rare earths mine in Kangankula, Malawi for the Lynas Corporation.
- 25. Study leader for ESIA for a large scale copper mine in the North West Province of Zambia for First Quantum Minerals (2011).
- 26. Study leader for an ESIA for a proposed Cement Plant and for a proposed Limestone quarry in southern Mozambique (2012).
- 27. Study Leader for an Environmental Impact Assessment of the Mooi-Mgeni Transfer Scheme Phase 2, KwaZulu-Natal Province, South Africa for TCTA (2012).
- 28. Study leader for an ESHIA for a proposed large scale palm oil plantation and estate in Liberia, compliant with international sector specific guidelines. For EP Oil (2012).
- 29. Study leader for an ESHIA for a proposed large scale forestry plantation in Niassa Province, Mozambique for Niassa Green Resources and to be compliant with international sector specific guidelines (2010).
- 30. Study leader for an EIA for a proposed golf course in Makana District, South Africa (2012)
- 31. Study leader for an EIA for a proposed housing and residential estate in Makana District, South Africa (2012).
- 32. Study Leader for an ESHIA for a heavy mineral mining project in South West Madagascar for World Titanium Resources (2013).
- 33. Study Leader for an ESHIA for a heavy mineral mining project on the West Coast of South Africa for Zirco Resources (2013).

Policy and strategic assessments

- 1. The development of the Eastern Cape Coastal Management Plan, to be adopted as policy by the Eastern Cape Government
- 2. Study leader for the preparation of a State of Environment Report, and Environmental Implementation Plan for the Amatole District Municipality, covering an area of approximately 25 000 km².
- 3. Reports on ecological assessments of the damage caused to the environment by alleged illegal developments along the former Transkei coastline.
- 4. Study leader and project manager for the preparation of a World Bank/Global Environmental Facility funded geographic Strategic Environmental Assessment of the proposed greater Addo Elephant National Park, Eastern Cape, South Africa.

- 5. A Strategic Environmental Assessment of four land use options in the Centane district of the Wild Coast.
- 6. SEA covering an area half the size of the Eastern Cape (former Transkei) to identify where afforestation projects could be implemented on a sustainable basis for poverty alleviation. Prepared for the Department of Water Affairs and Forestry (2006 2007).
- Integrated Coastal Zone Management Plan for the Buffalo City Municipality, Eastern Cape South Africa, including numerous Management Plans for estuaries, beaches etc. (2006 – 2007).
- 8. A Sustainability Analysis of various land use alternatives to determine optimum land use for the future rehabilitation of lease areas at Richards Bay Minerals. (2006).
- 9. State of Environmental Report and Environmental Management System for the Ukhulambe District Municipality. (2005).
- 10. Strategic Environmental Overview for two integrated tourism anchor projects in Mozambique for the International Finance Corporation (2010).

Ecological

- 1. Ecological impact assessment for a proposed Zinc and Phosphoric Acid plant in the Eastern Cape.
- 2. Ecological specialist reports for the Coega Industrial Development Zone Strategic Environmental Assessment
- 3. Ecological impact assessment of proposed 800km Wild Coast N2 Toll Road, Eastern Cape.
- 4. Study leader for the ecological impact assessment of the Wild Coast Toll Road EIA, Eastern Cape and Kwazulu/Natal, South Africa (2004).
- 5. Study Leader for Baseline Ecological Surveys of coastal lease areas in southern Mozambique for Rio Tinto exploration (2008).
- 6. Pre-feasibility Ecological Survey of the Skeleton Coast to identify critical impacts linked to Diamond and Mineral Mining exploration (2008).
- 7. Coordinator for ecological investigations to establish a sound baseline prior to implementing an EIA, North West Province, Zambia (2011).
- 8. Assessment of the extent and conservation value of forested areas along the Wild Coast within the former Transkei, on behalf of the Eastern Cape Parks Board (2011)

Environmental Management

- 1. Project manager for a five-year rehabilitation programme of Samancor's Chemfos mine on the West Coast.
- 2. Development of an Open Space Management Plan for the Coega Industrial Development Zone (IDZ), including the demarcation of open spaces, formulation of uses within the open space, integration with MOSS principles and developing guidelines and a business plan for the management of the open space system.
- 3. Preparation of numerous Environmental Management Programme Reports, in terms of the Minerals Act, for quarry operations in the Eastern Cape, including EMPRs for both the Eastern and Western Coega Kops.
- 4. Study Leader for the development of two detailed and definitive Environmental Management Plans for the construction of two large bridges across rivers in the Wild Coast, as part of the Wild Coast N2 Toll Road Project, for South African National Roads Agency Limited. (2006).
- 5. Joint Study Leader for the development of numerous Construction and Operational Phase Environmental and Social Management Plans for Tiomin's proposed Kwale mineral mine in Kenya.

Other

- 1. A position paper on the current ecological knowledge of the Eastern Cape Provincial Coastline: implications for planning and research.
- 2. Environmental training and teaching for a number of professional short courses, and at undergraduate and postgraduate level at Rhodes University.

- 3. Presented 29 conference papers and published 19 scientific articles in peer reviewed scientific journals.
- 4. Presented various courses on aspects of Environmental Impact Assessment, most notably as a key presenter on the EIA Short Course offered by CES since 2000.
- 5. Short course on Strategic Environmental Assessment offered to Rhodes Investec Business School MBA students.

CHANTEL BEZUIDENHOUT (DR)

Date of Birth: 11 March 1978 Languages: Afrikaans, mother tongue English, excellent

QUALIFICATIONS

- B.Sc. (Botany, Geography)
- B.Sc.(Hons)(Botany: Ecology, Environmental Management, Geographic Information Systems)
- M.Sc. (Botany: Estuarine Ecology)
- PhD (Botany: Estuarine Ecology)
- FIELDS OF RESEARCH
 - Third year project:
 - The Extraction of Agar from Macrophytes
 - Honours projects:
 - The Management of Phragmites australis in the Mcantsi Estuary
 - Assessing the PE Metropolitan Open Space Systems (MOSS) and assigning a conservancy score for the Port Elizabeth Municipality (PEM)
 - Masters project:
 - Diatoms as indicators of water quality in estuaries
 - PhD project:
 - Macrophytes as indicators of physico-chemical factors in South African estuaries

OTHER STUDIES AND WORKSHOPS

• The Biodiversity Planning Forum. Mpekweni Beach Resort, Eastern Cape. (March 2008)

PUBLICATIONS AND CONFERENCES

- Adams, J.B., Bornman, T.G. and Bezuidenhout, C. 2005. Specialist Report: Macrophytes. Olifants / Doring catchment. Ecological Water Requirements study, Olifants Estuary. Report submitted to CSIR, Environmentek, Stellenbosch. 39pp.
- Bezuidenhout, C., J.B. Adams and Bornman, T.G. 2005. Specialist Report: Macrophytes. Kromme Estuary Resources Directed Measures Study. Report submitted to the CSIR on behalf of the Department of Water Affairs and Forestry. 61pp.
- Bornman, T.G., Adams, J.B. and Bezuidenhout, C. 2004. Present status of the Orange River mouth wetland and potential for rehabilitation. Prepared for Working for Wetlands, South African National Biodiversity Institute. Nelson Mandela Metropolitan University. IECM Research Report No. 43. 54 pp.
- Bornman, T.G., Adams, J.B. and Bezuidenhout, C. 2004. Adaptations of salt march to semi-arid environments and management implications for the Orange River mouth. Transactions of the Royal Society of South Africa 59(2): 125-131.
- Bornman, T.G., Adams, J.B. and Bezuidenhout, C. 2005. Salt marsh characteristics and freshwater requirements of a cool temperate versus a warm temperate estuary. 12th Southern African Marine Science Symposium. Durban, Kwazulu-Natal.
- UPE Departmental Seminars: Extraction of Agar from Macrophytes (1999); The Application of National Legislation in the Management of and Conservation of Estuaries (2000); The Management of Phragmitesaustralis in the Mcanti Estuary (2000); Assessing the PE Metropolitan Open Space Systems (MOSS), and assigning a conservancy score for the PEM (2000).

CAREER BIOGRAPHY

October 2011 – Present

- Principal Environmental Consultant with Coastal & Environmental Services
- Branch Manager: Port Elizabeth office of Coastal & Environmental Services

February 2008 – September 2011

- Environmental Consultant with CEN Integrated Environmental Management Unit **February 2000 November 2006**
 - Botany Department Practical demonstrator, Nelson Mandela Metropolitan University (South Campus).
 - Field Research Assistant for research projects conducted in the Botany Department, Nelson Mandela Metropolitan University (South Campus).

February 2002 – November 2002

• Research Assistant in the Botany Department, Nelson Mandela Metropolitan University (South Campus).

February 2001 – August 2001

• Auxillary worker for the Western District Council.

Specialisation in Firm:

Environmental Impact Assessment, Estuarine and Saltmarsh Ecology

RECENT EXPERIENCE – COASTAL & ENVIRONMENTAL SERVICES

- Environmental Impact Assessment for the proposed residential development at the existing golf course in Grahamstown, Eastern Cape Province of South Africa (2012).
- Environmental Impact Assessment for the proposed golf course development at Belmont Valley, Grahamstown, Eastern Cape Province of South Africa (2012).
- Basic Assessment for the proposed development of a 13 MW Photovoltaic energy generating facility in the Coega Industrial Development Zone (Zone 12), Port Elizabeth, Eastern Cape Province. Authorization received 29/02/12.
- Scoping Report for the Mooi-Mgeni Transfer Scheme Phase 2, KwaZulu-Natal Province, South Africa (2012).
- Scoping Report for the proposed Peddie Wind Energy Project, Ngqushwa Local Municipality, Eastern Cape Province of South Africa (2012).

International Experience

Environmental Impact Assessment

- Environmental Impact Statement for a large scale copper mine in the North-Western Province of Zambia.
- Environmental Impact Statement for a large scale nickel mine in the North-Western Province of Zambia.
- Environmental and Social Impact Assessment for a heavy minerals mine in the Toliara Province, Madagascar.
- Project Manager: Graphite Mine in Cabo-Delgado Province, Mozambique

Specialist Assessment

- Land and Natural Mineral Resources Assessment for a heavy minerals mine in the Toliara Province, Madagascar.
- Land and Natural Mineral Resources Assessment Iron ore mine in Tete Province, Mozambique

PREVIOUS EXPERIENCE – SELECTED PROJECTS

• CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed establishment of 2 jetties, improvement of the existing, licensed slipway

and stabilization of the river banks on Portion 12 of the Farm Nocton 441 (Gamtoos ferry Hotel). (Port Elizabeth, Eastern Cape Province)

- CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed establishment of a Town Lodge Hotel on Erf 2150, Summerstrand. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed Rezoning and Subdivision of Erf 10501 and the remainder of Erf 5023, Walmer, Nelson Mandela Metropolitan Municipality, for the purpose of establishing a residential development. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed rezoning and the establishment of a hospital and associated infrastructure and facilities on a portion of the remainder of Erf 1226, Fairview, Port Elizabeth, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed rezoning of Portion 1 of the Farm Bucklands (No. 108), the Farm SchrikwatersPoort (No. 109) and the remainder of the farm Bucklands (No. 108) for the development of a Luxury Lodge, Makana Municipal Area, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed subdivision of Erf 2686, Parsonsvlei for a Residential Development Port Elizabeth, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2008) Basic Assessment for the proposed subdivision or Erf 2687, Parsonsvlei for a Residential Development, Port Elizabeth, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2008) Environmental Assessment for the proposed Rezoning and Subdivision of Portions 22 and 40 of the Farm Witteklip No 466, Nelson Mandela Bay Municipality. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2009) Environmental Assessment for the proposed subdivision of the remainder of Erf 1226, Fairview, Port Elizabeth, Eastern Cape for a Residential Development. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the establishment of a new 2.5 MI Kruisfontein Reservoir on Erf 2088 and a portion of the remainder of Erf 2, Humansdorp, Kouga Municipality, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the proposed extension of an existing 36m lattice mast to a 46m lattice mast on Erf 8917, Uitenhage, Nelson Mandela Bay Municipality, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the proposed extension of an existing 36m lattice mast to a 46m lattice mast of Erf 1296, Summerstrand, Port Elizabeth, Eastern Cape. (Port Elizabeth, Eastern Cape).
- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the proposed extension of an existing 36m lattice mast to a 56m lattice mast on Erf 1345, Walmer, Port Elizabeth, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the proposed rezoning and subdivision of a portion of Erf 1721, Aberdeen, Camdeboo Municipality, Eastern Cape to develop subsidized housing and related community facilities (Lotusville Extension). (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the proposed rezoning and subdivision of a portion of Erf 1721, Aberdeen, Camdeboo Municipality, Eastern Cape to develop subsidised housing and related community facilities (Thembalesizwe Extension). (Port Elizabeth, Eastern Cape)

- CEN Integrated Environmental Management Unit: (2009) Basic Assessment for the proposed stabilization of the river banks on Portion 2 of the Farm Nocton 441 (Adjacent to the Gamtoos Ferry Hotel). (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2010) Environmental Impact Assessment for the proposed construction and upgrading of the new Glen Hurd Road as well as the construction of the Baakens River Bridge, Port Elizabeth, Eastern Cape. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2010) Environmental Impact Assessment for the proposed subdivision of the remainder of Erf 982, Parsonsvlei, Port Elizabeth, Eastern Cape for a residential development. (Port Elizabeth, Eastern Cape)
- CEN Integrated Environmental Management Unit: (2010) Environmental Impact Assessment for the proposed rezoning and subdivision of erven 1070, 409 and the remainder of Erf 385, Theescombe, Port Elizabeth, Eastern Cape for a residential development. (Port Elizabeth, Eastern Cape)

KIM BRENT

Date of Birth: Languages: 16-11-1987 Afrikaans – Mother tongue English - excellent

QUALIFICATIONS

B.Sc degree (Botany, Geography)*

B.Sc Honours (Botany: environmental management, landscape ecology, geographic information systems)*

*Obtained as 'van Huyssteen'

FIELDS OF RESEARCH

Third year project:

What is eating the critically endangered Honeybush tea?

Honours projects:

- The biotic management of the Velddrif solar saltworks
- The short term effects of increase in temperature on the potential distribution of *Syncarpha paniculata*(thunb.) B.nordenstam and *Syncarpha recurvata*(I.f.) B.nordenstam, as determined by its physiological responses

CAREER BIOGRAPHY

February 2010-November 2010

Practical demonstrator at Nelson Mandela Metropolitan University (South Campus)

January 2011 – January 2014

• Environmental consultant at CEN Integrated Environmental Management unit

February 2014 – Present

• Environmental Consultant at EOH Coastal & Environmental Services

CONSULTING EXPERIENCE (PREVIOUS EMPLOYER)

- Review document for the Aggeneis-Oranjemond 400kV power line and substations upgrade, Northern Cape: Scoping Report.
- Review document for the Aggeneis-Oranjemond 400kV power line and substations upgrade, Northern Cape: EIA Report.
- Aston Bay Swanlake EMP
- Construction of a social housing project and associated infrastructure on Erf 3937, Fairview, Port Elizabeth: Environmental auditing process
- Kragga Kamma Road refuse transfer station: 24G application, Public participation and rectification assessment report.
- Pearston solar farm assisted in the Environmental Impact Assessment Report
- Pearston solar farm (Phase 2 & 3) assisted in the Environmental impact assessment report;
- Hemsley Family Trust: Subdivision and rezone of portion 176 (A and B) of the farm Goedgeloof nr 745, in St Francis Bay, Kouga district: Basic assessment
- Dondolo Family Trust: The construction of a Shopping centre on Erf 24296, KwaNobuhle: Basic assessment
- Dondolo Family Trust: The development of formalized parking on Erf 1, KwaNobuhle: Basic assessment and water use permit application
- Environmental Audits for the construction of a residential development and associated infrastructure on Erf 7023 (Ptn of 14935), Walmer: Environmental control officer
- Construction and upgrading of the new Glen Hurd Road as well as the construction of the Baakens River Bridge, Port Elizabeth, Eastern Cape: Water use Permit Applications
- Jefferey's Bay Wind farm –Environmental control officer auditing process
- Ntshekisa Ferguson- Sheya Kulati integrated public transport system (IPTS), Port Elizabeth, Eastern Cape: Environmental management plan – in progress
- Proposed rezoning and subdivision of Portion 12 (a portion of Portion 4) of the farm Vetmaak Vlakte No. 312, Uitenhage RD, in the Nelson Mandela Bay Municipality, Eastern Cape for a mixed use development: Scoping and EIA Report
- Proposed clearing of bush for the cultivation of Lucerne fields and the construction of a dam (approximately 30 000 m³) to irrigate the lands, in Addo, Sundays River Valley Municipality: Basic assessment
- Proposed construction and operation of a a fuel filling station with rest and retail facilities, an agri-business retail/wholesale facility and a farm store with tourism and related facilities on Remainder of Portion 8 of the Farm Nanaga Hoogte No. 229 in the Sundays River Valley Municipality: Basic assessment
- Proposed construction of a cemetery on a portion of Erf 1814 in Graaff-Reinet, Eastern Cape: Basic assessment
- Proposed Establishment of a Low Density Leisure Estate and the redesign of the existing Skuitbaai golf course on Portions 12, 13 and 70 of the Farm Eerste Rivier 626: Basic assessment
- Upgrade of the Donkin Reserve, Port Elizabeth: Environmental auditing process
- Vegetation mapping for various projects

CONSULTING EXPERIENCE (CURRENT EMPLOYER)

Kim has assisted and worked on the following projects:

- Augmentation of the Lusikisiki Regional Water Supply Scheme, Eastern Cape Province, South Africa – Scoping and Environmental Impact Assessment
- Balama Graphite Mine in the Cabo Delgado Province in the District of Balama in Northern Mozambique Environmental and Social Health Impact Assessment
- Calmag Limestone Prospecting Application Public Consultation and Environmental Management Plan
- Enterprise Deposit, North Western Province, Zambia Environmental Impact Statement
- Existing Innovative Mouldings Plastic Recycling Facility, Holland Park, Port Elizabeth - Application For A Waste Licence & Basic Assessment Process

- Gibson Bay Wind farm in the Kouga Local Municipality Environmental Management Programme
- Kouga Wind Farm in the Kouga Municipality Environmental Auditing
- Masakhane Housing Development in Kwazakhele, Port Elizabeth Basic Assessment report
- Zirco Roode Heuwel, Kamiesberg Project, Northern Cape Scoping and Environmental Impact Assessment

DR. ERIC E IGBINIGIE (Pr. Sci. Nat.)

Date of birth: 21 March 1974 **QUALIFICATIONS**

2008: PhD. Biotechnology. Rhodes University, South Africa

2004: MSc. Environmental Biotechnology. Rhodes University, South Africa 2003: Environmental Management Training. Received training in Industrial Environmental Management

1999: BSc. Hons. Biochemistry. Ambrose Alli University, Nigeria (formally Edo State University)

Training

2014: Facilitator – Soil Remediation Workshop (ARC - Institute for Soil, Climate and Water) 2014: Environmental Management System ISO 14001:2004 Lead Auditor Training (BUREAU VERITAS)

2013: Contaminated Land Workshop (IMBEWU Sustainability Legal Specialist (Pty) Ltd / GEO Pollution Technologies).

2011: Climate Change: Adaptation and Mitigation – Swedish Metrological and Hydrological Institute, Sweden (Part I Sweden and Part II Namibia).

2010: Environmental Impact Assessment Certificate – Coastal & Environmental Services / Rhodes University, South Africa

2003: Industrial Environmental Management & Process Biotechnology – MSc Module, Rhodes University, South Africa

MEMBERSHIP

- South African Council for Natural Scientific Professions (Environmental Science: 400201/09).
- Water Institute of Southern Africa (WISA) (20783).
- International Water Association (IWA, UK) (00895495.)

PROFESSIONAL EXPERIENCE

May 2010 – Present: Senior Environmental Consultant (Coastal & Environmental Services, South Africa). I serve as a specialist consultant and project manager in projects that are rooted in my areas of specialisation including Basic Assessment, Environmental Impact Assessment, Environmental Due Diligence (Phase 1, 2 & 3), Environmental & Social Due Diligence, Management Systems and Auditing, Bioremediation and Waste valorisation processes. My project management duties include active project opportunity search, developing expression of interest and proposals as well as the management and maintenance of prospective and existing clients.

July 2009 – April 2010: Senior Research Scientist / Post graduate co-ordinator (Institute for Environmental Biotechnology, Rhodes University (EBRU)). Led a research group tasked with the bioremediation of coal spoils. Lectured Sustainable Environmental Biotechnology at M.Sc and Honours levels.

January 2008 – April 2009: Post-Doctoral Fellowship / Course leader: Environmental Biotechnology at EBRU.

June 2000 – November 2002: Water quality control analyst (Edo Pharmaceuticals Benin city, Nigeria). Duties included water supply and quality analyst, general wet chemistry analyst, National

water quality report compilation and presentation and computer lab manager.

March 1999 – February 2000: Field officer, National Programme on Immunization (NPI) (National Youth Service Corps (NYSC) Kano State, Nigeria). Duties included rural health educator, data collection for the NPI and Implementation of Polio vaccination in rural areas.

CONSULTING EXPERIENCE

Environmental Due Diligence (Contamination Assessment)

South Africa:

- Jan. 2013: Environmental Due Diligence Assessment (Phase 1 and 2) for the Coega Brick at the Industrial Development Zone, Port Elizabeth, South Africa.
- Feb. 2012: Contaminated Land Assessment Fishwater Flats Wastewater Treatment Works. Port Elizabeth, South Africa.
- Jun. 2011: Environmental Due Diligence Assessment (Phase 1 and 2) for the Coega Zone 6 Industrial Development Zone, Port Elizabeth, South Africa.
- Nov. 2011: Environmental Due Diligence Assessment (Phase 1 and 2) for the Coega Zone 13 Industrial Development Zone, Port Elizabeth, South Africa.

Environmental Monitoring, Training and Implementation

South Africa:

• 2012 to date: EIA Short Course Rhodes University: (i) Post EIA implementation and monitoring, (ii) Development of Environmental and Social Monitoring Plan.

Mozambique:

- 2011: Kenmare Moma mine Environmental Monitoring Programme update.
- 2011: Water and effluent monitoring requirements based on the IFC, MIGA and the Mozambican legislation for the purpose of the environmental completion for Kenmare Moma Mines Mozambique. Designed, developed and implemented a water and effluent monitoring programme. Contributed to the design and development of 3 portable water treatment plants and three domestic waste water treatment plants for the mine.
- 2011: Developing a wet chemistry manual for Kenmare Moma mine and trained personnel on effluent and water monitoring including sampling, analysis and result interpretation. Training also included the management of the onsite portable water treatment plant and sewage plant.

Madagascar:

• Feb. 2013: Toliara Sands' Renobe Mine Project Environmental and Social Monitoring Plan.

Sierra Leone:

• 2012: Developed a wet chemistry manual for Addax Bioenergy Sierra Leone and trained personnel on effluent and water monitoring including sampling, analysis and result interpretation.

Zambia:

• Jan. 2014: First Quantum Minerals Environmental Monitoring Plan for the Enterprise, Zambia.

Environmental and Social Management Plan

Liberia:

• Mar. 2013: Equatorial Palm Oil Environmental and Social Management System in accordance with the IFC Performance Standard 1.

Madagascar:

• Feb. 2013: Toliara Sands' Renobe Mine Project: Environmental and Social Management System in accordance with the IFC Performance Standard 1.

Mozambique:

• May, 2013: Niassa Green Resource Forestry Environmental and Social Management

Plan.

- Sep. 2011: GS Cimentos Cement Plant Environmental and Social Management Plan
- Sep. 2011: GS Cimentos Limestone Quarry Environmental and Social Management Plan.
- 2010: Developed the EMS ISO 14001 for Kenmare Moma Mines, Mozambique.

Zambia:

• May, 2013: Trident Copper and Nickel Project, Enterprise deposit, North Western Province, Zambia: Environmental and Social Management Plan.

Waste Management Specialist Studies

Ghana:

• Jun. 2012: African Plantation for Sustainable Development Biomass Power Plant Project: Waste and Wastewater Assessment Specialist Report in accordance with National Legislation and the IFC Industry Specific EHS Guidelines for Forest Harvesting Operations and Thermal Power Plant.

Liberia:

• Mar. 2012: Equatorial Palm Oil Waste and Wastewater Specialist Assessment Report in accordance with National Legislation and the IFC Industry Specific EHS Guidelines for Plantation Crop Production and Vegetable Oil Processing.

Madagascar:

• Jun. 2012: Toliara Sands' Renobe Mine Project Waste and Wastewater Specialist Assessment Report in accordance with National Legislation and the IFC Industry Specific EHS Guidelines for Mining.

Malawi:

• Nov. 2010: Kangankunde Monazite Mine, Malawi: Waste and Wastewater Specialist Assessment Report in accordance with National Legislation and the IFC Industry Specific EHS Guidelines for Mining.

Mozambique:

• May, 2010: Kenmare Moma Titanium Mining Project: Sanitation Assessment Report. Sierra Leone:

• Nov. 2012: Samshi Steel Mill and Power Plant Project Sierra Leone: Waste and Wastewater Specialist Assessment Report in accordance with National Legislation and the IFC Industry Specific EHS Guidelines for Integrated Steel Mill and Thermal Power Plant.

Zambia:

• Feb. 2011: Trident Copper and Nickel Project, Sentinel Deposit North Western Province, Zambia: Assessment of Infrastructure, Waste and Process Related Issues.

Environmental and Social Due Diligence (Compliance Audits)

Kenya / Uganda:

• Current: Independent Environmental Monitor for the Rift Valley Railway Kenya and Uganda.

Mozambique:

- 2012: IFC PS deviation assessment and implementation for heavy mineral mining project, Kenmare Moma Mines, Mozambique.
- Sep. 2010: Rehabilitation Plan for Kenmare Moma Titanium Minerals Project, Mozambique.

Nigeria:

- Current: Olokola Single Point Mooring and Tank Farm ESIA gap analysis based on the International Finance Corporation (IFC) Performance Standards (PS) and Industry Specific guidelines and requirement.
- Jan. 2013: Environmental and Social Due Diligence for the proposed Ossiomo Petrochemical Ammonia-Urea project, Ologbo, Edo State, Nigeria SWEDFUND.

Climate Change – Adaptation and Mitigation

Nigeria:

• May, 2011: Integrated Municipal Solid Waste management: A Potential Waste-to-Energy Project in Nigeria.

Zambia:

• Feb. 2011: Effects of the Trident Project on Global Climate Change: Trident Copper and Nickel Project, Sentinel Deposit North Western Province.

Environmental Impact Assessment and Pre-Feasibility Assessment South Africa:

- 2012: Basic Assessment for the Healdtown College Sewage Treatment Package Plant, Forth Beaufort, South Africa.
- 2012: Environmental Impact Assessment Report and Environmental Management Plans for the upgrade of the Fishwater Flats Wastewater Treatment Works, Coega Development Zone, Port Elizabeth.
- 2011: Scoping Report Upgrade of the Fishwater Flats Wastewater Treatment Works, Coega Development Zone, Port Elizabeth.
- 2011: Pinedale Eco-Estate Environmental Impact Assessment. Bathurst, Eastern Cape Province South Africa.
- 2010: Basic Assessment Report Wood Energy Biomass Project, Grahamstown, South Africa.

RESEARCH & TEACHING EXPERIENCE

2012 - Environmental Impact Assessment Short Course at Rhodes University

- Facilitator for the EIA short course.
- Lectured Post EIA implementation and monitoring.

2009 – Current: Post-graduate Supervision

- PhD Supervision: Development of a broad spectrum biocatalyst tool for coal & petroleum contaminated soil. (Current).
- MSc Supervision: Stacked-Heap coal bioreactor process in coal dumps rehabilitation. (Current).
- 2011: Coal-derived humic acid as a sustainable material for soil amendment. (Honours).
- 2011: The role of *Cynodon dactylon* root exudates in coal spoils rehabilitation. (Honours).
- 2010: Characterization and beneficiation of weathered coal-derived humic acid. (Honours).

July 2009 – April 2010: Senior Research Scientist - EBRU

- Supervise and lead the coal dump bioremediation and beneficiation research group and was responsible for its deliverables.
- Lectured Sustainable Environmental Biotechnology at Post-graduate level.
- Reviewer The South African Journal of Science.
- Responsible for the safety and health environment of EBRU.
- Responsible for research logistics.

July 2009 – April 2010: Anglo Coal land rehabilitation (FungCoal) project, Phase III (AngloCoal) *Research:* Integrated approach for beneficiating acid mine drainage (AMD) in conjunction with coal spoils and its applications in coal dump rehabilitation strategy that is channelled towards a clean development mechanism (CDM).

Responsibility: Supervised and lead the research team and was responsible for its deliverables *Funder:* Anglo Coal South Africa.

May 2008 – January 2009: Flue gas beneficiation (SASOL)

Research: The beneficiation of algal sequestered industrial CO₂ (derived from flue gas) for the production of biofuel (Bio-methane and Bio-diesel) and other fine chemicals. *Responsibility*: Research deliverables.

Funder: Sasol.

Outcome: Confidential Feasibility report submitted to Sasol, South Africa (2009).

January 2004 – December 2007: Anglo Coal land rehabilitation (FungCoal) project, Phase II (AngloCoal)

Research: The microbial biotransformation of coal materials for coal dump rehabilitation purpose and the beneficiation of coal waste spoils

Responsibility: Research deliverables.

Funder: Anglo Coal South Africa.

Outcomes:

- Patented technology (See Patent & Publications).
- Publications (See Patent & Publications).
- PhD thesis (2007). (See Patent & Publications)
- Anglo Coal FungCoal Report, Phase I and II. (See Patent & Publications)
- Grant awarded for FungCoal Phase III: Research grant for 4-year duration.

February 2003 – January 2004: Anglo Platinum wastewater treatment project (Anglo Platinum) *Research:* Investigating the enzymatic recovery of platinum from platinum waste streams *Responsibility:* Responsible for the research outcome *Funder:* Anglo Platinum South Africa. *Outcomes:*

- MSc thesis (2004) (See Patent & Publications).
- Beneficiation of platinum wastewater Confidential report submitted to Anglo Platinum South Africa (2004)

SELECTED PUBLICATIONS AND PATENT

2013: Lerato M. Sekhohola, **Eric E. Igbinigie** and A. Keith Cowan. Biological degradation and solubilization of coal: A review. Biodegradation. 24(3):305-318.

2011: South African Patent Office Patent Number 2010/02354 - Rhodes University (Stacked-Heap Coal Bioreactor). Contributors: Rose, P.D., **Igbinigie, E.E.**, Horan, M.P., Dames, J.F & Mukasa-Mugerwa, T.T.

2010. **Igbinigie, E.E.**, Mutambanengwe, C.Z. & Rose, P.D. Phyto-bioconversion of hard coal in *Cynodon dactylon*/coal rhizosphere. *Biotechnology Journal*. 5:292-303.

2008. **Igbinigie, E.E.,** Atkins, S., van Breugel, Y., van Dyke, S., Davies-Coleman, M.T. & Rose, P.D. Fungal biodegradation of hard coal by a newly reported isolate, *Neosartorya fischeri. Biotechnology Journal*. 3:1407-1416.

2007. **Igbinigie**, **E.E.** The rhizosphere as a bioprocess environment for the bioconversion of hard coal. PhD Thesis. Rhodes University.

2007. Rose, P.D., **Igbinigie, E.E.**, Horan, M., Atkins, S., van Dyk, S., van Breugel, Y., Mukasa-Mugerwa, T., Dames, J., Mutambanengwe, C.Z., Bowker, M. & Laubscher, R. Biotechnology of coal biosolubilization and applications in waste coal beneficiation. Anglo Coal FungCoal Report, Phase II. 1-349.

2004. Rose, P.D., Clarke, A. & **Igbinigie, E.E**. Biotechnology of coal biosolubilization and applications in biological treatment of mine drainage wastewaters and waste coal beneficiation. Anglo Coal FungCoal Report, Phase I. 1-100.

2004. **Igbinigie, E.E.** The enzymatic use of hydrogenase in sulphate reducing bacteria for the removal of platinum from industrial wastewater. MSc Thesis. Rhodes University.

KEVIN JOHN WHITTINGTON-JONES (Ph.D)

Date of Birth: 17-01-1972

QUALIFICATIONS

- 2005 Post Graduate Diploma in Higher Education (Rhodes University)
- 2000 Ph.D. Biotechnology (Rhodes University)
- 1997 M.Sc Zoology (Rhodes University)
- 1994 B.Sc Hons. Marine Biology with distinction (Rhodes University)
- 1993 B.Sc Microbiology & Zoology (Rhodes University)

PROFESSIONAL REGISTRATIONS

- Associate Member Institute of Environmental Management & Assessment (IEMA) (No. 0014994)
- Member The Institute of Waste Management of South Africa (IWMSA) (No. 40105035)
- South African Council for Natural Scientific Professions (Environmental Scientist: No. 400027/07)
- Roundtable on Sustainable Biomaterials (RSB) Auditor (No. 2013 10010) **PROFESSIONAL EXPERIENCE**

June 2014 – Present: Executive and Head Office Manager (EOH Coastal & Environmental Services)

January 2013 – June 2014:

Director & Head Office Manager (Coastal & Environmental Services)

March 2009 – June 2014: Director (Coastal & Environmental Services)

January 2006 – February 2009: Principal Environmental Consultant (Coastal & Environmental Services)

January 2007 – February 2009:

Senior Lecturer & Coordinator of the MBA Environmental Management Elective Programme (Rhodes Investec Business School)

January 2004 – December 2006:

Senior Lecturer (Department of Environmental Science, Rhodes University) & Coordinator of the MBA Environmental Management Elective Programme (Rhodes Investec Business School). Acting Head of Department from August – December 2006

January 2002 – January 2004:

Lecturer in Biotechnology (Dept. Biochemistry, Microbiology & Biotechnology, Rhodes University, Grahamstown). Duties included development and coordination of the Environmental Biotechnology Masters Degree Course and a 3-week short course in Industrial Environmental Management. I was Acting Head of Department (Biotechnology) from May – December 2003.

January 2001 – January 2002:

Research Assistant and Course Coordinator for Environmental Biotechnology MSc Programme (Dept. Biochemistry, Microbiology & Biotechnology, Rhodes University).

2000 - 2001:

Accounts Assistant, Skandia Life, Southampton, UK. My primary duty during this period was to investigate the financial implications of new UK carbon tax legislation.

CONSULTING EXPERIENCE

Environmental consulting experience as project manager or team member is broad and covers a number of key areas. Specific experience includes the following:

Environmental Impact Assessment and pre-feasibility assessments

- ESIA for the Enterprise Copper Mine, Zambia (specialist and report review)
- ESIA for the Sentinel Copper Mine, Zambia (specialist and report review)
- Rapid Site Assessment for proposed resettlement village, Palma, Mozambique for WorleyParsons
- ESIA for Lurio Green Resources 120 000ha commercial plantation development, Mozambique
- ESIA for the Niassa Green Resources commercial plantation development, Mozambique
- ESIA for EcoFarm organic sugar and beef production facility, Mozambique [ongoing]
- ESHIAs for two heavy mineral mining projects for Kenmare Resources (Mozambique) [ongoing]
- Environmental assessment of the impact of the breach of a slimes settling pond for a corporate client
- EIA for Waainek wind energy facility outside Grahamstown (Eastern Cape)
- EIA for 1 million m³ per year sugarcane-to-ethanol biofuel development (Chemba, Mozambique)
- Scoping study for one large wind farm near Cookhouse (Eastern Cape)
- Environmental pre-feasibility assessment for 14 wind farms in the Western Cape, South Africa
- Basic Environmental Assessment for a 3MW wood to energy project near Grahamstown (Eastern Cape) for the Nollen Group
- Basic Environmental Assessments for wind measurement masts (InnoWind) and large-scale cattle feedlot (Roodepan Feedlot)
- EIAs for the proposed Exxaro AlloyStream and Kalagadi manganese smelters in the Coega IDZ
- Environmental Impact Assessment of the proposed regional hazardous waste site (Port Elizabeth, Eastern Cape)
- Environmental Scoping study and EMPR amendment for proposed salt mining and beneficiation plant (Coega IDZ, Eastern Cape)
- Scoping-level environmental assessment for a stainless steel strip mill (Coega IDZ, Eastern Cape)

Strategic Environmental Assessment

• Scoping-level Strategic Environmental Assessment (SEA) for the Port of Mossel Bay as well as contributions to the SEAs for the Ports of Port Elizabeth and East London

Climate change

- Climate change adaptation and mitigation policy for the Eastern Cape Province, South Africa (ongoing)
- Preliminary carbon footprint assessment for Kenmare Moma Heavy Mineral Sands Mine, Mozambique
- Climate change risk assessment for the South African Ports (TNPA)

Waste Management

- Waste management specialist studies for the following:
 - International heavy mineral mining projects including El Burulus (Egypt), Malawi Monazite (Malawi), and Tolira Sands (Madagascar);
 - Syrah graphite mine, Mozambique
 - First Quantum Trident copper mines (Zambia)
 - Two manganese smelters at the Coega IDZ, South Africa (for Exxaro Resources and Kalagadi Manganese);
 - Rabai power station (Kenya)
 - Large agro-industrial (bio-ethanol and palm oil) projects for Addax Bioenergy (Sierra Leone), Equatorial Palm Oil (Liberia), Grown Energy (Mozambique)
 - African Plantations for Sustainable Development (APSD) wood to energy plant (Ghana).
- Integrated Waste Management Plan for the Port of Mossel Bay
- Development of strategies and biological systems for the treatment and beneficiation of domestic grey water within the Scenery Park low-cost "eco-village" (Buffalo City, Eastern Cape)

Environmental Due Diligence and Business Risk

- IFC Performance Standards audit for Kenmare Resources' Moma Heavy Mineral Sands Mine, Mozambique
- Environmental & social due diligence on forestry operation for Global Solidarity Forest Fund for plantation development in Mozambique.
- Environmental & social due diligence for Cennergi on a proposed gas power plant and powerline (Mozambique)
- Environmental and social due diligence assessment for a forest plantation in Uganda on behalf of the German Development Bank (DEG)
- Environmental and social due diligence assessment for a pulp mill and forest plantation in Swaziland on behalf of the German Development Bank (DEG)
- Environmental risk assessment of alternative bunkering modes for the Port of Port Elizabeth (PE, Eastern Cape)
- Environmental risk assessment for private developer on the west coast, South Africa
- Environmental liability assessment for the Port of Durban
- Environmental due diligence (Phase 1 and 2) assessment for Zones 5, 6 and 13 of the Coega Industrial Development Zone
- Phase 1 and 2 contaminated land assessments for a private manufacturer and one parastatal organization

Policy and Guidelines

- Development of a municipal sanitation policy for Buffalo City Municipality
- Development of EIA guidelines for the Roundtable on Sustainable Biofuels

Environmental Auditing and compliance

- Environmental and Social management systems audit and ESMS development, Econet Wireless Zimbabwe (EWZ), Zimbabwe.
- Multiple environmental and social audits for Kenmare Resources' heavy mineral mine, Mozambique.
- Project management of the environmental component of the Completion Test for Kenmare Resources' heavy mineral mining project, Mozambique.
- IFC Performance Standards deviation assessment for Kenmare heavy mineral mining project, Mozambique (2010 and 2012)
- Environmental audit for mechanical sugarcane harvesting operation, Swaziland

- Development, implementation and auditing of industry-specific environmental management system for brick manufacturing companies in the Eastern cape, South Africa (2001 2004)
- Internal ISO 14001 audits at SAB Ibhayi Brewery (Port Elizabeth, Eastern Cape) [2001 – 2004]
- Trainee Auditor: Certification audit of car component manufacturer

RESEARCH & TEACHING EXPERIENCE

I have successfully supervised 3 PhD, 6 research and 15 coursework MSc / MBA students. Research has been published in peer-reviewed journals and presented at conferences. A full list of publications is available upon request. Areas of research include environmental biotechnology, integrated waste management and environmental management in business. From 2001 – 2003 I was responsible for coordinating the Environmental biotechnology MSc programme (Department of Biotechnology, Rhodes University) where I taught bioremediation. I have also taught environmental management and integrated pollution & waste management at the undergraduate and Honours level for the Department of Environmental Science (2004 – present) and have taught extensively on the Rhodes University MBA programme (2004 – present). Subjects taught at the MBA level include business and sustainable development, environmental risk assessment, technology assessment, life cycle assessment and climate change risk.

CHERIE-LYNN MACK

Date of Birth: 05-08-1980

QUALIFICATIONS

PhD Environmental Biotechnology (Rhodes University), M.Sc Environmental Biotechnology with distinction (Rhodes University), B.Sc Hons. Biotechnology (Rhodes University), B.Sc Microbiology & Biochemistry (Rhodes University)

Completed the SASS5 aquatic macroinvertebrate monitoring course (2012) conducted by Groundtruth (Dr Mark Graham)

MEMBERSHIP

- The Water Institute of Southern Africa (WISA)
- International Association for Impact Assessment (South Africa)

PROFESSIONAL EXPERIENCE

November 2009 – Present: Principle Environmental Consultant (Coastal & Environmental Services)

October 2008 – July 2009: Water Scientist (Golder Associates Africa)

January 2008 – June 2008: Postdoctoral Research student (Department of Microbiology, Stellenbosch University)

CONSULTING EXPERIENCE

October 2009 – present Principle Environmental Consultant, Coastal & Environmental Services

As a principle consultant, my role in the company is to manage and provide input into the compilation of Environmental Impact Assessments for a wide variety of clients, and for a wide variety of developments. To date, these projects have included:

Renewable Energy Projects

- Great Kei Wind Energy Facility
- Qumbu Wind Energy Facility
- Ngqamakhwe Renewable Energy Facility EIA
- Ncora Renewable Energy Facility EIA
- Qunu Renewable Energy Facility EIA
- Thomas River Renewable Energy Facility EIA
- Chaba Wind Energy EIA
- Lushington Park Wind Energy Facility EIA

Wastewater Specialist Assessments:

- Wastewater Specialist Impact Assessment for St Patricks Hospital Wastewater Treatment Works
- Environmental Management Plan as part of the Alfred Nzo District Municipality Effluent Management Plan
- Wastewater Specialist Impact Assessment for Jamestown Wastewater Treatment Works
- Wastewater Specialist Impact Assessment for Qolora Aquaculture Zone EIA
- All Saints Wastewater Treatment Works, Wastewater Specialist Impact
 Assessment
- Project Manager and Waste Specialist: Scoping and Environmental Impact assessment for Sunningdale Dairy Processing Facility

Water Quality Specialist Assessments:

- Surface and Groundwater Assessment Report. EcoFarm Sugar Plantation Project, Mozambique
- Water Quality Specialist Impact Assessment for the proposed abstraction works in the Lower Fish River. Ndlambe Local Municipality
- Surface Water and Groundwater Quality Annual Report, for Kenmare Mining, Mozambique
- Project Manager and Surface Water Quality Specialist: Surface and groundwater quality monitoring program for the East London Industrial Development Zone

Aquatic Ecology Specialist Assessments:

- Aquatic Ecology Baseline Survey and Impact Assessment (Macroinvertebrates and Water quality). Syrah Resources Graphite Mine, Mozambique.
- Aquatic Ecology Baseline Survey and Impact Assessment (Macroinvertebrates and Water quality). Baobab Iron Ore Mine, Mozambique.

Other:

- Waste License for the DAS Electro-coating Facility Wastewater Treatment Works EIA
- Eastern Cape Parks and Tourism Authority Upgrade of the Water and Wastewater Treatment works at Double Mouth Camp site EIA
- Department of Water Affairs: Lusikisiki Regional Bulk Water Supply Scheme EIA
- Ndlambe Local Municipality Bulk Water Supply Scheme EIA
- TNPA Foreshore Reclamation Project EIA, Port of East London
- Eskom Distribution Power line EIAs (x4)

October 2008 – July 2009 Water Scientist, Golder Associates Africa

Surface and Groundwater Specialist Assessments:

- Surface water specialist information gap analysis for LIFEX coal mine extension project for AngloCoal.
- Water quality trainee: Comprehensive reserve determination for the Lower and Middle Vaal Water Management Areas (DWAF).
- Water quality trainee: Intermediate reserve determination of the Crocodile (West) and Marico Water Management Areas (DWAF)

Other:

- The linear flow channel reactor for oxidation of sulphide in semi-treated acid mine drainage for the Water Research Commission (WRC)
- Construction and operation of an Integrated Managed Passive (IMPI) demonstration scale acid mine drainage treatment plant for BHP Billiton
- Metal removal using sulphate reducing bacteria (SRB) from acid mine drainage for Landau Colliery (AngloCoal)

RESEARCH & TEACHING EXPERIENCE

I have had my research published in peer-reviewed journals and have presented at various international conferences. A full list of publications is available upon request. My area of research is environmental biotechnology, with emphasis on industrial wastewater treatment technologies, particularly from the mining sector.

BILL ROWLSTON

Full name: Date of Birth: Nationality Languages: (understand) William Stuart John Rowlston 6th June 1949 South African (by naturalisation); English (by birth) English (fluent, all aspects), Afrikaans

PRESENT POSITION

Director, Coastal and Environmental Services (Pty) Ltd, Grahamstown, South Africa

ACADEMIC QUALIFICATIONS

BSc Honours Class 1, Civil Engineering, University of Salford, England, 1971

PROFESSIONAL MEMBERSHIPS

- Fellow of the Water Institute of Southern Africa
- Member of the South African Society of Aquatic Scientists (Silver Medal holder)

PROFESSIONAL EXPERIENCE (in reverse date order)

2007-Present: Coastal & Environmental Services, Grahamstown, RSA

- International Lenders' Environmental and Social Compliance reviews / monitoring for:
 - Two solar concentrated power facilities, Northern Cape Province of South Africa.
 - Small-scale hydroelectric project, North Eastern Zimbabwe.
 - Corporate E&S Review for electricity transmission and distribution company, North-West Province, Zambia.
 - Two large hydro-electric projects, Zambia.
 - The rehabilitation of the Rift Valley Railway, Kenya and Uganda.
 - Solar PV facility in, Northern Cape Province of South Africa
 - Agri-Industrial conglomerate, South Africa
- Project manager for:
 - ÉSHIA for a mini-steel mill in Port Loko, Sierra Leone
 - EIAs for two ferro-manganese smelters in the Coega IDZ, Port Elizabeth.
 - EIA for the Mooi-Mgeni Water Transfer Scheme, Phase 2, KZN Province, South Africa.
 - Determination of the environmental water requirements for the Kafue River, downstream of a proposed hydro-electric project.
 - Determination of environmental water requirements for the Musangezhi River, Zambia, downstream of a major copper mining operation.
 - A number of Basic Assessments (agri-industrial, residential, commercial), Eastern Cape Province, South Africa
- Water resources specialist for a number of mining, agri-industrial and bio-fuel projects in Mozambique and Zambia.
- Team member (water policy and institutional specialist) for the review and revision of Vietnam's Law on Water Resources (in Hanoi).
- Strategic advisor in the development of South Africa's National Groundwater Strategy.
- Contributor to a review of South Africa's experience with environmental water requirements. Lead author for two chapters on the history of the development of water law in South Africa, and institutional arrangements.
- Co-author of a Technical Report for the Ramsar Convention on Wetlands: Determining and Implementing Environmental Water Requirements (not published – reasons unknown).

- Technical support and training for Catchment Management Agencies in developing catchment management strategies.
- Project manager / specialist water studies for various environmental impact assessments.
- Team member for the regulatory Impact Assessment for the SA Department of Environmental Affairs' Integrated Coastal Management Bill.
- Legal review for Knysna's Estuary Management Plan.

1992-2007: Department of Water Affairs & Forestry, Pretoria, RSA – policy and strategy development

- Formulation and analysis of policies and strategies for water resources management, including nine years' involvement with the development and formulation of the National Water Policy (1997), the National Water Act (1998), and the National Water Resource Strategy, First Edition (2005).
- Co-authored and compiled the National Water Resource Strategy, First Edition, 2004
- Project leader for the development of guidelines for the preparation of catchment management strategies
- Contributed to investigations into the effects on water resources and the implications for water resources management of global climate change. Member of the National and Government Climate Change Committees.
- Investigations into the potential for augmenting water resources by artificially enhancing rainfall by cloud seeding.
- Co-ordination of activities to implement the National Water Act, 1998, including ensuring coherence with other legislation related to, *inter alia*, the provision of water services, the management and conservation of the natural environment, agriculture, industrial development and financial management in the public sector.

1982-1993: Department of Water Affairs & Forestry, Pretoria, RSA – hydraulic analysis and modelling

- Hydraulic analysis, and physical and mathematical modelling of weirs, dam spillways, pipelines and fixed and mobile bed open channels.
- Conceptual and hydraulic design of fish passage facilities.
- Hydraulics aspects of the development of a methodology for determining the instream flow requirements for the maintenance of ecological functioning of rivers the Reserve of the National Water Act. (Principal author of the chapter dealing with the hydraulic aspects of determining in-stream flow requirements in the Building Block Methodology Manual, King *et al* 2000).
- Hydraulics specialist in environmental impact assessments and environmental water requirement assessments for dams and associated water resources developments.

1971-1982: various English engineering consultants and water organisations

- Planning, design and supervision of construction of small and large scale works of sewerage and sewage treatment in rural and urban areas (various English consultants)
- Planning, design and construction supervision of large water supply schemes (North-West Water Authority, England)

CONFERENCE PRESENTATIONS

 Invited/keynote speaker at a number of national and international conferences and congresses, including -

• The International Congress on Large Dams, Durban, 1994: The South African approach to determining the instream flow requirements of rivers.

- Biennial conference of the South African National Committee of the International Association of Hydrologic Sciences, Pretoria, 1998: The South African National Water Policy.
- South African Institution of Civil Engineers annual conference, Johannesburg, 2001: The National Water Resource Strategy.
- International Conference on Environmental Flows, Cape Town, 2002: A brief history of environmental flows in South Africa with special reference to the policy, legislative and water research regimes.
- Joint South Africa / Australia workshop on water resources management (under the auspices of the SA Academy of Engineers and the Australian Academy of Engineering and Technological Sciences), Melbourne, 2003: Approaches to water pricing and funding new water resources infrastructure.
- VIIth International Rangeland Congress, Durban, July 2003: A National Strategy for Implementing South Africa's National Water Act: Opportunities for Synergy with Rangeland Management.
- Biennial Groundwater Conference of the Groundwater Division of the Geological Society of South Africa, Pretoria, March 2005: The National Water Resource Strategy: Implications for Groundwater Management.
- International workshop iin Volunteerism, Democracy, Administration and the Evolution of Future Landscapes (invited participant), organised by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Perth Australia, April 2006.

In addition, a large number of presentations on aspects of the National Water Policy, the National Water Act and the National Water Resource Strategy to a wide range of audiences from 1998 to 2006.

TARRYN MARTIN (M.Sc)

Date of Birth: 17-11-1982

QUALIFICATIONS

- M.Sc Botany with distinction (Rhodes University)
- B.Sc Hons. African Vertebrate Biodiversity (Rhodes University)
- B.Sc Botany and Zoology (Rhodes University)

COURSES

2012 - EIA Short Course, Rhodes University and CES, Grahamstown

MEMBERSHIP

- South African Council of Natural Scientific Professions (SACNASP). Registered as a Professional Natural Scientist (400018/14).
- Member of the South African Association of Botanists (SAAB)
- Member of Golden Key International Honour Society

THESIS

Photosynthetic and evolutionary determinants of the response of selected C3 and C4 (NADP-ME) grasses to fire.

AWARDS AND NOTABLE ACHIEVEMENTS

2011 - Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art

2010 - Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa

SELECTED PUBLICATIONS

Martin, T; Osborne, C and Ripley, B. (2012). Fire ecology of C3 and C4 grasses: a comparison of four co-occurring lineages. Submitted for review.

Ripley, B; Donald, G; Osborne, C; Abraham, T and Martin, T. (2010). Experimental investigation of fire ecology in the C3 and C4 subspecies of Alloteropsis semialata. Journal of Ecology. 98 (5): 1196 - 1203

South African Association of Botanists (SAAB) conference, Grahamstown. January 2010 Title: Responses of C3 and C4 Panicoid and non-Panicoid grasses to fire.

South African Association of Botanists (SAAB) conference, Drakensberg. January 2008. Title: Photosynthetic and Evolutionary determinants of the response of selected C3 and C4 (NADP-ME) grasses to fire.

PROFESSIONAL EXPERIENCE

May 2012 – Present: Environmental Consultant and Botanical Specialist (Coastal and Environmental Services, Grahamstown). Duties include conducting botanical and ecological assessments for local and international EIAs in southern Africa, identifying and mapping vegetation communities and sensitive areas, designing and implementing monitoring plans, designing rehabilitation and biodiversity offset plans, managing project budgets, coordinating specialists and site visits.

October 2011 – January 2012: Accounts Manager (Green Route DMC, Cape Town). Duties included project and staff co-ordination, managing large budgets for incentive and conference groups travelling to southern Africa, creating tailor-made programs for clients, negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

April 2011 – September 2011: Camp Administrator and Project Co-ordinator (Windsor Mountain International Summer Camp, New Hampshire, USA). Co-ordinated staff and camper travel arrangements, coordinated main camp events, assisted with marketing the camp to prospective families.

October 2010 – April 2011: Freelance Project Manager (Green Route DMC, Cape Town). Duties included project and staff co-ordination, managing large budgets for incentive and conference groups travelling to southern Africa, creating tailor-made programs for clients, negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

June 2010 – October 2010: Camp Counselor (Windsor Mountain International Summer Camp, New Hampshire, USA)

April 2009 – May 2010: NERC Research Assistant (Botany Department, Rhodes University, Grahamstown in collaboration with Sheffield University, Sheffield, England). Set up and maintained experiments within a common garden plot experiment, collected, collated and entered data, assisted with the analysis of the data and writing of journal articles.

March 2007 – October 2008: Head Demonstrator (Botany Department, Rhodes University, Grahamstown).

September 2005 – February 2007: Operations Assistant (Green Route DMC, Cape Town). Project co-ordination.

CONSULTING EXPERIENCE

Environmental consulting experience as project manager or team member is broad and covers a number of key areas. Specific experience includes the following:

Forestry Projects

• Lurio Green Resources Plantation Project Botanical Assessment, Vegetation and Sensitivity Mapping, Specialist Co-ordination and Mozambique

Mining Projects

- Toliara Mineral Sands Rehabilitation and Offset Strategy Report, Madagascar
- Syrah Resources Ecological Assessment, Cabo del Gado, Mozambique
- Baobab Mining Ecological Assessment, Tete, Mozambique

Ecological Monitoring Projects

• Kenmare Terrestrial Monitoring Program Project Manager and Specialist Survey, MOMA, Mozambique (ongoing)

Ecological Baseline Surveys

- LHDA Botanical Survey and Impact Assessment, Lesotho
- Eco Planet Bamboo Baseline Study and Ecological Assessment, Eastern Cape, South Africa

Wind Energy Facility Projects

- Dassiesridge Wind Energy Facility Project Manager, Eastern Cape, South Africa
- St Lucia Wind Energy Facility Scoping Report, Kwa-Zulu Natal, South Africa
- Inyanda Wind Energy Facility Scoping Report, Eastern Cape, South Africa
- Tsitsikamma Wind Energy Facility Community Power Line Ecological Assessment, Eastern Cape, South Africa
- Golden Valley Wind Energy Facility Power Line Ecological Assessment, Eastern Cape, South Africa
- Middleton Wind Energy Facility Ecological Assessment and Project Management, Eastern Cape, South Africa
- Mossel Bay Power Line Ecological Assessment, Western Cape, South Africa

Ecological Groundtruthing Projects

- Harvestvale botanical groundtruthing assessment, Eastern Cape, South Africa
- Groundtruthing the turbine sites for the Waainek Wind Energy Facility, Eastern Cape, South Africa
- Cob Bay botanical groundtruthing assessment, Eastern Cape, South Afica

Due Diligence

• Solar Capitol Solar Photovoltaic Energy Facility Environmental and Social Compliance Monitoring Project Manager, Northern Cape, South Africa

DR GREER LEIGH HAWLEY

Date of birth: 30 May 1978

QUALIFICATIONS

BSc (University of Cape Town) BSc (Botany Hons) (University of Cape Town), PhD (Rhodes University) Training in Greenhouse Gas Accounting for Forest Inventories (Greenhouse Gas Management Institute)

ASSOCIATIONS

- South African Association of Microbiology
- International Association for Impact Assessment
- South African Association of Botany

PROFESSIONAL EXPERIENCE

1998	:	Botanical consultant: University of Cape Town Laboratory assistant: University of Cape Town
1999		Undergraduate Tutor: University of Cape Town
2000- 2001 London	:	Temporary administrative position: Robert Half International,
		Assistant Office Manager: Warwick House, London Office administration: West London Magistrates Court, London
2002	:	Laboratory Assistant: Amphigro
2002- 2007 University	:	Undergraduate Tutor: Botany and Microbiology, Rhodes
2006- 2007 Rhodes	:	Laboratory researcher: Abalone Probiotic isolation and testing,
		University
2007 (Ptv) Ltd	:	Laboratory assistant and product quality control: Mycoroot
(Grahamstown
2007- presen Services	t :	Principal Environmental Consultant - Coastal & Environmental
-	Enviro	nmental Impact Assessments
-	Ecolog	ical and Carbon Stock Specialist studies
-	Provid Frame	e input, report writing and management of Spatial Development works
	Drovid	ed input and carry out report writing of Environmental Feasibility

- Provided input and carry out report writing of Environmental Feasibility studies

RESEARCH INTERESTS

In the last 10 years, Dr Greer Hawley has been involved in a number of diverse activities. The core academic focus has however, been directed in the field of taxonomy both in the plant and fungal kingdom. The theory of taxonomy and phylogenetic analysis has been applied to further knowledge of species identification and understanding of biodiversity in South Africa. Greer's research ranges from studying fresh and marine algae, estuarine diatoms, *Restio* species classification in the fynbos vegetation and fungal species identification and ecology in *Pinus* plantation in Mpumalanga. Greer's microbiological study of Ectomycorrhizal fungi has

also contributed towards an understanding of soil ecology and "below ground" networks, including saprotrophic and mutual symbiotic micro-organisms. **POST GRADUATE STUDENT SUPERVISION**

2005 – 2007: 3 Honours students in the Mycology Unit, Rhodes University 2006: MSc student in the Mycology Unit, Rhodes University. **SELECTED RECENT PUBLICATIONS**

Hawley GL and Dames JF. 2004. Mycorrhizal status of indigenous tree species in a forest biome of the Eastern Cape, South Africa. South African Journal of Science 100, 633-637.

Hawley GL and Dames JF. (2008). Ectomycorrhizas in association with *Pinus* in South Africa. South African Journal of Science.

RECENT CONFERENCE PAPER/PUBLICATIONS

2010: Hawley, GL, McMaster AR and Carter AR. The Environmental and Social Impact Assessment, and associated issues and challenges associated with Biofuels. African, Caribbean and Pacific Group of States (ACP), Science and Technology Programme, Sustainable Crop Biofuels in Africa.

2009: Hawley, GL, McMaster AR and Carter AR. Carbon, carbon stock and life-cycle assessment in assessing cumulative climate change impacts in the environmental impact process. International Association of Impact Assessors.

2008: Hawley GL and Dames JF. Ectomycorrhizal species diversity above- and below ground comparison in *Pinus patula* (Schlecht et Cham) plantations, South Africa. South African Society for Microbiology (Poster presentation).

2006: Hawley, GL and Dames, JF. Morphological and molecular identification of ectomycorrhizal fungi in *Pinus* plantations. South African Society of Microbiology.

RECENT ENVIRONMENTAL MANAGEMENT EXPERIENCE

Specialist Ecological/Biodiversity studies

- Addax BioEnergy (2009/2010), Biodiversity and Ecological Impact Assessment AND Carbon Stock Impact Assessment, Sierra Leone.

The above specialist studies were submitted as separate deliverables and are described separately.

Biodiversity and Ecological Impact Assessment: This study involved the survey of a 60 000 ha site in Sierra Leone. The vegetation types were described and assessed in terms of biodiversity and overall ecological sensitivity. In addition, the area was surveyed by local experts for the presence of rare and endangered faunal species, for inclusion into the report. All vegetation types were mapped using GIS. The assessment was compiled for international review in accordance with World Bank standards.

Carbon Stock Impact Assessment: In accordance with the EU directive, Biofuel production needs to demonstrate a 30% reduction in carbon emissions compared to fossil fuels. For this reason, a Carbon Stock study was carried out to determine site specific carbon stocks. *This study included field calculations, vegetation and soil sampling and carbon stock calculations according to internationally accepted standards and using best practice guidelines.* Using the detailed GIS vegetation maps, total carbon stocks could be calculated. Sample collection included local

academic soil scientists. This study and associated methodology was compiled according to the International Panel on Climate Change (IPCC) standards.

- Wild Coast Forest Survey: (2009-2010) Department of Water and Forestry / Eastern Cape Parks Board initiative

The forest survey included substantial field work and data collection of the following: plant species identification, GPS mapping of forest boundaries, forest-typing and identifying and quantifying disturbance impacts.

- Mncwasa Water Scheme (2009): Ecological Sensitivity Assessment

This assessment involved a detailed vegetation survey of forest vegetation and wetlands along anticipated and alternative pipeline routes. The survey included an assessment of the environmental sensitivity along the route and recommendations for mitigation and environmentally acceptable alternatives.

- Peregrine Dunes Golf Estate (2009): Vegetation Rehabilitation Plan and Ecological Impact Assessment

The Ecological Impact Assessment and Rehabilitation Plan were represented as two reports for the same project. The work carried out on the Ecological Impact Assessment included report revision writing.

The Rehabilitation Plan was submitted as part of the Environmental Management Plan and incorporated elements of re-vegetation, alien plant removal and rehabilitation, landscape restoration, based on widely accepted concepts of soil ecology and plant succession ecology.

Feasibility studies

- Nkanya Lodge Feasibility Study: Eastern Cape Development Corporation (ECDC) initiative

Aspects of this study included the consideration of the economic and financial viability of the proposed project as well as the environmental risks and alternative technologies.

Full Scoping and Environmental Impact Assessments (South African National Environmental Management: EIA regulations)

- Buffalo City Municipality R72 national road re-alignment (2007-2008): Sleeper site

Responsibilities included: Project Management, budget management, written report, public participation and engagement with key stakeholders throughout the EIA process. Environmental approval obtained.

- Wild Coast Abalone expansion and processing plant (2008)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders. Environmental approval obtained.

- All Saints Hospital Waste Water Treatment Works (2012)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders. Environmental approval obtained.

- Qolora Aquaculture Development Zone (2011)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders. Environmental approval obtained.

- Jamestown Waste Water Treatment Works (2012)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders. Environmental approval obtained.

- Ntabankulu Waste Water Treatment Works (2012)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders. Environmental approval obtained.

- Qamata: No-gate Waste Water Treatment Works (2012)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders. Environmental approval obtained.

St Patricks Hospital Waste Water Treatment Works (Current)

Responsibilities included: Project management, budget management, written reports, public participation and stakeholder engagement with key stakeholders.

State of Environment (SoER) and Environmental Management Plans (EMP) for:

- OR Tambo District Municipality, Eastern Cape Province, South Africa (2009-2010). Accepted by council.
- Ukhahlamba (Joe Gqabi) District Municipality, Eastern Cape Province, South Africa. (2011)
- Mnquma Local Municipality, Eastern Cape Province, South Africa (2012)

Activities:

- Field survey of district municipality through aerial surveying and field work reporting of whole district municipality (incorporating 4-7 local municipalities).
- Continued interaction with municipal representatives and key stakeholders
- Workshops held with key role-players and decision-makers
- Review of planning document and integrated development programs.
- Identification of key environmental issues
- Selection of priority environmental issues
- Development of Environmental Management Action Plans directly aimed at mitigated priority issues.

Responsibilities:

- Overall project manager,
- Budget management,
- Report writing,
- Team delegation and management and
- Client liaison.

Additional Specialist studies

- Sensitive Ecology Assessment: Mncwasa Water Scheme
- Vegetation Rehabilitation Plan: Peregrine Dunes Golf Estate
- Ecological Impact Assessment: Peregrine Dunes Golf Estate
- Vegetation Assessment: Atterbury Development
- Wild Coast Forest Survey: (current) DWAF/EC Parks initiative
- Biodiversity and Ecological Impact Assessment, Sierra Leone, Addax Biofuels
 - Land use Impact Assessment, Sierra Leone, Addax Biofuels

- Thyspunt Melkhout Eskom Power line, Ecological Impact Assessment
- Ecological Impact Assessment: Chaba Wind Energy Facility
- Ecological Impact Assessment: Chaba Wind Energy Facility
- Ecological Impact Assessment: Qunu Renewable Energy Facility
- Ecological Impact Assessment: Ncora Renewable Energy Facility
- Ecological Impact Assessment: Ngqamakwe Renewable Energy Facility
- Ecological Impact Assessment: Qumbu Wind Energy Facility
- Terrestrial Ecology Impact Assessment: Qolora Aquaculture Zone
- Toboshane Valley Estate: Ecological Impact Assessment
- Toboshane Valley Estate: Conservation Management Plan
- Floral Biodiversity and Impact Assessment: Niassa Green Resource, Mozambique

THOMAS KING

Date of Birth: 13-10-1987

QUALIFICATIONS

- BSc Honours Biodiversity and Conservation (Rhodes University)
- BSc Zoology (University of Pretoria)

MEMBERSHIP

• South African Council for Natural Scientific Professions (Candidate Environmental Scientist)

PROFESSIONAL EXPERIENCE

January 2006 – December 2006: Field assistant (Remote Exploration Services) January 2011 – April 2011: GIS technician (Conservation Support Services) April 2011 – Present: Environmental consultant (Coastal & Environmental Services)

CONSULTING EXPERIENCE

Environmental consulting experience as a project manager, report writing and GIS manager for various development types. Specific experience includes the following:

Forestry

- Lurio Green Resources Forestry Environmental and Social Impact Assessment.
- Niassa Plantation Environmental and Social Impact Assessment.
- Equatorial Palm Oil Liberia Environmental, Social and Health Impact Assessment.
- Ugandan Palm Oil Environmental and Social Impact Assessment.

Renewable energy

- EIA for Richards Bay Wind Energy Project, EAB Astrum Energy
- EIA for Hluhluwe Wind Energy Project, Kimocode (Pty) Ltd
- EIA for Plan 8 Wind Energy Project, Infinite Plan 8
- EIA for St Lucia Wind Farm, St Lucia Wind Farms (Pty) Ltd
- EIA for Coega Wind Farm, InnoWind (Pty) Ltd
- EIA for Brakkefontein Wind Farm, Terra Power Solutions

Agriculture and waste management

• Basic environmental assessment for the development of a chicken rearing facility in the Paterson district of the Eastern Cape, Eco Pullets (Pty) Ltd.

Mining

- Pre-feasibility risk assessment for the development of a heavy minerals mine on the West Coast of South Africa, Zirco Resources (Pty) Ltd.
- Environmental Control Officer for the Kenmare Heavy Mineral Mine, Nampula Province, Mozambique.

SPECIALIST ASSESSMENTS

- Visual Impact Assessment for the Syrah Resources Graphite Mine, Cabo Delgado, Mozambique. Completed: August, 2013.
- Visual Impact Assessment for the Zirco Roode-Heuwel Mine in the Northern Cape of South Africa. Completed: March, 2014.

RESEARCH & TEACHING EXPERIENCE

I have completed a study on the rate at which Sub-tropical Thicket (an Eastern Cape vegetation type) recovers after heavy grazing by ostriches. This study was done as part of my honours degree at Rhodes University.

JAN ANTON HOUGH (MA Sociology)

Date of Birth: Unmarried

30-05-1986

QUALIFICATIONS

MA (Sociology) 2011 - University of Stellenbosch (South Africa) Hons (Sociology) 2009 - University of Stellenbosch (South Africa) Accredited Resettlement Action Planning Training Course (Rhodes University) 2013 Microsoft Access Training Course 2014 (South Africa)

MEMBERSHIP

None currently

PROFESSIONAL EXPERIENCE

April 2012 – Present: Social scientist (Coastal and Environmental Services)

- March 2011 March 2012: Employed as a social scientist for Umsizi Sustainable Social Solutions (Umsizi), a social science consultancy firm in Johannesburg working within the mining sector. Worked extensively with mining communities, developing and implementing Socio-Economic Development (SED) programmes.
- January 2010 December 2010: Intern for an internet-based African research consultancy firm (Consultancy Africa Intelligence). Writing discussion papers on socio-environmental matters in Africa. Gaining experience in writing and editing papers, developing an environmental publication series, while gaining insight into relevant environmental policies and debates.
- January 2009 December 2011: Masters thesis: Beneficiary dependence on the National Working for Water Programme in the Western Cape (one published article in the ISI-accredited *Social Dynamics*). MA bursary from the DST-NRF Centre of Excellence for Invasive Biology (C.I.B). Extensive experience in large-scale socio-economic baseline studies, quantitative and qualitative data analysis and fieldwork coordination.
- January December 2008: Honours mini thesis: Involuntary resettlement of the Coleske residents living within the Baviaanskloof Nature Reserve (one published article in the ISI-accredited *South African Geographical Journal*). Gained in-depth experience in resettlement issues and debates in Africa and quantitative and qualitative data analysis and report writing.

CONSULTING EXPERIENCE

Social scientific consulting experience obtained at Umsizi:

- Baseline Socio-Economic Study Surveys (BSESS) and Socio-Economic Development
- 2011. Eskom Holdings South Africa. Conducted extensive desktop research and compiled a Socio-Economic Development (SED) Research Report and Framework;
- 2011. Tendele Mining Group. Conducting a Baseline Socio-Economic Survey Study (BSESS) of both the employees and labour-sending and surrounding communities of the Somkhele Mine in KwaZulu-Natal [Tendele Mining group] in 2010. Compilation of a community BSESS Report, an Employee BSESS Report as well as an Integrated Sustainable Management Framework Report. I was a fieldwork coordinator for this project for about 15 fieldworkers;
- 2011. Eskom Holdings South Africa. Conducted research (face-to-face interviews and focus groups) of the new Eskom building plant, Kusile, and compiling a Baseline Socio-Economic Development Assessments Report for the new station's labour-sending and surrounding communities; and
- Integrated Reporting project manager for Evraz Mapochs Mine in South Africa, subsidiary mine of Evraz Highveld Steel and Vanadium. Monthly reporting on its SED, sustainability and social investments.
- Strategic Environmental Assessment

- 2012: Assisted in the compilation of a Scoping Report for Nuco Chrome Mine in South Africa

Projects involved in at CES

- General
- 2012: Environmental and Social Due Diligence for First Quantum Minerals Ltd
- 2012: Socio-Economic Baseline Study (SEBS) for Liberian Palm Developments (LPD) oil palm estate projects (Liberia)
- 2012-2014: SEBS for the Lesotho Highlands Development Authority (Lesotho)
- Lender group: Environmental and Social Due Diligence Gap-Analysis for the Kabompo Gorge Hydro-Electric Power Project in Zambia
- 2012. First Quantum Minerals Ltd: Social Due Diligence Gap-Analysis in accordance with the Performance Standards (PS) of the IFC
- Social and Labour Plan for Zirco Resources Pty Ltd (South Africa)
- Grievance Address and Dispute Resolution Procedure for Lurio Green Resources (LGR) in Mozambique
- Stakeholder Engagement Plan for Savannah Environmental Pty Ltd.
- Resettlement Action Plans (RAPs)
- 2013-present: RAPs for LPD oil palm estate projects (Liberia)
- 2013-present: RAP for Syrah Resources Ltd in Mozambique
- 2013-present: RAP for EcoFarm Lda. Irrigation and Sugarcane Scheme, Mozambique
- Social Impact Assessments (SIAs)
- 2012: SIA for Samshi Ltd. (Sierra Leone)
- 2013: SIA for LPD oil palm estate projects (Liberia)
- 2013: SIA for Syrah Resources Ltd. in Mozambique
- 2013: SIA for EcoFarm Lda. Irrigation and Sugarcane Scheme, Mozambique
- 2014: SIA for Zirco Resources Pty Ltd. (South Africa)
- 2014: SIA for Mainstream South África (Waaihoek Wind Energy Facility) (South Africa)
- Socio-Economic Baseline Study (SEBS)
- 2014: Socio-Economic Baseline Study of the Bisie Tin Project in the Democratic Republic of the Congo (DRC) for Mining Processing Congo (MPC) SPRL and Alphamin Resources Corp
- Environmental, Health and Social Impact Assessment (ESHIA)
- 2012-2013: Part of a team that is conducting an ESHIA of the LPD oil palm estate projects (Liberia)
- 2012. Green Resource Niassa: Niassa Green Resources Plantation Project in Mozambique. Assisted with the report compilation of the ESHIA
- 2014. Part of a team that is conducting an ESIA of the Garoua and Maroua oil mills in Cameroon for Society of the Development Corporation of Cotton (SODECOTON).

Selected publications and conferences presented:

• Web publications:

Hough, J.A. 2010. Carbon trading: the real threat facing Africa? [Online]. Available: http://www.consultancyafrica.com.

Hough, J.A. 2010. The protection of coastal marine ecosystems in sub-Saharan Africa. [Online]. Available: <u>http://www.consultancyafrica.com</u>.

Hough, J.A. 2010. Understanding invasive alien species in Africa. [Online]. Available: http://www.consultancyafrica.com.

Hough, J.A. 2010. The battle to save Africa's horn: rhino poaching depletes conservation efforts in Southern Africa. [Online]. Available: http://www.consultancyafrica.com.

Hough, J.A. 2011. Climate talks in Cancún, Mexico: a step forward? [Online]. Available: http://www.consultancyafrica.com.

• ISI-listed scientific journals:

Hough, J.A & Prozesky, H.E. 2010. "But we don't spoil it, we protect it" A case study of the Coleske residents' conceptualisations of the Baviaanskloof Nature Reserve and its protection. South African Geographical Journal, 92(2): 1-13.

Hough, J.A & Prozesky, H.E. 2011. "I don't want to go back to the farm": A multi-site case study of Working for Water beneficiaries' fear of returning to farm work. South African Journal of Science. [being published]

Hough, J.A & Prozesky, H.E. 2011. Beneficiaries' aspirations for permanent employment within the South African Working for Water Programme. *Social Dynamics*, 39(2): 331-349.

• Conferences presented

Hough, J.A. "No boss shouting at you": A multi-site case study of Working for Water beneficiaries' fears of returning to farm work. Paper presented at the ASSAf-DST-NRF First Annual South African Young Scientists' Conference, Pretoria, 12-13 October 2010.

Hough, J.A. & Prozesky, H.E. Creating independent entrepreneurs? A multi-site case study of beneficiaries' aspirations for permanent employment within the South African Working for Water Programme. Paper presented at the 6th European Conference on Biological Invasions NEOBIOTA: 'Biological Invasions in a Changing World -from Science to Management', Copenhagen, 14-17 September 2010.

Presented MA thesis' preliminary findings at the New Social Forms Seminar, Department of Sociology and Social Anthropology, May 2010: Stellenbosch.

Presented MA thesis' preliminary findings at the National WfW's Training and Social Development Meeting, May, 2010: Cape Town.

Presented thesis research proposal at the Sociology and Social Anthropology Department, June 2009: Stellenbosch University.

Presented thesis proposal at the CapeNature AVM Quarterly Meeting, June 2009: Oudtshoorn. South African Sociology Association (SASA) Conference, in June/July 2009. Presented an article (based on honours thesis) with co-author, Dr. H.E.: "Why would they destroy it?" A case study of contested conceptualisations of the environment and its protection: Johannesburg.

Presented thesis proposal as part of the DST-NRF Centre of Excellence for Invasive Biology's (bursary holder) Annual Research Meeting, Nov 2009: Stellenbosch.

Poster presentation of thesis proposal as part of the DST-NRF Centre of Excellence for Invasive Biology's (C.I.B.) Annual Research Meeting, Nov 2009: Stellenbosch.

LUNGISA ROSEMAN BOSMAN

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QUALIFICATIONS

1993	UCT	B Soc.	Sci. (Public	Administra	ation	and Sociology)		
1997	UCT	Post	Graduate	Diploma	in	Organisation	and	Management
2002	Rhodes	Certific	cate in Mana	igement				

WORK EXPERIENCE

1995	Contract supervisor for Kat River Citrus Co-op
1998	Part-time site supervisor for Ikamva Builders
2001	Social Facilitator for the <i>Learn to Value Water</i> project (Institute for Water Research, IWR)
2002	Part-time post at the National Science Festival: <i>Bringing Science to the People</i> (Institute for Water Research, IWR)
2002	Commissioned by the Water Research Commission (WRC) to co- ordinate a short course on <i>How Ecosystems Work – Goods and</i> <i>Services</i> (Institute for Water Research, IWR)
2002	Environmental Impact Assessment for a bridge at Hertzog (worked with environmental consultant, Anton Bok)
2002	Sub-consultant to Coastal & Environmental Services (CES) in a project for developing an Environmental Implementation Plan for the Amatole District Municipality
2002 – 2003	Junior Research Officer with the <i>Working for the Wetlands</i> inventory group (Institute for Water Research, IWR)
April 2003 – 2004	Full-time Environmental Consultant – joint post with Coastal & Environmental Services (CES) and the Institute for Water Research (IWR)
2004- present	Senior Environmental Consultant – (CES)

PROJECTS INVOLVING STAKEHOKDER ENGAEMENT/ PUBLIC PARTICIPATION

- Development of a State of Environment Report for Amatole District Municipality
- Development of an Environmental Management System for Ukhahlamba District Municipality
- Development of an Environmental Management Plan for Chris Hani District Municipality
- Doing a Social Impact Assessment for Coffee bay Hole-in-the Wall
- Development of the Great Kei Strategic Environmental Assessment
- Knysna N2 Toll Highway Public Participation
- Fishwater Flats Wastewater Treatment Upgrade- Public Participation
- Tsitsa River Basin Land Use Plan Project manager and Public Participation

- Qolora Abalone Fish Farm- Public Participation
- Kalagadi Manganese Smelter- Public Participation
- Innowind Ncora Wind Energy Project- Public Participation
- Innowind Ngqamakhwe Wind Energy Project- Public Participation
- Malawi Kangankunde Monazite Mine- Social Impact Assessment
- Joe Gqabi District Municipality EMP- Public Participation and Institutional Arrangements
- Ndakana Zero Waste Agricultural Project- Public Participation and Institutional Arrangements
- Laguna Bay Resort EIA- Public Participation
- Coega Filling Station EIA- Public Participation
- Egazini Memorial Centre- Project Manger and Public Participation
- Witsand Dune Stabilisation- Project Manager and Public Participation
- Uitenhage Bulk Storwater Upgrade Project Manager and Public Participation
- Mondile Street Stormwater Upgrade Project Manager and Public Participation
- EP Oil Liberia Resettlement Action Plan

SOCIAL IMPACT ASSESMENTS

- Chibuto Corridor Sands EIA Mozambique
- N2 Wildcoast Toll Road
- Malawi Monazite Mine
- Madiba Bay Leisure park
- Coleske
- Ncora Wind Farm
- Peddie Wind Farm
- Great Kei Wind Farm
- Lurio Green Resources
- Syrah Graphite Mine
- Lusikisiki Regional Water Supply Scheme
- Innowind Ngqamakhwe
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GENERAL PROJECT INVOLVMENT

- Port Alfred Waste Water Treatment Works
- Uitenhage Bulk Sewer Upgrade
- Jamestown Wastewater Treatment Works
- Ukhahlamba District Municipality Integrated Environmental Management Plan (IEMP)
- Mnquma Local Municipality IEMP
- Egazini Memorial Precinct Project, Grahamstown, Eastern Cape Province (Basic Assessment);
- Eskom Albany Mimosa Powerline Basic Assesment
- Eskom Hombe Substation and powerline
- Eskom Mfinizo substation and powerline
- Gansbaai Waste Water treatment Works (WWTW) EMP development, Western Cape

PROFESSIONAL MEMBERSHIP

• International Association for Impact Assessment (IAIAsa – Member No: 2416)

ROY DE KOCK (M.Sc.)

Date of Birth: 22-06-1976

QUALIFICATIONS

M.Sc. in Rehabilitation Ecology (Nelson Mandela Metropolitan University, 2010) B.Sc Honours in Geology (Nelson Mandela Metropolitan University, 2008) B.Sc Geology/Botany (Nelson Mandela Metropolitan University, 2007) Diploma in Marketing (University of Witwatersrand, 2003). EIA Course (Rhodes University, 2010)

MEMBERSHIPS

Environmental

• Registered as a Candidate Environmental Scientist with the South African Council for Natural Scientific Professions (SACNASP).

PROFESSIONAL EXPERIENCE

April 2010 – Present: Environmental Consultant (Coastal & Environmental Services)

June 2008 – March 2010: Laboratory Technician (Nelson Mandela Metropolitan University)

March 1995 – November 2003: Financial Advisor (ABSA Bank)

CONSULTING EXPERIENCE

Environmental consulting experience as project manager or team member is broad and covers a number of key areas. Specific experience includes the following:

Environmental Impact Assessment and pre-feasibility assessments

- Stone Vegetation Assessment, Kaizers Beach (2010)
- Eskom Vegetation Assessment, Elloit-Ugie-Sappi (2010)
- Eskom Melkhout 132kV Distribution EIA, Oyster Bay (2011)
- Bizana Mixed-use Development Scoping and full EIR, Bizana; Eastern Cape (Current)
- Toboshane Valley Estate EIA, East London (2011)
- Toboshane Valley Estate Visual Impact Assessment (2011)
- Thomas River Windfarm EIA, Cathcart (2010)
- Chaba Windfarm EIA, Komga; Eastern Cape (2010)
- Lushington Park Windfarm EIA, East London (2011)
- Lushington Park Windfarm Ecological Impact Assessment, East London (2011)
- Langa Solar Facility EIA, Berlin (2011)
- Red Cap 66kV Power line EIA, St. Francis, Eastern cape (2011)
- Red Cap 66kV Power line Ecological Impact Assessment, St. Francis, Eastern cape (2011)
- N9 road upgrade in Middelburg EIA, Eastern Cape (2012)
- Hard rock quarry licence and EMPr, Middelburg, Eastern Cape (2012)
- Ecological Impact Assessment in Hombe, Eastern Cape for a new Eskom 132kV power line (2012)
- Ecological Impact Assessment in Taweni, Eastern Cape for a new Eskom 132kV power line (2011)
- Ecological Impact Assessment in Mfinizo, Eastern Cape for a new Eskom 132kV power line (2011)

- ADM Sleeper site basic Assessment Report and Soil Contamination Assessment (2012)
- Eskom Mfinizo, Taweni and Hombe Basic Assessment Reports (2011).
- Tsolwane Road upgrade EIA, Tarkastad EIA (2012)
- Centane Road road upgrade EIA, Mazeppa Bay, Eastern Cape (Current)
- Innowind Peddie Solar facility EIA, Eastern Cape (2012)
- Innowind Peddie Solar and Wind facility Agricultural Impact study, Eastern Cape (2012)
- Innowind Peddie Solar facility Visual Impact study, Eastern Cape (2012)
- Innowind Peddie Solar facility Ecological Impact study, Eastern Cape (2012)
- Innowind Qumbu Solar and Wind facility Agricultural Impact study, Eastern Cape (2012)
- Innowind Qumbu Solar facility Visual Impact study, Eastern Cape (2012)
- Kangankunde Rare Minerals mine, Malawi, Rehabilitation Management Plan and Mine Closure Plan (2011)
- Kenmare Moma Titanium mine, Mozambique, Weed Control Plan and Species of Special Concern Management Plan (2011)
- GS Cimentos limestone mine, Maputu, Mozambique, Rehabilitation Management Plan and Mine Closure Plan (2011)
- Upgrade of the R61 between Baziya and Umthatha BAR (2012)
- Upgrade of the R61 between Baziya and Umthatha Ecological Impact Assessment (2012)
- Amatola Water Bulk Water Pipeline Ecological Report Cannon Rocks to Alexandria (2012)
- Amatola Water Bulk Water Pipeline Ecological Report Port Alfred Borehole Extraction & Treatment (2012)
- Amatola Water Bulk Water Pipeline Ecological Report Bushmansriver to Cannon Rocks (Current)
- Ndabakazi Mixed-use Development Ecological Report (Current)
- Ndabakazi Mixed-use Development Geotechnical Assessment (Current)
- Goba water pipeline, Katberg, Eastern Cape Vegetation Assessment (2012)
- SSI Botanical Compliance for EA (2012)
- Terra Wind Middleton Wind Energy Facility Agricultural Impact Assessment (Current)

Policy and Guidelines

- Ukhahlamba District Municipality EMP, Eastern Cape (2010)
- Qamata LSDF, Eastern cape (2010)
- Water use license applications x 12 for N9 road upgrade, Middelburg, Eastern Cape (Current)
- Tsolwane Water use lisence applications, Tarkastad EIA (2012)
- Section 24G NEMA application for an unauthorised bridge build over the Black Kei river, Tarkastad, Eastern Cape (Current).
- Centane Road Water use license application, Mazeppa Bay, Eastern Cape (Current)
- Centane Road borrow pit license applications, Mazeppa Bay, Eastern Cape (Current)
- Upgrade of the R61 between Baziya and Umthatha Water use licence application (Current)
- Upgrade of the R61 between Baziya and Umthatha Mining License (Current)

Environmental Auditing and compliance

• TNPA Car Berth Dredging ECO, Port of East London (2010)

- Kenmare Moma Titanium mine, Mozambique. Development of Rehabilitation KPI's (2011)
- Eskom Zebra substation ECO, Cradock, Eastern Cape (2011)
- Tsolwane Road upgrade ECO, Tarkastad EIA (Current)
- Centane Road Upgrade ECO, Mazeppa Bay, Eastern Cape (Current)
- N9 road upgrade in Middelburg ECO, Eastern Cape (Current)
- Red Cap Kouga Windfarm ECO, St Francis Bay, Eastern Cape (Current)

RESEARCH

I assisted the Nelson Mandela Metropolitan University; Botany Department, headed by Prof. Janine Adams, in a 3 year monitoring program of Mangrove forests along the South African East Coast. We monitored growth of the different types of Mangroves as well as human impacts on the survivability of these forests.

B. External specialists

WILLIAM ROY BRANCH

Date of Birth: Nationality:	12 May 1946 British						
QUALIFICATIONS							
B.Sc., Ph.D,	University of Southampton, 1968 University of Southampton, 1971						
PROFESSIONAL EXPE	ERIENCE:						
1972-1976	Scientist; Life Sciences Division, Atomic Energy Board, Pretoria, South Africa Post-Doctoral Research Fellow; Department of Biology, University of Southampton, United Kingdom Curator of Herpetology; Port Elizabeth Museum, South Africa						
1976-1978							
1979-ongoing							
APPOINTMENTS							
Member 1990 - ongoing	IUCN SSC Captive Breeding Specialist Group (Herpetology),						
Board of Directors Chair	IUCN SSC Declining Amphibian Population Task Group, 1991 - 1994 IUCN SSC African Reptile and Amphibian Group, elected for 1997-						
Editor	Journal Herpetological Association if Africa; initially elected June 1983; re-elected 1985, 1987, 1989, 1991; retired Nov. 1993.						
Committee Member Editorial Board International Committee	Herpetetological Association of Africa, 1989-2002 <i>African Journal of Herpetology</i> 1994-ongoing First World Herpetological Congress, Canterbury, U.K., September						
1000.	Second World Herpetological Congress, Adelaide, December 1993 -January 1994.						
Executive Committee 1994	Third World Herpetological Congress, Prague - elected Adelaide						
Scientific Committee Executive Committee 1997	Third World Herpetological Congress, Prague - elected July 1995 Fourth World Herpetological Congress, Sri Lanka - elected Prague						
Scientific Committee Editor	Fourth World Herpetological Congress, Sri Lanka - elected 2000 Revised South African Red Data Book - Reptiles and Amphibians S. Afr. Nat. Sci. Prog. Rpt 151: j-iv. 242p. 1988						
Board of Directors	International Congress Chelonian Conservation, Nice, France, 1994- 5 (6-10 July, 1995).						
Board of Directors	2 nd International Congress Chelonian Conservation, Saly, Senegal,						
Editorial Review Board	Chelonian Conservation and Biology, international journal of the Chelonian Research Foundation; March 1997 - ongoing						
Board Executive committee	International Herpetological Society, May 1997- ongoing Invited for nomination to Executive committee of the International Society for Vertebrate Morphology, September 2000. Appointment declined due to prior committeents.						
Keynote address	Invited to give the annual Distinguished Herpetologist Lecture at the combined Herpetologist League and Society for the Study of Amphibians and Reptiles 44th annual meeting, Indiana University, 26-30 July 2001.						
Research Associate

Smithsonian Institute, Center for Tropical Biodiversity, Washington DC, 2003-ongoing.

PUBLICATIONS

Major scientific articles in peer-reviewed journals	112
Scientific notes in peer-reviewed journals	122
Popular articles	68
Book Reviews	74
Books	7
Television: SABC TV 50/50 Environmental Programmes	11
Radio programmes on wildlife, conservation, etc.	28
Environmental impact assessment reports	31

SELECTED RESEARCH PUBLICATIONS

BRANCH, W. R. (ed.), 1988. South African Red Data Book - Reptiles and Amphibians. S. Afr. Nat. Sci. Prog. Rpt **151:** I-iv, 242p.

SPAWLS, S. and W. R. BRANCH, 1995. *Dangerous Snakes of Africa*. Blandford Press, London, 192p. (released in southern Africa under Southern Book Publ, and in USA by Ralph Curtis Books.)

BRANCH, W. R., G. A. BENN and A. T. LOMBARD, 1995. The tortoises (Testudinidae) and terrapins (Pelomedusidae) of southern Africa: Their diversity, distribution and conservation. *S. Afr. J. Zool.* 30(3): 91-102.

BRANCH, W. R., A. M. BAUER & D. A. GOOD, 1996. A review of the Namaqua gecko, *Pachydactylus namaquensis* (Reptilia: Gekkonidae) from southern Africa, with the description of two new species. *S. Afr. J. Zool.* 31(2): 53-69.

BRANCH, W. R., 1997. A new adder (*Bitis*; Viperidae) from the Western Cape Province, South Africa. *S. Afr. J. Zool.* 32(2): 37-42.

BAUER, A. M., D. A. GOOD, & W. R. BRANCH, 1997. The taxonomy of the southern African leaf-toed geckos, with a review of Old World *Phyllodactylus* (Squamata: Gekkonidae) and the description of five new genera. *Proc. Cal. Acad. Sci.* 49(14): 447-497.

BRANCH, W. R. & M. J. WHITING. 1997. A new *Platysaurus* (Squamata: Cordylidae) from the Northern Cape Province, South Africa. *Afr. J. Herpetol.* 46(2): 124-136.

BRANCH, W. R., 1998. *Field Guide to the Snakes and other Reptiles of Southern Africa.* rev. ed. Struiks Publ., Cape Town, 399 pp, 112 col. pls.

HAAGNER, G.V., BRANCH, W.R. & HAAGNER, A.J.F. 2000. Notes on a collection of reptiles from Zambia and adjacent areas of the Democratic Republic of the Congo. *Annals Eastern Cape Prov Mus.* 1: 1-25.

BRANCH, W. R. & RYAN, P. G. 2001. Additions to the Mozambique Herpetofauna: Two new lizards from the Namuli Massif, Mozambique. *Herpetol. Rev.* 32(4): 281-282.

BRANCH, W.R, 2002. The Conservation Status of South Africa's Threatened Reptiles. pp 89-103. In: "*The State of South Africa's Species*" Proceedings of a conference held at the Rosebank Hotel in Johannesburg 4 - 7 September 2001, Endangered Wildlife Trust and WWF-SA.

BROADLEY, D.G. & BRANCH, W.R. 2002. A review of the small East African *Cordylus* (Sauria: Cordylidae), with the description of a new species. *Afr. J. Herpetol.* 51(1): 9-34.

BAUER, A.M. & BRANCH, W.R. 2000 (2003). The herpetofauna of the Richterveld National Park and the adjacent northern Richtersveld, Northern Cape Province, Republic of South Africa. *Herpetol. Nat. Hist.* 8(2): 111-160.

BRANCH, W. R. & RÖDEL, M.-O. 2003. Herpetological survey of the Haute Dodo and Cavally Forests, western Côte d'Ivoire. Part 2. Trapping results and Reptiles - *Salamandra*. 39(1):

LAMB, T., MEEKER, A.M., BAUER, A.M. & BRANCH, W.R. 2003. On the systematic status of the desert plated lizard (*Angolosaurus skoogi*): phylogenetic inference from DNA sequence analysis of the African Gerrhosauridae. *Biol. J. Linn. Soc.* 78: 253-261.

ANTON H BOK (DR)

PERSONAL INFORMATION

MARITAL STATUS: NATIONALITY: LANGUAGE: DATE OF BIRTH: SEX: Married South African English 22 April 1945 Male

PRESENT POSITION

Private Environmental Consultant (specializing in aquatic ecosystems)

Honorary Research Associate of JLB Smith Institute of Ichthyology, Grahamstown.

ADDRESS:

WORK/HOME:

Anton Bok & Associates (trading as *Anton Bok Aquatic Consultants cc*) 5 Young Lane Mill Park, Port Elizabeth (6001) Tel: 041-333 464; Fax: 086 646 4620 E-mail: antonbok@aquabok.co.za

FORMAL QUALIFICATIONS

- 1. B.Sc. (Zoology), 1968.
- 2. B.Sc. Hon. (Zoology), 1969)
- 3. M.Sc. (Zoology), 1974
- 4. Ph.D. (Ichthyology), 1984

University of Cape Town Rhodes University University of Port Elizabeth Rhodes Univ., JLB Smith Institute of

Ichthyology

PROFESSIONAL MEMBERSHIPS

- Registered Professional Natural Scientist with The South African Council for Natural Scientific Professions (Reg. No. 400406/11).
- Professional member of South African Institute of Ecologists and Environmental Scientists.
- Dember of Southern African Society of Aquatic Scientists.
- Honorary Research Associate of the South African Institute for Aquatic Biodiversity (SAIAB)

PROFESSIONAL EXPERIENCE

1975 to 1985: Cape Nature Conservation

Employed as aquatic scientist with (the ex) Directorate of Cape Nature Conservation based in Grahamstown. Activities included research on the biodiversity of aquatic ecosystems and the conservation and sustainable utilization of all aquatic resources in the Cape Province.

1985 to 1994: Cape Nature Conservation

Employed as Specialist Scientist based in East London at the Departmental Amalinda Fish Research Station as leader of a number of research projects and conservation management activities related to aquatic biota (mainly fish) and freshwater and estuarine ecosystems. Management advice included specialist input into EIA's relating to environmental impacts caused by development and utilization of freshwater and estuarine ecoystems. This specialist advisory work was conducted in close liaison with various regulatory bodies (e.g. DWAF, Provincial Government and local authorities). 1994 to end February 1996: Eastern Cape Nature Conservation

Transferred to Port Elizabeth Regional Office where work entailed:

- Supervision of research projects and management advice and formulating departmental policy guidelines on conservation management of estuarine and freshwater ecosystems,
- (ii) Specialist advice on potential environmental impacts of proposed developments (EIA's), particularly related to the aquatic ecosystems,
- (iii) Specialist input into workshops, advisory committees, joint projects with various organizations (e.g. DWAF, university and museum staff) concerned with development, management and conservation of aquatic ecosystems, particularly regarding IFR (Instream Flow Requirements) of rivers.

February 1997 to present date: Private environmental consultant

Formed **Anton Bok Aquatic Consultants cc** (trading as *Anton Bok & Associates*), an environmental consultancy, specializing in environmental impact assessments (EIAs) of developments, mainly those associated with aquatic ecosystems and specifically freshwater fish . Anton Bok is the principle member of the Closed Corporation, and there is one part-time secretary/accountant.

FIELDS OF SPECIAL EXPERTISE

• Environmental Impact Assessments (EIAs)

Extensive experience involving undertaking EIAs for a wide variety of developments, including assessment of impacts associated with bridge construction on rivers, waste water treatment works, bulk water supply pipelines and storage reservoirs, abstraction of groundwater and surface water from rivers to augment existing bulk water supplies, etc.

Aquatic Ecosystem Conservation

Experience with Ecological Water Requirements or "Ecological Reserve" determinations of rivers in relation to fish populations; EIA's of developments in rivers (e.g. dams, weirs construction) and mitigation measures required; assessment and biomonitoring of river ecosystem health; EIA's for proposed developments (industrial, agricultural and mining projects) impacting on aquatic ecosystems, with specialist studies on the impact on the fish fauna.

• Design and Operation of Fishways (Fish ladders)

A number of studies and reports involving the necessity for, the conceptual design of and monitoring of fishways (catering for indigenous fish including eels) in southern Africa have been conducted over the last 12 years.

EXAMPLES OF RECENT CONSULTANCY WORK UNDERTAKEN

2013-2014	Lesotho. Specialist fish & aquatic habitat study forming part of the EIA
	Development Authority) for potential impacts of the proposed Polihali
	Dam on the Sengu (Orange) River, including impacts on fish migration
	and recommended mitigation measures.
2012	Madagascar. Specialist aquatic (ichthyofauna) study forming part of the
	EIA for the proposed Toliara Sands Mine – with emphasis on ecological
	impacts on the seasonal (sand) Fiherehana River due to water
	abstractions for mining operations (Sub-contracted by Coastal &
	Environmental Services (CES), Grahamstown).
2011-2012	Zambia: Specialist Study on Fish Biodiversity & Aquatic Habitat Integrity
	Assessment for EIA for proposed Kalumbila Minerals Copper Mine, NW
	Zambia (contracted to CES).
2011	South Africa. Specialist input (fish) on Habitat Integrity and Ecological
	Reserve (EWR) study on the Wildebees River, as part of licence
	application for the proposed Ugie Dam, contracted to Scherman Colloty
	& Associates cc.
2010	South Africa: specialist Studies (fish fauna) on the impact of bridge
	construction on the Habitat Integrity and Present Ecological Status

	(PES) in 4 Transkei rivers as part of Wild Coast Meander DR 08029
2008 & 2009	Democratic Republic of Congo (DRC). Specialist baseline study on fish fauna and aquatia babitata farming part of the Environmental and
	Social Impact Assessment (ESIA) Plan for the Kalukundi Copper-Cobalt
2007	South Africa . Specialist input (fish) on Rapid/Intermediate Ecological
	Reserve (EWR) study on selected rivers in the Outeniqua Region, contracted to IWR Source to Sea.
2004/2007	South Africa – Fishway Research . Member of a team for a research programme sponsored by the Water Research Commission (WRC) on fishways in South Africa. Deliverables (final reports) from this programme include:
	 a) WRC Report No. 1270/2/04. Guidelines for the planning, design and operation of fishways in South Africa by A Bok, J Rossouw and A Rooseboom (2004).)
	 b) WRC Report No. 1310/105. Development of criteria for the design of fishways for South African Rivers and Estuaries. R Heath, A Bok, PSO Fouche, MK Mastenbroek & AT Forbes (August 2005).
	c) WRC Report No.TT 287/07. <i>Guidelines for the planning, design and operation of fishways in South Africa</i> . A Bok, P Kotze, R Heath & J Rossouw.
2004/2005	South Africa . Project leader for EIA studies to obtain environmental authorisation for the construction of 5 gauging weirs on various rivers in Transkei, including Habitat Integrity and Present Ecological Status (PES) and fish surveys of impacted river reaches order to assess the need for and conceptual design of fishways. DWAF: Hydrology Division.
PUBLICATIONS	

Papers based on research on the following topics have been written:

- * the ecology and captive of breeding of mullet (*Mugilidae*) in the Eastern Cape;
- * freshwater fish production under intensive and extensive conditions;
- * captive breeding (including hormone -induced spawning) of threatened indigenous fishes;
- * fish distribution in eastern Cape estuaries, and
- * the conceptual design and monitoring of fishways for southern African fish species.

These papers have been published in local and international journals and presented at workshops and conferences, both national and international. They include one chapter in a book, two theses (M.Sc. and Ph.D.), 7 published workshop/symposium proceeding, 3 Water Research Commission Report Publications, 4 semi-popular articles and 13 papers in scientific journals. A full publications list is available on request.



MATTHEW OJELEDE

Dr Matthew Ojelede Air Quality Specialist GIS & Air Quality Department Digby Wells Environmental

EDUCATION

1994 - 1998: Bachelor of Science (Hons): Majored in Geology (University of Benin) 2002 - 2004: MSc Environmental Science (Graduated with overall score of 73%).

Courses:

- Environmental Chemistry
- Environmental Management
- Air Quality Physics and Chemistry of the Urban Atmosphere
- Global Environmental Change: Adaptation and Mitigation
- Geographic Information System
- Mining and the Environment.

2005 – 2012 - PhD Environmental Management: Risk assessment of atmospheric emissions from gold mine tailings on the Witwatersrand

The thesis addressed a major environmental concern in Gauteng, namely the public health risk posed by atmospheric dust emissions from gold mine tailings on the Witwatersrand. Economic opportunities to reprocess the legacy tailing storage facilities to extract residual gold, removal of the protective layer of vegetation, and urban densification of the Witwatersrand combined to create adverse conditions, particularly during the windy season August to October, when dust levels frequently become a serious nuisance and may pose a threat to public health. Despite widespread public awareness of the hazard, no prior systematic evaluation of the risk posed by the dust from the dumps was conducted. My research reported on a systematic study of the hazard posed by the respirable silica dust; of the historical development of residential suburbs in proximity to the dumps; measurements of ambient concentrations of dust during severe wind storms; and a risk assessment to the neighbouring communities.

LANGUAGE SKILLS

English and Edo language

EMPLOYMENT

June 2012 – September 2012 October 2012 to present University of Johannesburg (Researcher) Digby Wells Environmental

EXPERIENCE

Air pollution specialist in the Air Quality Department. Graduated with a PhD in Environmental Management. I conducted research projects for mining companies i.e. Crown Gold Recoveries, Eastplat, Anglogold Ashanti and several mining companies. In the past, I worked closely with the University of the Witwatersrand, University of Pretoria and the National Health Laboratory Service (NHLS) in looking at the "Adverse Health Impacts Associated with Dust Emissions from Gold Mine Tailings" for the Mine Health and Safety Council.

EXPERIENCE

Countries worked in South Africa, Mali, Mozambique, Malawi and Liberia

PROJECT EXPERIENCE

AIR QUALITY BASELINE ASSESSMENTS, EMISSION INVENTORIES, DISPERSION MODELLING AND AIR QUALITY MANAGEMENT AND MITIGATION PLANS Air Quality Impact Assessment study for an IPP power station and associated infrastructure, Limpopo, South Africa Ventersburg Gold Mine Air Quality Impact Assessment study, Free State, South Africa Air Quality Baseline Assessment study for Falea Uranium Project, Mali Air Quality Scoping report for the Harwar Colliery Mpumalanga, South Africa Baseline Air Quality Assessment study for Mkango Resources Limited, Songwe Rare Earth project, Malawi Air Quality Impact Assessment study for the proposed Balama Graphite Mine, Mozambique Air Quality Impact Assessment study for New Liberty Gold Mine, Liberia Air Quality Impact Assessment study for Loulo Gold Mine, Mali

TRAINING

Basic Fire Fighting – Accreditation number: HW591PA0808095 NACA : Introduction to Dispersion Modelling

PROFESSIONAL AFFILIATIONS

National Association for Clean Air (NACA) South African Society for Atmospheric Sciences (SASAS) Geo Information Society of South Africa (GISSA) International Association of Impact Assessment South Africa (IAIAsa)

PUBLICATIONS

- Ojelede, M. E., Annegarn, H. J. and Remy, B. Levels of quartz in the ≤ 5 µm and ≤ 10 µm fractions of gold mine tailings: Implications for exposed residents on the Witwatersrand (In progress).
- OJELEDE, M. E., Kneen, M. A., Annegarn, H. J. HOUSING SPRAWL NEAR TAILINGS STORAGE FACILITIES: HISTORICAL AND CURRENT SCENARIO ON THE CENTRAL WITWATERSRAND. *Journal of Housing and Built environment* (In progress).
- **OJELEDE, M. E.**, Annegarn, H. J., Kneen, M. A (2012). Evaluation of Aeolian emissions from gold mine tailings on the Witwatersrand. *Journal of Aeolian Research* 3 (4), 477 486.
- OJELEDE, M. E., Annegarn H. J., Mlondo M. (2008). Grain-size analysis and elemental composition of the PM10 and PM5 fractions of gold-tailings, in *Mine Closure 2008*, A.B. Fourie, M. Tibbett, I.M. Weiersbye, P.J. Dye (eds), Australian Centre for Geomechanics, Perth, Australia, ISBN 978-0-9804 185-6-9, *Proceedings of the Third International Conference on Mine Closure*, Johannesburg, October 2008, pp. 609-616.
- OJELEDE, M. E., Liebenberg-Enslin H., Annegarn H. J. (2009). Tailings dust evolution over fifty years of gold mine tailings sources and sensitive receptors on the central Witwatersrand, in *Mine Closure 2009*, A.B. Fourie, M. Tibbett (eds) © 2009 Australian Centre for Geomechanics, Perth, ISBN 978-0-9804185-9-0, *Proceedings* of the Fourth International Conference on Mine Closure, 9-11 September 2009, Perth, Australia, pp. 375–388.
- **Ojelede**, **M**. **E**., Annegarn, H. J., Price, C., Kneen, Goyns, P (2008). Lightningproduced NOX budget over the Highveld region in South Africa. *Atmospheric Environment 42,* 5706-5714.
- Ojelede, M. E., Annegarn, H. J., Mlondo, M. (2007). Evaluation of respirable particle matter in gold mine tailings on the Witwatersrand, *Proceeding of the Mining and the Environment IV International conference*, Sudbury, 19 – 26 October, 7pp ISBN 978-0-

88667-072-6. Refereed Conference Paper

- Bhikha, B., Ojelede, M. E., Annegarn, H. J., Kneen, M. (2006). Advancing lightning counts by using LIS efficiency factor derived from comparison with SAWS lightning detection network, *Proceedings of the Lightning Imaging sensor International Workshop*, Huntsville, AI, USA, 11-14 September, 4pp
- Ojelede, M. E, Annegarn H. J., Price, C. G. (2005). Lightning NOx estimations over southern Africa, proceedings of International Association of Meteorology and Atmospheric Sciences, Beijing, 2 – 11 August, p. 20. (Abstract)
- Ojelede, M. E., Annegarn, H. J., Price, C., Kneen M. A., Zulu J., Nhlahla, N. (2004). Lightning frequency distributions over southern Africa from satellite and ground based observations, *Proceedings of the 5th AARSE conference*, Nairobi, 18 – 21 October, 9 pp.
- **Ojelede**, **M**. **E**., Annegarn, H. J., Price, C., Kneen., M. A. Spatial and temporal variability of Lightning over southern Africa insight from satellite and ground-based observations (In progress).

Selected Technical Reports

- Annegarn, H.J., **OJELEDE**, **M**. **E**., Umba-Ndolo, G., Kneen, M.A. (2010), Anglogold Ashanti Dust Monitoring Project. Report No. DMP/2010/UJ-01.
- Annegarn, H.J., OJELEDE, M. E., Kneen, M.A. (2008), Wind Generated Dust: Identification of High Risk Areas Within Anglo's Vaal River and West Wits Operations – UJ-GEMES Report No 2008.01 AngloGold_A_VR/WW.
- Annegarn, H.J., Kneen, M.A., **OJELEDE**, **M**. **E**., Josipovic, M. (2005), Special Investigation: Source Apportionment of Soiling Dust in the Vicinity of Richards Bay Coal Terminal, Specialist report to the Richards Bay Coal Terminal. Report No. 25.115.
- Annegarn H. J., Kneen, M. A., **Ojelede, M**. **E**., Josipovic M. (2005). Special investigation: Grab samples of dust and ash collected near ERPM dumps after a significant incident. Report submitted to Crown Gold Recoveries (Pty) Ltd. Report No. AER 25_Spec ERPM, 42 pp.
- Annegarn, H.J., Kneen, M. A., Josipovic, M., **OJELEDE, M. E.** (2004), Vegetation and Fire report (R99-00778), Eskom contracted project; own participation from July 2004 to December 2004 RES/RR?04/02/24473
- Annegarn, H.J., **OJELEDE**, **M**. **E**., Maseloa, P., Rantlaleng, L (2008), Eastplats Crocodile River Mine Tailings Toxicity Assessment – AER 28.322S_EC.



VUMILE DLAMINI

Miss Vumile Dlamini Environmental Health Consultant Social Sciences Department – Community Health Impact Assessment Unit Digby Wells Environmental

Vumile Dlamini is an Environmental Health Consultant employed within Digby Wells' Community Health Impact Assessment Division where she is involved in conducting Health Impact Assessments in various mining operations throughout Africa. Her responsibilities include the compilation of Health and Environmental Management Plans, in accordance with both local South African standards and International standards. Vumile holds a Bachelor of Social Sciences (Honours) degree in Environmental Analysis and Management from the University of Pretoria, and is currently completing her Masters Degree (at the University of the Witwatersrand) in Environmental Science focussing on Air Quality: The Respiratory Health Impacts of Open-cast Coal Mining. Before joining Digby Wells, Vumile has spent time as a Client Services Executive under Ernst and Young's Climate Change and Sustainability Services Department, offering Environmental Auditing and advisory services around sustainable development strategies and frameworks. Vumile has six years in the consultancy environment and is well versed in Environmental Impact Assessments, Environmental Auditing, GIS and Remote sensing, as well as Environmental Law practices.

EDUCATION

BSocSc. (Geography and Environmental Management) University of KwaZulu Natal (2007) BSocSc. Hons. (Environmental Analysis and Management) University of Pretoria (2011) MSc. (Environmental Science) WITS University (current)

LANGUAGE SKILLS

- English (excellent)
- Zulu (excellent)
- Swati (excellent)
- Xhosa (excellent)
- Sotho (intermediate)
- Afrikaans (intermediate)
- Portuguese (basic)

EMPLOYMENT

March 2012 - present:

Environmental Health Consultant Human Sciences Department, Digby Wells Environmental, South Africa

- Provide technical input into the environmental management field.
- Specializing in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental authorization and permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management.
- Support the Community Health Impact Assessment Division, evaluating the baseline health levels and health needs of communities and development of health plans for development various projects across Africa.

I am part of the Community Health Impact Assessment Unit, responsible for the compilation of new tendered projects. Contributions to Compilations of Health and Environmental Management Plans in accordance with both local South African standards (NEMA and MPRDA) and International standards (IFC). Consistently involved in Project management and Budget tracking.

March 2010 – December 2010:

GIS Technician

- Niara Environmental Consultants
- Using ArcMap tools, wizards, and extensions to accomplish project objectives.
- Create custom and standard map products for internal and external use as requested.
- Enter and manage data through database front-end and through raw tables.
- Manipulating digital land base data in ArcMap environment (such as GPS points, aerial photography, parcel lines, street centrelines etc).
- Handling multiple tasks simultaneously while meeting client and project objectives. Clearly and concisely communicating technical information and concepts with coworkers and management.

October 2008 – May 2009:

Client Service Executive Ernst & Young

- Working in a team, responsible for delivering high quality work for review by the Manager to ensure the client's objectives are met.
- Assurance of reports and/or process.
- Verification of key performance indicators and advisory services around sustainable development strategies.
- Frameworks and leading practice; develop and implement a personal, professional and technical development plan.
- Perform moderately complex, high risk or high profile individual sustainable development projects in line with the client's requirement and methodologies previously developed or developed for specific assignments.
- Quality delivery within the scope of work, to ensure effective management of Ernst & Young's engagement risks and agreed budget.

July 2007 – August 2008:

GIS technician/ data Capturer Geospace International

(City of Tshwane Public Works and Infrastructure Development Department: Roads and Storm Water Division Project.)

- Provide support on GIS projects, particularly relating to capturing and verification of data into the municipalities GIS.
- Validating and corrections of storm water point features and selective line features 2003-2006 Data Capture and queries.
- Use of ESRI ArcGIS to identify and correct anomalies.
- Capturing of additional Planning Applications as directed by the Planning Technician, Engineers or GIS Manager.
- Appropriate provision of GIS support to Specialists.
- Undertaking ad-hoc duties as and when required.

April 2007 – July 2007:

Mineral information Management Intern Department of Minerals and Energy

- Usage of Mineral Resources Management System GIS based software to capture information, check the availability of farm portions, and prepare reports there forth.
- Customer focused interactive communication and various departmental operations engagement.
- Create and modify documents using Microsoft Office.
- Perform general administrative functions and duties which included photocopying, faxing, mailing, filing, maintaining hard copies and electronic filing systems.

PROJECT EXPERIENCE

Sasol Syferfontein Block 4 Expansion Project;

Sasol Sigma Colliery Underground Ash Backfilling Project;

Exxaro: Annual External Sustainable Development Data assurance audits. Auditing Health, Safety, Socio-economic and Environmental KPI's. Exxaro KZN Sands

Crown (DRD Gold) – Amendment to City Deep EIA/EMP for the inclusion of Dump 3/L/40 and 3/L/42 (Project Manager) (awaiting authorisation);

Xstrata South Africa (Pty) Ltd – Nooitgedacht EMP Amendment;

Scoping HIA for Rockgate Capital at their Faléa Uranium Project, Mali;

Comprehensive HIA for Severstal at their Putu Iron Ore Project, Liberia;

Scoping HIA for Syrah Resources at their Balama Graphite Mine, Mozambique;

Baseline community Health Assessment for Koidu Holdings at their Proposed Tonguma Project: Diamond Mining (2012);

Baseline community Health Assessment for Vedanta Zinc International's Vedanta Power Plant and associated Transmission Lines Project IFC ESIA;

Baseline community Health Assessment for Gold One at their proposed Geluksdal Tailings Storage Facility and Pipeline Infrastructure (2012); and

Baseline community Health Assessment for Platreef Resources' Proposed Underground Platinum Mine.

PROFESSIONAL AFFILIATIONS

International Association of Impact Assessment South Africa (IAIASA)



FRANCIS KOM

Mr Francis Kom Hydrogeologist Water Geosciences Department Digby Wells Environmental

EDUCATION

- MSc Contaminant Hydrogeology, University of Pretoria, (Currently studying).
- Honours in Hydrogeology, Institute for Groundwater Studies, University of the Free State, South Africa, 2011.
- BSc major in Geology and minor in Chemistry, Geology Department, University of Buea, Cameroon, 2008.

EMPLOYMENT

Digby Wells and Associates, Johannesburg, South Africa (October 2011 to current)

EXPERIENCE

Francis is a French and English speaking Hydrogeologist at Digby Wells with over 2 years of experience, as a consultant.

Francis' key experiences include:

- Mine dewatering management and EIA/EMP assessments.
- Drilling supervision, realisation and logistics
- Expertise in realisation and interpretation of hydraulic test (packer test, slug test, pumping test).
- Technical and financial management of drilling operations for mining and water supply
- Groundwater Contamination Investigations,
- Groundwater Geophysical Explorations,
- Groundwater resource assessment and management.
- Knowledge of Hydrogeology and GIS based softwares: WISH, Aquifer Test Pro, Aquiworx, Crystal ball, Surfer, ArcView, Global Mapper, PM-Win 5.

PROJECT EXPERIENCE

MMG Limited – Kinsevere Copper Mine (DRC): Site Hydrogeologist, Drilling Supervisor **Randgold Resources– Kibali Gold Mine (DRC):** Project Field Hydrogeologist

Platinum Group Metals (PTY) – Blouberg Area: Hydrogeology of Blouberg and Mogalekwena Magisterial District

Anglo Platinum (PTY) – Witbank Area: Hydrogeology of Witbank Magisterial District

Rockgate Resources – Falea Uranium Project Mali: Hydrocensus, Drilling and Pumptest Supervision

Syrah Resources – Balama Graphite Project Mozambique: Hydrocensus, Ground geophysical survey, Drilling, Pump test characterisation

Crown Mines – Withok TSF: Hydrocensus, ground water and surface water monitoring **Mashala Coal Mines – Delta plant**: Groundwater and surface water monitoring

Mashala Coal Mines – Ferreira plant: Groundwater and surface water monitoring

Mashala Coal Mines – Penumbra plant: Groundwater and surface water monitoring



STEPHEN FONKEM

Mr. Stephen Fonkem Senior Environmental Consultant/Hydrogeologist Water Geoscience Department Digby Wells Environmental

EDUCATION

MSc. Geohydrology, University of the Free State, 2010. BSc. (Hon) Geohydrology, University of the Free State, 2008. BSc. Geology and Computer Sciences, University of Buea, 2007.

EMPLOYMENT

2014-Present, Senior Environmental Consultant, Digby Wells Environmental
2011- 2014, Hydrogeologist, Digby Wells Environmental, Johannesburg.
2010-2011, Hydrogeologist, Aqua Earth Consulting, Johannesburg.
2009-2010, Research Assistant, Institute for Groundwater Studies, Bloemfontein.
2008-2009, Junior Hydrogeologist, ERM, Johannesburg

EXPERIENCE

Stephen is a senior environmental consultant and hydrogeologist at Digby Wells with extensive experience on hydrogeological assessment for a wide range of mining and mineral development projects in relation to coal mining, metal mining, and industrial minerals sectors. Stephen is fluent in French, English and Pidgin English.

PROJECT EXPERIENCE

Recent 10 assignments include:

Xstrata Coal South Africa – Trichardtsfontein Mine: Numerical modelling for groundwater impact assessment for EIA and IWUL applications.

Uranex Tanzania – Nachu Graphite Exploration: Hydrogeological assessment to initiate an early groundwater monitoring system in the project area.

Syrah Resources Mozambique- Balama Graphite Mine: Numerical modelling for groundwater impact assessment for ESIA application.

Sasol Mining South Africa – Sigma Colliery: Numerical modelling for underground mine ash backfill to assess the impacts of ash backfilling on groundwater.

Randgold Resources Mali- Morila Gold Mine: Groundwater model update to revise the closure according to a pushback plan and in-pit deposition of reprocessed tailings.

Randgold Resources DR Congo- Kibali Gold Mine: Delivered a WISH (Windows Interpretation System for Hydrogeologists) course training program to the mine's principal environmental manager and senior hydrogeologist.

Cluff Gold Burkina Faso- Seguenega Gold Mine: Hydrogeological assessment (geophysical surveying, borehole drilling, aquifer testing, and numerical modelling) for groundwater impact assessment for ESIA application.

Randgold Resources Mali- Loulo Gold Mine: Six months ssecondment as project hydrogeologist, for detailed open pit and underground dewatering studies and numerical modelling;

Universal Coal South Africa – Rodekoop Mine: Hydrogeological assessment (geophysical surveying, borehole drilling, aquifer testing, and numerical modelling) for groundwater impact assessment for EIA and IWUL applications.

Universal Coal South Africa- Kangala Mine: Conceptual modelling for groundwater impact assessment for EIA application.

PROFESSIONAL AFFILIATIONS

International Association of Hydrogeologists (IAH) Ground Water Division of the Geological Society of South Africa

PUBLICATIONS

Fonkem, S. (2013). The Structural Hydrogeology of a Gold Mine in Mali. Biennial South African Groundwater Conference, Durban, 17-19 September 2013.



HLAYISEKO MASHABA

Mr Hlaviseko Mashaba Junior Closure Consultant **Closure/Noise Department Digby Wells Environmental**

EDUCATION

Bsc honours Environmental Analysis and Management University of Pretoria
Environmental principles, Environmental Impact Assessment, Urban
Geography of SA, Environmental Compliance etc.
Bachelor of Geology (Bsc)
University of Pretoria
Sustainable Development, Igneous petrology, Environmental interaction, Remote sensing, Engineering Geology etc.

EMPLOYMENT

2013 – To date:

Digby Wells Environmental Junior Closure Consultant

- Consultant with specialised focus on closure planning, • rehabilitation and noise monitoring. I have been involved in projects with clients such as Harmony Gold, Xstrata Coal, Ivanhoe Platinum etc.
- Project management and project administration; and •
- Compilation of proposals for various projects; •

EXPERIENCE

2012:

Tutor – University Of Pretoria

Chemistry tutor at University of Pretoria in 2012. I assisted students with chemistry questions and also monitoring them throughout their practical sessions.

PROJECT EXPERIENCE

2013:

Digby Wells Environmental Projects Harmony Gold- Closure cost assessment Bokoni Platinum mine- Closure cost assessment Lanxess Chrome Mine- Closure cost assessment Xstrata Coal- Noise monitoring studies Ivanhoe Platinum-Closure cost assessment and Noise monitoring studies



BRETT COUTTS

Mr. Brett Coutts Ecologist/GIS Specialist/Rehabilitation Consultant Biophysical Department - Rehabilitation Digby Wells Environmental

EDUCATION

2006 – 2007: BSc Honours in Ecology, Environment and Conservation - University of the Witwatersrand

2003 - 2006: Undergraduate BSc - University of the Witwatersrand

EMPLOYMENT

September 2012 – Present: Digby Wells Environmental – Unit Manager: Rehabilitation

October 2008 – August 2012: Terra Pacis Environmental (Pty) Ltd – Environmental Consultant

November 2007 - September 2008: Hydromulch (Pty) Ltd - Junior Project Manager

EXPERIENCE

Current Work at Digby Wells

Brett is the Rehabilitation Unit manager and has been appointed to assist with the management and co-ordination of all relevant studies related to rehabilitation. This includes the management of rehabilitation projects, compilation of rehabilitation plans and undertaking of rehabilitation assessments. In addition to this Brett assists within the Biophysical Department with the management of specialist studies that are undertaken by the department and is also responsible for the compilation of the Geographic Information System (GIS) component of Biodiversity Land Management Plans (BLMP) ad undertaking ecological assessments.

Prior to joining Digby Wells Environmental (November 2007 – August 2012)

Prior to his appointment, he gained experience as a junior project manager on environmental rehabilitation projects at Hydromulch and then was appointed by Terra Pacis as an Environmental Consultant where his roles and responsibilities included the compilation of Basic Assessment (BA) reports, Scoping &Environmental Impact Reports, compilation of Environmental Management Plans (EMP), GIS mapping and Biophysical Studies.

PROJECT EXPERIENCE

The following project list is indicative of Brett's experience, providing insight into the various projects, roles and locations he has worked in.

Project	Role	Activities	Resource	Client	Location
Bokoni Platinum Mine	Key Accounts Manager	Overall management and coordination of projects	Platinum	Bokoni Platinum Mine	South Africa
Anglo Operations	Key Accounts Manager	Overall management and coordination of projects	Platinum	Anglo American	South Africa

Project	Role	Activities	Resource	Client	Location
Anglo Operations	Technical	Compilation	Coal	Anglo	South Africa
	specialist	01 rehabilitation			
		and closure			
		plan			
Balama Graphite	Technical	Compilation	Graphite	Syrah	Mozambique
Mine	specialist	01 rebabilitation		Resources	
		and closure			
		plan			
Putu Iron Ore	Technical	Compilation	Iron ore	Putu Iron Ore	Liberia
Mine	specialist	0† robobilitation		Mine	
		and closure			
		plan			
Anglo Operations	Technical	Update of	Coal	Anglo	South Africa
	specialist	Closure Plan			
		Collierv			
Sekoko	Technical	Compilation	Coal	Savannah	South Africa
Rehabilitation	specialist	of		Environmental	
Plan		rehabilitation			
		and closure			
Rehabilitation	Technical	Compilation	Coal	Msobo Coal	South Africa
Plan for Consbrey	specialist	of			
and Hawar		rehabilitation			
Projects		and closure			
Rehabilitation	Technical	Compilation	Power	Vedanta	South Africa
Plan for IPP	specialist	of	Station	Resources	
Station		rehabilitation			
		plan ciosure			
Rehabilitation	Technical	Compilation	Platinum	Platreef	South Africa
Plan	specialist	of			
		renabilitation			
		plan			
Preliminary	Technical	Compilation	Gold	Aureus mining	Liberia
Closure Plan for	specialist	of			
New Liberty		rehabilitation			
		plan ciosure			
Environmental	Project	Project	Gold	Aureus mining	Liberia
and Social Impact	Manager	Manager			
Assessment	Project	Project	Coal	Exvaro	South Africa
Mine	Manager	Manager			
Wetland Offset	Project	Project	Coal	Exxaro	South Africa
Strategy	Manager	Manager			
Compilation of	Project	Project	GIS	In house	South Africa
Manual	wanager	wanager			
Invasive Alien	Technical	Compilation	Smelter	BHP Billiton	South Africa

Project	Role	Activities	Resource	Client	Location
Plant control	specialist	of	Operations		
Procedure		plan			
Vegetation,	Technical	Compilation	Residential	Business	South Africa
Invertebrate and	Specialist	of report	Development	Venture	
Wetland				Investments	
Assessments and GIS Mapping					
GIS mapping for a	Technical	Public	Smelter	BHP Billiton	South Africa
range of Scoping	Specialist	Participation	Operations		
and		and Report			
Environmental		Writing			
Impact Reporting					
Diadiyaraity		Technical	Cald	Dandrald	Mali and
Monogoment	GIS		Gold	Ranugolu Resources	Iviali and
Plans (for two	Specialist	nroiect		Resources	IVOLY COASE
operations)		management			
Biodiversity	GIS	Technical	Coal	Analo	South Africa
Management	specialist	input &	Oodi	American	
Plans (for six	opeolanot	project		, anonoan	
operations)		management			

SHORT COURSES

- 2009: IEMA Approved Carbon Footprint Management Course: An Introductory Programme
- 2010: Exclusive Panel Discussion on: The Copenhagen Climate Change Conference
- 2011: International Association for Impact Assessments conference at the Wild Coast
- 2012: Centre for Environmental Management, North-West University: Environmental Law for Environmental Managers

PROFESSIONAL REGISTRATION

- 2009: IAIAsa International Association for Impact Assessment (South Africa)
- 2012: Registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions

AWARDS

- 2006: Certificate of Merit and Ecology, Environmental and Conservation Prize
- 2006: Postgraduate Merit Award to the Value of R30 000



LUKAS SADLER

Mr. Stephen Fonkem Environmental Consultant Noise Unit Digby Wells Environmental (Pty) Ltd

EDUCATION

2013:	Course in Environmental Noise Control
2010:	Short course in Air Quality Management
2009:	Short course in Occupational and Environmental Noise
2002 – 2004:	BCom Environmental Management (North West University)

EMPLOYMENT

November 2007 - Present:	Digby Wells Environmental
May 2006 – July 2007:	West View Rail (Pty) Ltd (London)

EXPERIENCE

During my two year stay in London from September 2005 – September 2007, I worked for West View Rail (Pty) Ltd on the London Underground Railway.

I am currently working at Digby Wells Environmental in the Environmental Noise Unit, where I am responsible for the Noise Impact Assessments relating to EIA/EMP's, as well as assisting with the compilation of reports such as environmental impact assessments. This includes experience working with projects in accordance with the International Finance Corporation (IFC) and World Bank standards, in countries such as Namibia, Mali, Senegal, Ghana, Mozambique Liberia, DRC and Sierra Leone.

My core focus is working on Environmental Noise Impact Assessments, which includes the assessment, remediation and management of impacts related to noise nuisance for the construction, mining and petrochemical industry.

Further responsibilities and experience gained at Digby Wells Environmental currently include, but are not limited to:

Assisting with the compilation of EIA's and EMP's; and Noise monitoring (baseline as well as continuous compliance monitoring).

PROJECT EXPERIENCE

Noise Impact Assessments: Boikarabelo Colliery – RSA Putu Iron Ore Project – Liberia New Liberty Gold Mine - Liberia Thabametsi Colliery - RSA Temo Coal Project – RSA Cooke Uranium Project - RSA Kibali Gold Project - DRC Sadiola ESIA – Mali Mmamabula Optimisation Project - Botswana Koidu – Sierra Leone Dust Monitoring Experience: Mashala Resources - South Africa Anglo Gold Ashanti Iduapriem Mine – Ghana Eastplats - South Africa Universal Coal - South Africa

PROFESSIONAL AFFILIATIONS

The National Association for Clean Air (NACA)

PART III: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN AND MONITORING PROGRAMME

THE PROPOSED BALAMA GRAPHITE MINE IN THE CABO DELGADO PROVINCE IN THE DISTRICT OF BALAMA IN NORTHERN MOZAMBIQUE

PREPARED FOR
Twigg Exploration & Mining Limitada A subsidiary of Syrah Resources Limited
Syrah Resources Limited
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DRAFT FOR REVIEW

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Coastal and Environmental Services

Report Title:

Balama Graphite Project Environmental and Social Management Plan and Monitoring Programme. Draft 1

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I AYANDA ZIDE declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, in application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

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TABLE OF CONTENTS

1.		. 1
1.1	Project background	. 1
1.2	Objectives of the Environmental and Social Management Plan	. 3
1.3	Environmental and Social Impact Assessment Process to Date	. 3
1.4	Study team	. 4
2.	PROJECT DESCRIPTION	. 6
2.1	Introduction	. 6
2.2	Project description	. 6
3.	BACKGROUND TO ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	. 8
3.1	Introduction	. 8
3.2	Framework Environmental and Social Management Plans	. 9
3	.2.1 Design and Planning Phase ESMP	. 9
3	2.2 Construction Phase ESMP	10
3	2.3 Operational Phase ESMP	11
3	2.4 Decommissioning Phase ESMP	11
4.	APPLICABLE POLICIES, LEGISLATION AND STANDARDS	12
4.1	Applicable Local and National Legislation	12
4.2	Applicable International Guidelines and Conventions	14
4	.2.1 International Finance Corporation Performance Standards (2012)	14
4	.2.2 IFC General EHS Guidelines	14
4	.2.3 IFC EHS Guidelines for Mining	15
- 4		15
5.	IRAINING AND AWARENESS PROGRAMMES	16
5.1 5.2	Concret Stoff E2S Training	10
5.Z	Community Health and Safaty Training Awaranasa and Compatence	10
5.3 5.4	Community Realth and Salety Training, Awareness and Competence	10
0.4 6		10
0.		10
6.2	Stakeholder Engagement Planning	10
63	Mozambique Legislation on Stakeholder Engagement	20
6.4	The International Einance Corporation's Handbook on Stakeholder Engagement	20 2nt
0.4		20
65	Proposed Syrah Balama Stakeholder Engagement Plan	21
6.6	External Communications and Grievance Mechanism	23
7.	ORGANISATIONAL REQUIREMENTS FOR IMPLEMENTATION	24
7.1	Senior Management	24
7	.1.1 General Manager	24
7	.1.2 Technical Manger	24
7	.1.3 Environmental, Health & Safety Manager	24
7	1.4 Resettlement and Social Affairs (Community) Manager	27
8.	STRUCTURE AND IMPLEMENTATION OF THE MANAGEMENT PLANS	28
8.1	Introduction	28
8.2	Framework Requirements	28
8.3	Specific Mitigation Measures	28
9.	MONITORING, IMPLEMENTATION AND MANAGEMENT REVIEW	85
9.1	Introduction	85
9.2	Checking and Monitoring	85
9	2.1 Performance objectives and targets	85
9	2.2 Monitoring Programmes	85
9	2.3 On-going inspections and continuous improvement	86
9	2.4 Internal and external audits	86
9.3	Incidents Reporting, Non-compliance and Corrective Action	86
9	.3.1 Incident Documentation and Reporting	86

	9.3.2	Non-compliance	.87
	9.3.3	Corrective Action	.87
9.4	Man	agement review	.87
9.5	Fina	ncial resources	.88
10.	MON		.89
10.	1 Intro	duction	.89
	10.1.1	Objectives	.89
	10.1.2	Monitoring Programme Structure	.89
	10.1.3	Monitoring Categories	.90
	10.1.4	Monitoring Responsibilities	.91
	10.1.5	Quality Assurance / Quality Control	.91
	10.1.6	Review and Modification of the Monitoring Programme	.91
	10.1.7	Reporting	.92
10.:	2 Polic	y Guidelines and Regulatory Framework	.92
	10.2.1	National Legislation	.92
	10.2.2	World Health Organisation Guidelines for Drinking Water Quality (2011)	.92
	10.2.3	International Finance Corporation Performance Standards on Environmental	and
		Social Sustainability (2012)	.92
10.3	3 Wate	er Quality Monitoring	.93
	10.3.1	Objectives of Ambient Surface and Ground Water Quality Monitoring	.93
	10.3.2	Specific Monitoring requirements	.93
	10.3.3	Point Source Discharge	.94
	10.3.4	Potable Water Quality	.97
	10.3.5	Groundwater Monitoring	.98
	10.3.6	Sampling Locations	.98
	10.3.7	Monitoring Frequency	103
	10.3.8	Quality Control Measures	103
	10.3.9	Contingency	104
10.4	4 Mete	eorology	104
	10.4.1	Objectives	104
	10.4.2	Parameters, Frequency and Sampling location	104
	10.4.3	Quality Control Measures	104
10.	5 Air C	Quality Monitoring	104
	10.5.1	Dust Monitoring	106
	10.5.2	PM ₁₀ Monitoring Programme	107
	10.5.3	Gaseous Monitoring Programme	107
	10.5.4	Sampling Locations	107
10.	6 Nois	e and Vibrations Monitoring	109
	10.6.1	Sampling Locations	110
10.	7 Biod	iversity and Ecological Monitoring	112
	10.7.1	Objective	112
	10.7.2	Sampling Methodology and Assessment Criteria	112
10.8	8 Was	te Disposal Facilities and Practices	118
	10.8.1	Objectives	118
	10.8.2	Parameters and Frequency	118
	10.8.3	Sampling Locations	118
	10.8.4	Quality Control Measures	118
	10.8.5	Contingency	118
10.9	9 Occi	upational Health and Safety Monitoring	118
	10.9.1	Accident and Disease Monitoring	119
	10.9.2	Radiation Monitoring	119
10.	10	Socio-Economic Monitoring	120
	10.10.	1 Agriculture	121
	10.10.2	2 Education	122
	10.10.3	3 Health	122
	10.10.4	4 Wider 'social' indicators (not in order of importance)	122
	10.10.3	5 Transport safety monitoring	123

LIST OF TABLES

Table 1-2: Reports produced for the updated ESIA process	4
Table 4-1: List of Applicable Legislation	12
Table 4-2: International conventions applicable to the project	15
Table 8-1: Framework Environmental and Social Management Plans – Design and	
Construction Phase of the Syrah Resource Balama Graphite Project	29
Table 8-2: Framework Environmental and Social Management Plans – Operational Phase	of
the Syrah Resource Balama Graphite Project	31
Table 8-3: Cross-cutting Framework Environmental and Social Management Plans –	
Operational Phase of the Syrah Resource Balama Graphite Project	37
Table 8-4: Design/Planning and Construction Phases Environmental and Social Mitigation	l
Measures for the Syrah Resources Balama Graphite Project	44
Table 8-5: Operational Phase Environmental and Social Mitigation Measures for the Syrah	۱
Resources Balama Graphite Project	68
Table 8-6: Decommissioning Phase Environmental and Social Mitigation Measures for the	;
Syrah Resources Balama Graphite Project	81
Table 10-1: Proposed Parameters for regular in situ Ground and Surface Water Monitoring	ງ94
Table 10-2: Proposed Parameters for Surface Water Monitoring	95
Table 10-3: Discharge water quality guidelines applicable to the Syrah Balama Graphite	
Project	96
Table 10-4: Sanitary Effluent Discharge Standards	97
Table 10-5: Drinking water quality guidelines applicable to the Syrah Balama Graphite	~ -
Project	97
Table 10-6: Surface and ground water sampling points	99
Table 10-7: Water, Sediment and Invertebrate Monitoring Frequency	103
Table 10-8: Acceptable dust fall rates as measured (using ASTM D1739:1970 or equivalent	nt)
at and beyond the boundary of premises where dust originates	105
Table 10-9: Applicable Air Quality Guidelines	106
Table 10-10: Air Quality Sampling Points at Sensitive Receptors	107
Table 10-11: Ambient and Occupational Noise Level Guidelines (IFC 2007)	109
Table 10-12: Amplent and Occupational Noise Monitoring	109
Table 10-13: Noise Sampling Locations at Sensitive Receptors	110
Table 10-14: Selected Indicator / Variables to be measured	112
Table 10-15: Indicators at each level (vvorid Bank, 1998)	114
Table 10-10. Effective dose limits for occupational and public ionizing radiation exposures	100
	120

LIST OF FIGURES

Figure 1-1: Locality map indicating the position of the proposed Balama Graphite Mine	area.2
Figure 7-1: Organisational Structure of Senior Management	24
Figure 10-1: Summary of Structure of the Environmental Monitoring Programme	90
Figure 10-2: Map showing the location of surface water monitoring including, fish and	
invertebrate sampling points	101
Figure 10-3: Map showing the location of ground water monitoring points	102
Figure 10-4: Air Quality Monitoring Locations	108
Figure 10-5: Noise Monitoring Locations	111

LIST OF ABBREVIATIONS

AfDB	African Development Bank's			
AMD	Acid Mine Drainage			
ANZECC	Australian and New Zealand Guidelines for fresh and marine water quality			
ARAs	Regional Water Administrations			
ASTM	American Society for Testing and Materials			
CDP	Community Development Plan			
CES	Coastal & Environmental Services			
CESMP	Construction Phase ESMP			
D/PESMP	Design and Planning Phase ESMP			
DEMP	Decommissioning phase ESMP			
DO	Dissolved Oxygen			
DSF Definitive Feasibility Study				
E&S	Environmental & Social			
EA&R-SH	Environmental Affairs and Rehabilitation – Section Head			
EASP	E&S Action Plans			
ECO	Environmental Control Officer			
EHS	Environmental, Health and Safety			
EHS-M EHS Manager				
EPCM Engineering, Procurement, Contractor Management				
EPCM-SH	Engineering, Procurement, Construction Management – Section Head			
EPR	Emergency Preparedness and Response			
ESIA	Environmental and Social Impact Assessment			
ESMP	Environmental and Social Management Plans			
OESMP	Operational Phase ESMP			
ESMPr	Environmental and Social Management Programme			
ESMS	Environmental and Social Management System			
FAO	Containers (Food and Agriculture Organisation			
GM	General Manager			
GoM	Government of Mozambique			
H&S-SH	Health & Safety Section Head			
HAZOP	Hazard and Operability Study			
HIV	human immunodeficiency virus			
HR	Human Resources			
I&AP	interested and affected parties			
IAEA	International Atomic Energy Agency			
IFC	International Finance Corporations			
ISS	Integrated Safeguards System			
ITN	Insecticide-treated BedNet			
KAP	knowledge, attitude and practice			
KPI	Key Performance Indicators			
LoM	Life of Mine			
LTV	Long-term trigger value			

MICOA	Ministry for the Coordination of Environmental Affairs		
MSDS	ISDS Material Safety Data Sheets		
NCD Non-communicable diseases			
NGO	Non-Governmental Organization		
OECD	Organization for Economic Co-operation and Development		
OHS Occupational Health & Safety			
OS	Operational Safeguards		
PAC	AC Project-Affected Communities		
PPE	Personnel Protective Equipment		
PS	Performance Standards		
RAP	Resettlement Action Plan		
RSA-M	Resettlement and Social Affairs Manager		
SANS	South African National Standard		
SEP	Stakeholder Engagement Plan		
SOP Standard Operating Procedures			
STH Transmitted Helminthiasis			
STI	Sexually Transmitted Infection		
STV	Short-term trigger value		
ТВ	Tuberculosis		
ТМ	Technical Managers		
ToR	Terms of Reference		
TSF	tailing storage facility		
TWG	Technical Working Group		
UN	United Nation		
VCT	Voluntary Counselling and Testing		
VIP	Ventilated Improved Pit		
WHO	World Health Organisation		
WRD	waste rock dump		

1. INTRODUCTION

1.1 Project background

Twigg Mining & Exploration Lda, a subsidiary of Syrah Resources Limited, an Australian resource company listed on the Australian Stock Exchange, proposes to construct and operate a graphite mining project on a portion of the 30 km² (3000 hectares) of land on which they hold an mining licence, in the Cabo Delgado province in the District of Namuno of northern Mozambique (Figure 1-1). The proposed site is approximately 7 km away from the town of Balama and 260 km by road west of the port town of Nacala a deep water container port, which is the third largest port in Mozambique. Syrah Resources Ltd currently holds a 106 km² (106000 hectares) Prospecting License in the Cabo Delgado province in the District (Figure 1-1).

The Balama site contains the world's largest known graphite deposit, and excluding market considerations, has the potential to deliver a mine life of 100 years at a process rate of 2 000 000 tpa. A mining license application for a period of 25 years will be submitted (an effective mine life of 23.5 years to allow for closure) with an option to extend for a further 25 years. The plant will operate 365 days per year.

Syrah Resources aim to be the leader in socially and environmentally responsible mining in the region and, as such, will seek compliance with local and international standards. The primary tool for implementing a sound Environmental & Social (E&S) management is a series of Environmental and Social Management Plans (ESMP) that include Design and Planning Phase ESMP (D/PESMP), Construction Phase ESMP (CESMP), Operational Phase ESMP (OESMP) and Decommissioning Phase ESMP (DESMP) (Equator Principles III, 2013). For the purpose of this report, these documents are jointly referred to as the Environmental and Social Management Programme (ESMPr). The ESMPr (this document) has been standardised and adapted to the requirements stipulated in the International Finance Corporations (IFC) Performance Standards on Environmental and Social Sustainability (2012) and associated Environmental, Health and Safety (EHS) Guidelines.

Consequently, this report is structured as follows:

- <u>Chapter 1</u> provides an overview of the Syrah Balama Graphite project and details of the team members that drafted this report.
- <u>Chapter 2</u> provides a summary of the project description.
- <u>Chapter 3</u> provides a background to the ESMP and details of relevant management plans required in each phase of the operation to ensure compliance with relevant standards.
- <u>Chapter 4</u> provides the applicable legislation and relevant local and international policies and standards.
- <u>Chapter 5</u> identifies the training needs that include staff training and community training and partnerships that will be required to implement the ESMPr.
- <u>Chapter 6</u> contains community engagement and on-going consultation and communication requirements.
- <u>Chapter 7</u> contains the organisational capacity and human resources requirement to implement the ESMPr.
- <u>Chapter 8</u> presents the mitigation measures and identifies specific measures that would be required to manage the range of identified environmental and social impacts.
- <u>Chapter 9</u> describes the monitoring and review procedure implemented by the management team.
- <u>Chapter 10</u> provides details of the monitoring programmed required to address the described mitigation measures.



Figure 1-1: Locality map indicating the position of the proposed Balama Graphite Mine area.

2

1.2 Objectives of the Environmental and Social Management Plan

This document is intended to assist Syrah Resources to implement a sound E&S management system. It represents the company's commitment to addressing and managing the potential negative and positive impacts associated with the construction, operation and closure phases of the Balama Graphite Project in a systematic, efficient and effective manner.

The objectives of the document are to:

- 1. Ensure the project is compliant with applicable national environmental and social legal requirements.
- 2. Identify the required mitigation measures that are needed in order to reduce negative E&S impacts and enhance positive ones.
- 3. Ensure that all mitigation measures and recommendations identified during the Environmental and Social Impact Assessment (ESIA) are incorporated into documents that are referenced and expanded if necessary during the various phases of the project.
- 4. Outlines management structures to ensure that the implementation of the ESMPr is possible for all phases of the project,
- 5. Identify relevant documents and procedures to be developed that will facilitate the implementation of the ESMPr.

1.3 Environmental and Social Impact Assessment Process to Date

In 2013, Syrah Resources requested Coastal & Environmental Services (CES) to conduct an ESIA completed to local Mozambican standards as well as those of the IFC. Table 1-2 presents the volumes that were produced during the ESIA process. All documents prepared as part of the ESIA process were in accordance with required international standards.

Report produce	Date	Authors				
Scoping						
Environmental Pre-feasibility Scoping Study and Terms of Reference	May 2013	Coastal & Environmental Services, South Africa				
Specialist Studies						
Air Quality	January 2014	M. Ojelede, V. Jovi & A. Husted				
Aquatic Ecology Baseline and Impact Assessment	December 2013	C. Mack, B. Rowlston & T. Avis				
Geochemistry	September 2014	Digby Wells Environmental				
Health Impacts Assessment	May 2013	V. Dlamini , C. Nyaundi, N. Taylor-Meyer & J. Perold				
Hydrogeology	December 2013	F. Kom & S. Fonkem				
Noise Assessment	January 2014	L. Sadler & B. Thornton				
Land, Natural Resource Use and Agricultural Assessment	December 2013	R. de Kock & M. Bailey				
Social Impact Assessment Report	July 2013	J.A. Hough				
Terrestrial Faunal Impact Assessment Report	December 2013	B. Branch				
Radiation Specialist Report	May, 2014	I.D Kruger				
Traffic and Transport Assessment Report	August 2013	T. King & B. Rowlston				
Vegetation and floristic specialist study	October 2013	T. Martin & G. Hawley				
Waste and Wastewater Assessment Report	November 2013	E. Igbinigie & K. Whittington-Jones				
Preliminary mine closure and rehabilitation plan	April 2014	H. Mashaba, B. Coutts & P. Tanner				
Environmental and Social Impact Assessment						
Environmental and Social Impact Report		Coastal & Environmental Services				
Environmental and Social Management Plan and Monitoring Programme						
Environmental and Social Management Plan and Monitoring Programme (current report)	September 2014	A. Zide, E. Igbinigie & K. Whittington-Jones				

Table 1-2: Reports produced for the updated ESIA process

1.4 Study team

The following team members were involved in developing the current report:

Ayanda Zide

Environmental Consultant holds a B.Sc. in Botany, Microbiology and Chemistry and a B.Sc. (Hons) in Botany where her thesis focused on identifying and characterising galls and gall forming insects and associated pathogens (Fungi) on the mangrove species *Avicennia marina*. Courses in her honours year included Diversity Rarity and Endemism (DRE), Pollination Biology, Estuarine Ecology, Rehabilitation Ecology, a Stats course and a short GIS course. Her research interests lie in biological invasion, conservation, rehabilitation ecology, plant biotechnology and water research. Ayanda conducts vegetation and impact assessments that guide proposed developments to reduce their impacts on sensitive vegetation. As part of these surveys she identifies and maps the vegetation communities and areas of high sensitivity. She has worked as a botanical assistant on the Lesotho Highlands Development Authority botanical baseline survey and has conducted groundtruthing surveys for developments in the Eastern Cape.

Dr Eric E Igbinigie

Eric is a Senior Environmental Consultant and a registered Professional Natural Scientist (Pr.Sci.Nat.). Eric holds a PhD in Environmental Biotechnology and his professional interest is in Sustainable Integrated Environmental Management with a keen interest in Waste & wastewater specialist assessment, Environmental due diligence, Contamination assessment and remediation, and Environmental & Social management compliance audits. Eric has

successfully conducted several related local and international environmental projects across Africa in compliance with the requirement of multinational lenders such as the IFC, SWEDFUND, DEG and AfDB, where he served as both specialist consultant and project manager. Before joining CES Eric served as a Senior Research Scientist at the Institute for Environmental Biotechnology, Rhodes University conducting postgraduate lectures and led a research group tasked with the successful beneficiation of coal spoils facilitating the revegetation of coal mine dump sites evident in Witbank, South Africa.

Dr Kevin Whittington-Jones

Kevin, an Executive of CES, holds a PhD in Environmental Biotechnology and has been involved in integrated environmental management since 1998. His professional interests include environmental and social due diligence, integrated waste management and environmental auditing. He has worked in a number of different sectors throughout Africa but primarily mining, forestry, agro-industry and ports and is certified as an auditor by the Roundtable on Sustainable Biomaterials (RSB). Kevin has been involved in a number of industrial ESIA projects within South Africa and internationally, both as Project Manager and as a waste management specialist. These include various heavy mineral, copper, iron and graphite mining projects, wind energy facilities, forestry operations and numerous largescale agro-industrial / biofuel developments. The majority of these studies have been conducted to IFC Performance Standards. From 2004 - 2009 Kevin held the position of Senior Lecturer in the Rhodes Investec Business School where he was responsible for the development and co-ordination of the environmental management electives of the MBA programme. To date, Kevin has worked on projects in South Africa, Swaziland, Namibia, Mozambique, Malawi, Zambia, Zimbabwe, Liberia, Sierra Leone, Kenya, Uganda, Egypt and Madagascar.

2. PROJECT DESCRIPTION

2.1 Introduction

In December 2011, Syrah Resources acquired 100% ownership of the Balama Graphite Project and has since conducted a large diamond drilling resource definition program to establish a graphite resource with a strong potential to be developed into a mining operation. As such, Syrah conducted a Scoping Study in July 2012 and is currently completing a Definitive Feasibility Study (DFS).

2.2 **Project description**

Balama is accessed by a good quality asphalt road from Pemba to Montepuez, a regional town, and then via a 45 km unsurfaced road which is in the process of being upgraded by the Government. An existing unsurfaced road currently links Nquide and Ntete with Balama via a circuitous northern route.

In December 2011, Syrah acquired 100% ownership of the Balama Graphite Project and has since conducted a large diamond drilling resource program to define a graphite resource with a strong potential to be developed into a mining operation. Syrah aim to produce a high purity graphite concentrate (between 90-99% total graphite content - TGC), with a requirement to preserve flakes. Balama is currently the world's largest known graphite deposit and excluding market considerations, has the potential to deliver a mine life of 100 years at a process rate of 2 million tpa. A mining license application for a period of 25 years will be submitted (an effective mine life of 23.5 years to allow for closure) with an option to extend for a further 25 years. The plant will operate 365 days per year.

Conventional open pit mining will be used to extract the ore with a base case scenario of 2 million tonnes per annum. Graphite extraction requires a conventional flotation process. The Chipembe dam, located approximately 13 km northwest of the project site, will be the primary source of water for this process.

Infrastructure required for the graphite mine includes:

- A pipeline (±13 km) from the Chipembe dam to the project site;
- Pump houses at the dam and project site;
- Water reservoirs, for process and waste water;
- Internal roads to enable access to various parts of the development and for transportation of materials, equipment, supplies and employees;
- Transportation to Nacala;
- Grid power supplied by the Mozambique Government through EDM;
- A diesel powered electricity generation plant as back-up in the event grid power is not on line by the time the project starts. The power plant includesbunded storage areas for diesel fuel, lubricants and waste oil;
- An ore processing plant; and
- A tailings storage facility.

The project will also require infrastructure related to auxiliary services including the following:

- Offices
- Accommodation at the project site for approximately 250 people;
- A lay-down area for construction materials and equipment. This area will continue to be used during the operational phase, although the actual area of land required may be reduced;
- Workshops for repair of equipment and machinery;
- Stores and a lay-down area(s) for equipment, spares and consumables;

- Offices for site staff;
- Ablution facilities and associated sewage treatment plants;
- Security measures
3. BACKGROUND TO ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

3.1 Introduction

Environmental and Social Management Plan, otherwise referred to as "Management Program" summarises the client's commitments to address and mitigate risks and impacts identified as part of the E&S assessment, through avoidance, minimisation, and compensation/offset (Equator Principles III, 2013). It establishes mitigation measures which defines desired outcomes and actions to address the issues raised during the E&S assessment, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources and responsibilities for implementation. More specifically, the ESMP includes the following components:

- Mitigation: This identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, costeffective, or sufficient.
- *Monitoring*: Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the • environmental impacts of the project and the effectiveness of mitigation measures.
- Capacity Development and Training: To support timely and effective implementation of mitigation measures, the ESMP must draw attention to the existence, role, and capability of environmental departments at various Government levels. The ESMP must provide a specific description of institutional arrangements, specifying who is responsible for carrying out the mitigation and monitoring measures.
- Implementation Schedule and Cost Estimates: For all three aspects (mitigation, • monitoring, and capacity development), the ESMP provides an implementation schedule for measures that must be carried out as part of the project, and the capital and recurrent cost estimates and sources of funds for implementing the ESMP may also be provided.

The ESMP ensures that:

- 1. During project planning and design all mitigation measures identified during the ESIA that could be incorporated into the layout or design of the project are considered (as documented in this report). Although some of the identified responsibilities can be passed on to various third parties, such as contractors for construction-related impacts or sub-contractors for various operational activities (e.g. Vegetation clearing/ spillage from truck carrying raw organic material), the ultimate responsibility for ensuring compliance with the objectives of E&S management rests with Syrah Resources and their project managers. A good approach to facilitate legal enforceability of the ESMP is to integrate the ESMP into the tender and contractual documents as a set of environmental specifications.
- 2. During construction all constraints, restrictions and actions required to minimize construction related impacts are implemented.
- 3. During commissioning and operation, detailed operating procedures are developed so that all constraints, restrictions and actions required to minimize impacts caused by commissioning and operation are developed, implemented and monitored for all aspects of the project.
- 4. During the life of the project continue to enhance positive impacts and ensure mitigation for negative impacts. An important component of this is monitoring, evaluation and communication of findings, and adherence to the principle of continued improvement.

5. **During decommissioning,** detailed procedures are developed to ensure that the project area is rehabilitated to an acceptable and previously agreed-to level.

3.2 Framework Environmental and Social Management Plans

The E&S assessment is normally conducted prior to preparation of the final design and operational details of the development. While it is possible to identify and assess potential E&S impacts at this early stage, in many cases, the outcome of the assessment process results in modification of the original conceptual plans. Thus, while it is possible to identify a number of specific mitigations measures applicable to the construction and operational phases at the time of completing the E&S assessment, it is necessary to allow for modification of these mitigation measures as the plans for the development mature. Framework ESMP allows for this flexibility and this approach has been adopted for the current development (see chapter 8). All ESMPs would be continually implemented and periodically audited, reviewed, and, if required, redeveloped to ensure that the procedures are efficient and serve their purpose.

A Framework ESMP does not present technical details and specifications for managing construction or operational phase impacts since many of these have not been finalised yet. Rather, it maps out broad management initiatives and principles, and establishes a framework within which environmental issues are managed at various stages in the project. The framework and principles do not deal with the specific project specifications of construction or operational impacts, and usually reflect the company's commitment and responsibility to manage project impacts. Although much of this responsibility is passed on to various third parties, such as contractors for construction related impacts or sub-contractors for various operational activities, the ultimate responsibility for ensuring compliance with the objectives of the Framework ESMP rest with the proponent and their project managers.

In large and complex projects it is usually necessary to expand and add to the environmental framework, management initiatives and principles developed in the Framework ESMP for the construction, operation and decommissioning phases of a project as the project evolves. This is required in order to update the Framework ESMPs using specific project details regarding the various actions that will take place once the project is implemented. These specific details are used to develop phase and action specific ESMP, but these will be guided overall by the framework and principles detailed in the Framework ESMP.

Further detail on the ESMPs for each phase of the project is provided below.

3.2.1 Design and Planning Phase ESMP

The Design and Planning Phase ESMP (D/PESMP) is an integral component of the project life cycle and requires interaction between the design engineers and environmental consultants to ensure that the engineers are aware of the environmental constraints that they must consider and incorporate into the final design. For the Syrah Balama Graphite project, the selected contractor will finalise the detailed design for many of the components and undertake the construction of the plant and equipment. To ensure that the E&S constraints are accommodated in the final detailed design, the selected contractors will be briefed through the production of a D/PESMP.

The format of the D/PESMP is that of a checklist, to ensure that all specifications are included in the design phase. The design phase requires ongoing and in-depth discussions between the contractors final design team and the environmental officer. The engineer will have to cost for and be available for ongoing discussions with the environmental officer at all stages of final design. The key aim of the D/PESMP is to ensure that the final design stages of the Syrah Balama Graphite project and its entire associated infrastructure, during its construction, operation, closure, and post-closure phases:

- Adheres to Mozambican law.
- Adheres to applicable International Best Practice including the IFC Performance Standards on Environmental and Social Sustainability (2012), IFC General EHS Guidelines (2007) and the IFC EHS Guidelines for Mining (2007);
- Takes due cognisance of the biophysical, social and economic environment in which the project will operate.

While the contractor is required to adhere to all the standards and policies outlined in this document (see chapter 4 of this report), the following checklist of criteria will be included as a minimum in the final design of project:

- 1. Any changes to the proposed location of primary infrastructure will take due cognisance of the environment and local communities and in particular impacts on the adjacent terrestrial environment and the local.
- 2. Runoff and stormwater controls to be developed to prevent increased turbidity and pollution of fresh and marine water due to increased runoff.
- 3. Erosion control measures to be developed for the various project components where bare ground is exposed or where soil is stockpiled.
- 4. Any elements of the project that will result in air emissions or fugitive dust (such as product conveyors) will be designed in such a way so as to ensure that the required emissions limited and ambient air quality standards are consistently achieved.
- 5. Noise reduction measures to ensure that the relevant noise limits are not exceeded at the boundary of the site.
- 6. To prevent/contain oil spillages and chemical pollution of terrestrial and marine areas, the following will be incorporated into the design of the relevant components:
 - a. Oil traps, cut-off drains, sumps and settling ponds to be installed at all vehicle servicing areas, areas with hydraulic and transformer oils and other areas where needed.
 - b. Specific approved areas to be dedicated as routine service areas.
 - c. Fuel and chemical storage tanks to be designed in suitably bunded areas and in accordance with the accepted international standards.
 - d. An emergency response/preparedness plan for chemical spills and related incidents to be developed.
 - e. A training and awareness programme for handling chemical products to be developed and implemented.
- 7. Environmental performance objectives and measurable indicators against which the performance of the project can be measured and monitored have been developed and these will be applicable to all phases of the project to ensure the impact on the marine and terrestrial biophysical environment is minimal.

3.2.2 Construction Phase ESMP

A comprehensive Construction Phase ESMP (CESMP) will be employed during the construction phase. This will list activities during the construction phase that are likely to have environmentally and socially significant impacts, and provide mitigation measures. Syrah Resources will implement the CESMP for all activities that will occur during the construction phase (e.g. Integrated Waste Management Plan) based on international standards, especially IFC Performance Standards on Environmental and Social Sustainability (2012). This will be done to protect human health and the environment from the potential impacts of its activities, and to assist in maintaining and improving the quality of the environment.

3.2.3 Operational Phase ESMP

The Operational Phase ESMP (OESMP) lists activities during the operational phase that are likely to have environmentally and socially significant impacts, and provide mitigation measures. Syrah Resources will implement the OESMP for all operational activities (e.g. Integrated Waste Management Plan) based on international standards, especially IFC Performance Standards on Environmental and Social Sustainability (2012). This will be done to protect human health and the environment from the potential impacts of its activities, and to assist in maintaining and improving the quality of the environment.

In some cases Standard Operating Procedures (SOPs) or Method Statements will be adequate to manage certain aspects of the operation. These should focus on the measures and actions necessary to comply with specific regulations and other applicable standards. For example, a SOP can be developed to deal with the handling and use of chemicals and pesticides. In addition, E&S Action Plans (ESAP) may be developed to fill in the gaps of existing management programmes or SOPs to ensure consistency or to provide immediate remedy and timely closure of specific items.

Environmental management during the operational phase will deal with impacts associated with, and caused by, the operational phase of the project. The OESMP eventually becomes the environmental, social, safety and occupational health operational procedures, much like specifications, that govern the actual day-to-day operational activities of the operation, and must therefore be practical, implementable and precise. They will form part of the Technical Operational Procedures that detail exactly how each operation needs to be undertaken and by whom, as well as when, to ensure efficient, safe and environmentally and socially acceptable operations. They deal with the "on-the-ground" management of actions that may have a direct impact on the environment and people.

3.2.4 Decommissioning Phase ESMP

As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative use and the cessation of impacts associated with operational activities. However, depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased. Examples of potential residual impacts and risks include contamination of soil and groundwater and old (unserviceable) structures. Decommissioning phase ESMP (DEMP) is typically encountered within extractive industries such as oil and gas exploration and extraction, and mineral mining extraction such as the Syrah Balama Graphite project. It should be noted that due to the expected lifespan of the proposed project, a detailed DESMP has not been included in this volume but will need to be developed closer to the time of decommissioning.

A DESMP to be developed will include specifications relevant to the decommissioning of all the facilities, outlining the procedures required to close and rehabilitate the site once all operational activities have ceased. Closure and Rehabilitation Management Plans form an intricate part of the DESMP.

4. APPLICABLE POLICIES, LEGISLATION AND STANDARDS

A number of local and international standards and guidelines are applicable to the project and are briefly discussed below.

4.1 Applicable Local and National Legislation

A summary of the legislation applicable to the mining project is provided in Table 4-1 below. It should be noted that the list provided below is not exhaustive, and has been restricted to documents that have direct relevance to either the environment and/or communities.

Table 4-1: List of Applicable Legislation

LEGISLATION	DATE OF ENACTMENT
NATIONAL LEGISLATION	
Constitution of the Republic of Mozambique	2004
INDUSTRIAL LICENSING AND LABOUR LAW	
General Investment Act	Law 3/1993 of June 24th
Industrial Licensing Regulations	Decree 39/2003 of November 26th
Industry and Trade Inspection Regulations	Decree 199/2004 of November 24th
Labour Act	Law no. 23/2007 of August 1st
DATE OF ENACTMENT	DATE OF ENACTMENT
ENVIRONMENTAL FRAMEWORK LAW, EIA, INSPECTIO	NS and AUDITS
Environment Act	Law 20/1997 of October 1st
	Decree 45/2004 of September 29th
Environmental Impact Assessment Regulations	(As amended by Decree 42/2008 of
	Ministerial Diploma 198/2005 of
Addenda to the EIA Process Regulations no. 45/2004	September 28th
General Directive for EIA	Ministerial Diploma 129/2006 of July
Conoral Directive for the Public Participation Process in	19th Ministerial Diploma 120/2006 of July
the EIA process	19th
Amendments of sections 5, 15, 18, 20, 21, 24, 25 and 28	Decree 42/2008 of November 4th
of the Regulations for the EIA Process Decree 45/2004	
Regulations for Environmental Inspections	Ministerial Decree 11/2006 of June 15th
Environmental Audit Process	Ministerial Decree 32/2003 of August 12th
Extracts from the Penal Code	16 September 1886
Norms of application of fines and other sanctions prescribed in the Environmental legislation	Ministerial Diploma 1/2006 of January 4th
Law on Crimes against the Environment	Ministerial Diploma of 2006/7
Protection of the Mozambican Cultural Heritage	Decree 10/1988
Archaeological Heritage	Decree 27/1994
Regulation on Resettlement Process Resulting from Economic Activities	Decree 31/2012 of August 8
MINING ACTIVITIES	
Mining Act	Law 14/2002 of June 26th
Mining Law Regulations	Ministerial Decree 28/2003 of June
Environmental Regulations for Mining Activities	17th Ministerial Decree 26/2004 of August 20th

LEGISLATION	DATE OF ENACTMENT
WASTE	
Waste Management Regulations	Ministerial Decree 13/2006 of June
Regulation on Environmental Quality and Effluents Emission Standards	Decree 18/2004 of June 2 nd (as amended by the Decree No. 67/2010)
WATER AND MARINE RESOURCES	
Water Act	Law 16/1991 of August 3rd
Water License and Concessions Regulations	Decree 43/2007 of October 30th
Sea Act	Law 4/1996 of January 4th
Protection and prevention of pollution of the coastal and marine environment	Decree 45/2006 of November 30th
Regulations for the Transport, Handling and Transit of Dangerous Cargoes in the Ports of the Province of Mozambique	Ministerial Decree 18-891 of 1965
BIODIVERSITY AND WILDLIFE, LAND	
Wildlife and Forestry Act	Law 10/1999 of July 7th
Wildlife and Forestry Regulations	Decree 10/1999 of July 6th
General Regulations for Marine Fisheries	Ministerial Decree 43/2003 of December 10th
Land Act	Law19/97 of October 1st
Land Act Regulations	Decree 66/1998 December 8th (Amended by Decree 1/2003 of February 18th)
Regulations for expropriation associated with Territorial Planning - Directiva Sobre o Processo de Expropriacao para Efeitos de Ordenamento Territorial	Ministerial Diploma 181/2010, of June 18

The management of water resources in Mozambique is covered by the National Water Policy (recently revised) and Water Law (Law no. 16/91). The Regional Water Administrations (ARAs), which are organized in terms of river basins, are the institutions responsible for managing the country's water resources. The centre-north regional water administration (ARA Centro-Norte) is responsible for water resource issues at Moma.

The Water Law (Law 16/91 of 3 August) defines user-pays and polluter pays principles as the basis for water resources management and the regime for water concession and licenses. These factors are based on environmental sustainability principles.

According to the Water Law, water use may be termed "common", i.e. for domestic or personal use, which is free to utilize, or "private". Private water use may be carried out under:

- a) Rights granted under law (i.e. holders of land (DUAT-holders) can use water sources on their land without a license if such water use is for domestic or agricultural use, unless the volume to be utilized is such that a license or concession is required) (Article 23);
- b) Licensed rights; or
- c) Water rights concession (Article 21).

A water use license or concession may be granted to any natural or legal person, public or private, national or foreign if they have legal authority to be in Mozambique, and if the water use will not damage the environmental and ecological equilibrium. Licensing and concessions are regulated under the Water Law.

4.2 Applicable International Guidelines and Conventions

4.2.1 International Finance Corporation Performance Standards (2012)

In 2005 the IFC embarked on an extensive review of its environmental assessment procedures and Performance Standards (PS). These Performance Standards (see Box 1) have become the international benchmark for ESIA's and are used to measure the environmental performance and management of large international projects. They have been adopted by most lender groups and Equator Principle-compliant commercial banks. These eight Performance Standards have been revised more rigorous and more clearly defined Performance Standards came into effect in January, 2012. Box 1 below outlines these standards, the main objectives of which are briefly discussed.

Box 1: IFC Performance Standards on Environmental and Social Sustainability (2012)

Performance Standard 1:	Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2:	Labour and Working Conditions
Performance Standard 3:	Resource Efficiency and Pollution Prevention
Performance Standard 4:	Community Health, Safety and Security
Performance Standard 5:	Land Acquisition and Involuntary Resettlement
Performance Standard 6:	Biodiversity Conservation and Sustainable Management of Living
	Natural Resources
Performance Standard 7:	Indigenous Peoples
Performance Standard 8:	Cultural Heritage

Of particular relevance to this report is the IFC PS 1 which requires that:

- The identification and review of the E&S impacts and risks of the operations achieved through the ESIA process and specialists studies;
- Define a set of policies and objectives for E&S performance;
- Establish a management plans to achieve these objectives;
- Monitor performance against these policies and objectives;
- Report results appropriately; and
- Review the system and outcomes, to strive for continuous improvement.

The effort needed to establish ESMP depends on the existing management practice. Any production and quality-based management systems operating within the organisation can be used as a foundation on which to build the elements of a system consistent with IFC PS 1 in the absence of an existing environmental, health and safety, human resource or social management system. Syrah Resources will therefore adopt industry best practice management systems that will be implemented in a manner that ensures all requirements presented here are met.

As part of its on-going engagement with affected communities, Syrah Resources is required to disclose its various E&S management plans in advance of project implementation to affected communities and stakeholders, and provide updates throughout the life of the project as mitigation measures are adjusted and upgraded to reflect the feedback from the affected communities.

4.2.2 IFC General EHS Guidelines

The IFC General EHS Guidelines (30 April 2007) are applicable to this project. The guidelines detail general impacts and ways to manage them. They cover environmental, occupational health and safety, community health and safety, performance indicators, and monitoring.

4.2.3 IFC EHS Guidelines for Mining

The IFC EHS Guidelines for Mining (10 December 2007) are applicable to this project. The guidelines detail industry-specific impacts and ways to manage them. They cover environmental, occupational health and safety, community health and safety, performance indicators, and monitoring.

4.2.4 International Conventions

Mozambique is a signatory to a number of international conventions. Those applicable to this project are summarised in Table 4-2 below.

Table 4-2: International conventions applicable to the project

INTERNATIONAL CONVENTIONS		
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal	1989	
African Convention on the Conservation of Nature and Natural Resources	1968	
(Amended)-Revised African Convention on the Conservation of Nature and Natural Resources (Amended Version) Not yet in force. Mozambique is a party and would be bound upon entry into force	2003	
Constitutive Act of the African Union	2000	
Bamako Convention on the Ban of the Import into Africa and the Control of Trans- boundary Movement and Management of Hazardous Wastes within Africa	1991	
Convention on Biological Diversity	1992	
Convention on International Trade in Endangered Species of Wild Fauna and Flora (Cites)	1973	
UN Convention Concerning the Protection of World Cultural and Natural Heritage	1972	
Kyoto Protocol to the UN Framework Convention on Climate Change	1998	
Convention on Oil Pollution Preparedness, Response and Cooperation	1990	
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR)	1971	
Stockholm Convention on Persistent Organic Pollutants	2001	
UN Framework Convention on Climate Change (read with Kyoto Protocol)	1992	
Vienna Convention for the Protection of the Ozone Layer	1985	
International Convention on Civil Liability for Oil Pollution Damage	1992	
Montreal Protocol on Substances that Deplete the Ozone Layer	1987	
United Nations Convention on the Law of the Sea	1982	
International Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1994	
Treaty Establishing the African Economic Community	1991	
SADC Protocol on Mining	1997	
African Charter on Human and Peoples" Rights	1981	

5. TRAINING AND AWARENESS PROGRAMMES

5.1 Introduction

Syrah Resources' personnel and its contractors, including third parties, will be conversant with all environmental and social legislation and international best practice applicable to their contract. They will need to be appropriately trained in environmental management in order to possess the skills necessary to impart on their subordinates.

All personnel involved in the construction and operation of the project will undergo a training and awareness programme on E&S management prior to commencing activities. Syrah Resources will develop a procedure for environmental training which will lay out in detail the methodology for developing and presenting environmental awareness and induction training.

Information will be transferred in an appropriate manner and training courses will take language and cultural and educational levels into consideration. In particular, the training of illiterate staff will require the development of appropriate training programmes and extensive use of signage (such as pictures, logos, drawings etc). A site Environmental Handbook will be developed and distributed to all literate personnel. This handbook will cover some of the information presented in the Environmental Awareness and Induction Training. Records will be maintained of all E&S training.

5.2 General Staff E&S Training

Syrah Resources will ensure that its staff and other employed parties or their contractors, who carry out any aspects of the work, in any phase of the project, are adequately trained with regard to the implementation of the ESMP described here. Contractors and third parties will be aware of their health, safety, environmental and social requirements and obligations, and these will be legally and contractually binding on them. A training-needs-analysis that would cover EHS and Community issues would need to be developed and should identify the appropriate training programmes and target groups.

The training staff will be appropriately trained in their respective disciplines and will possess the skills necessary to train, inform and sensitise all personnel involved in the project.

All personnel involved in the construction and operation of the Balama Graphite Project will be required to participate in an EHS and Community induction programme. Training programmes will be targeted at three distinct levels of employment, i.e. executive, middle management and labour, and awareness training programmes will contain the following information:

- The names, positions and responsibilities of personnel to be trained.
- The framework for appropriate training plans.
- The summarised content of each training course.
- A schedule for the presentation of the training courses.

The range of topics that need to be covered in the awareness training will, inter alia, include:

- Syrah Resources' Environmental Policy;
- Syrah Resources' Health and Safety Policy;
- Syrah Resources' Community Policy;
- Syrah Resources' Environmental Objectives and Targets;
- Organizational structure and responsibilities;
- Aspects of routine day-to-day operational activities, which can have environmental, social, safety or health impacts;

- Environmental and safety hazards which could arise from non-routine situations and corrective actions;
- The importance of environmental and safety Incident reporting and completion of appropriate reports;
- Emergency Preparedness and Response;
- Channels of communication for discussing and reporting E&S issues;
- Documentation systems so that appropriate records of E&S matters are maintained;
- Responsibilities under the applicable E&S legislation and international best practice;
- Responsibilities related to Labour and Working Conditions, in particular, the requirements of IFC Performance Standard 2 that will apply to project and their contractors;
- Culturally appropriate behaviour; and
- Community engagement, security and grievances.

Additional training on cultural heritage and culturally appropriate behaviour, and on health, safety, environmental and social hazards which could arise from non-routine situations and corrective actions will be provided. Training will highlight the importance of incident reporting and completion of appropriate reports, channels of communication for reporting EHS and Community issues and incidents, documentation systems and responsibilities under Mozambican legislation.

Information will be transferred in an appropriate manner, and training courses will take language, cultural and educational levels into consideration. It is proposed that an EHS and Community Handbook be developed and distributed to all literate personnel.

5.3 Community Health and Safety Training, Awareness and Competence

The objectives of the community health and safety are:

- Induction and training to raise awareness levels;
- Specific community-based interventions based on the proactive identification of safety behaviour and trends; and
- Training for community-based monitoring of health and safety issues addressed by the Community Health and Safety Operating Procedure.

This training will be rolled out to the surrounding communities through:

- Education sessions at clinics and community centres.
- Briefing sessions with local government.
- Distribution of pamphlets.
- Broadcast of information on local radio stations
- If suitable NGO's are identified in the area, and if appropriate, partnerships with selected NGOs and other bodies currently engaged in the local area might be developed.

Many aspects of community engagement related to the project involve partnerships with NGOs and other relevant local government and non-government structures. These partnerships will be facilitated under the following Operating Procedures:

- Health and Safety;
- Resettlement;
- Emergency Preparedness and Response;

- Rehabilitation and Closure; and
- Stakeholder Engagement.

5.4 Emergency Preparedness and Response Training and Awareness

Where the project involves specifically identified physical elements, aspects and facilities that are likely to have significant E&S impacts, Syrah Resources will establish and maintain an Emergency Preparedness and Response (EPR) Plan, in collaboration with appropriate and relevant third parties. The EPR plan will be developed to respond to accidental and emergency situations associated with the project in a manner that will assist in preventing and mitigating any harm to people and/or the environment. In particular, the EPR plan will address:

- areas where accidents and emergency situations may occur (high risk areas),
- communities and individuals that may be impacted (high risk receptors),
- response procedures,
- provision of equipment and resources,
- designation of responsibilities,
- communication, including that with potentially affected communities; and
- periodic training to ensure effective response.

All staff, including contractors, will adhere to Syrah Resources' EPR plans, including incident and accident-reporting requirements, as well as all relevant Mozambican legislation. Where necessary, Method Statements or SOPs that detail the exact process, resource requirements and responsibilities for ensuring that these emergency procedures are documented and enforceable will be developed.

EPR training and awareness will form part the EPR plan to be developed. Incidents that will be considered during the development of the EPR include but will not be limited to:

- Details on emergency organisation (manpower) and responsibilities, accountability and liability;
- A list of key personnel to be contacted;
- Details of emergency services applicable to the various areas along the route that components will need to be transported and for the site itself (e.g. the fire department, spill clean-up services, etc.);
- Internal and external communication plans, including prescribed reporting procedures where required by legislation;
- A risk assessment and Hazard and Operability Study (HAZOP) to identify all potential incidents and emergencies;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures required to be implemented;
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release; and
- Training plans, testing exercises (including fire drills) and schedules for effectiveness;

Training and awareness component to be considered will include:

- Accidental discharges to water and land;
- Accidental exposure of employees to hazardous substances;
- Medical evacuation;
- Work stoppage incidents requiring medical intervention across all aspects of the operation
- Accidental fires and fire drill; and
- Vehicle accidents, including vehicle collisions with pedestrians;

6. COMMUNITY ENGAGEMENT

6.1 Introduction

The stakeholder and community engagement process is a crucial process for any Category A project. It is vital that all interested and affected parties (I&APs) are not only aware of the project and its possible negative implications, but also understand the project and its potential benefits to their communities and surrounding environment. Failure to do so could cause disputes and disagreements between communities, the developer and government authorities and the disruption of established structures such as community administration.

6.2 Stakeholder Engagement Planning

A Stakeholder Engagement Plan (SEP) is the basis for building strong, constructive and responsive relationships that are essential for the successful management of a project's E&S impacts. This is an on-going process that may involve, in varying degrees, the following elements: Stakeholder engagement planning; Disclosure and dissemination of information; consultation and participation; a grievance mechanism; and on-going reporting to affected communities.

The main objectives of SEP are as follows:

- Disclosure of planned project activities;
- Identification of concerns and grievances from stakeholders;
- Harnessing of local expertise and knowledge from interested and affected people;
- Response to grievances and enquiries of stakeholders; and
- Promoting collaborative efforts.

Stakeholder engagement is initiated during the ESIA process and continues for the duration of the project's life cycle. As a minimum, the SEP will be:

- Underpinned by the concept of free prior and informed consent; and
- Structured in accordance with IFC's guideline document "Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets (IFC, 2007).

Disclosure of relevant project information helps affected communities and other stakeholders understand the risks, impacts and opportunities of the project. Syrah Resources will provide affected communities with access to relevant information and consultations and will avail the affected communities the opportunity to express their views on project risks, impacts and mitigation measures. This will allow Syrah Resources the opportunity to consider and respond to them.

The benefits of timely stakeholder engagement include the following:

- It assists the developer to address relevant issues, including those raised by the different stakeholder groups.
- It harnesses traditional knowledge which conventional approaches often overlook.
- It improves information flow between the developers and different stakeholder groups, improving the understanding and 'ownership' of a project.
- It enables project proponents to better respond to different stakeholders' needs.
- It helps to identify important environmental characteristics or mitigation opportunities that might have been overlooked during the ESIA process.

- It helps to ensure that the magnitude and significance of impacts has been properly assessed; and improves the acceptability and quality of mitigation and monitoring processes.
- It may avoid escalation of potential conflicts between the company and the stakeholders.

6.3 Mozambique Legislation on Stakeholder Engagement

Both the Constitution and Environment Law establish the rights of citizens to have information about, and to participate in, decision-making about activities which may affect the environment. Stakeholder engagement is a legal requirement for Category A projects and MICOA have prepared a Directive for the Stakeholder Engagement Process published as Ministerial Diploma 130/2006 of 19 July.

In summary, the directive requires that a Stakeholder Engagement process is carried out whenever the proposed activity implies the permanent or temporary relocation of people or communities, and the relocation of goods or assets or restrictions on the use of or access to natural resources.

Stakeholder Engagement is expected to identify the I&APs, disseminate information to them, manage a dialogue with the proponent of the activity, assimilate and take into account public comments received and feedback the outcomes of the dialogue and inputs so as to demonstrate how these have been taken into account in the design of the activity.

Stakeholder Engagement is an integral part of the ESIA process and will not end with the issuing of the environmental license but will continue during the construction and operational phases of the planned activity.

6.4 The International Finance Corporation's Handbook on Stakeholder Engagement (2007)

In 2007, the IFC published stakeholder engagement guidance notes in the form of a handbook to support projects to deal and engage with its stakeholders. According to this source, eight central pillars of a stakeholder engagement plan include the following:

- Stakeholder identification and analysis;
- Information disclosure;
- Stakeholder consultation;
- Negotiation and partnership;
- Grievance management;
- Stakeholder involvement and project monitoring;
- Reporting to stakeholders; and
- Management functions.

According to the IFC (2007), for any stakeholder plan, identifying the direct and indirect stakeholders is an important step which needs to form the basis for future engagement. Different stakeholders also have different interests in a project, and hence identifying such stakeholders not only ensures that different interest groups are being considered by a project, but also that such interests are incorporated into the design of a project to ameliorate future negative project impacts. Identifying such stakeholders also needs to be strategic and prioritised; constantly referring to previous stakeholder engagements and consultations to direct future engagement. For example, a socio-economic fact sheet or data on the affected population can be used to identify stakeholders and, more importantly, particular subsets of stakeholders such as vulnerable groups.

As encouraged by the IFC, in any engagement with stakeholders or the surrounding communities, the following questions need to be asked:

- Why are we engaging with these stakeholders at this particular phase of the project?
- What local and international requirements have to be met with regard to this consultation?
- Who are the stakeholder groups?
- Are there any sub-stakeholder groups that require special attention (vulnerable population)?
- What techniques or methods will be most affected in dealing with these stakeholders and to ensure their participation in the process?
- Who in the company will bear the responsibility for managing this stakeholder engagement?
- How are we going to capture, record, track and disseminate the results of our engagement processes and sessions?

Building upon these questions, engagement needs to be a two-way exchange of views and opinions in a process through which the project developer listens, but also addresses views and concerns from its stakeholders in a culturally appropriate manner. Attention also needs to be provided to gender inclusivity, especially for the project at hand as women are often marginalised and excluded from decision-making.

A decent community engagement strategy is nothing without proper documentation. "Documenting consultation activities and their outcomes is critical to effectively managing the stakeholder engagement process" (IFC, 2007). The process needs to be highly organised and records need to be kept of each consultation. Each issue raised needs to be documented, as well as action provided for each issue raised by a stakeholder during a consultation session. Documenting such issues and/or concerns also needs to be followed by corrective actions by the developer, and reported back in a timely way to those consulted with clarification steps.

Realising that different stakeholders' interests need to be accounted for, it is often difficult to establish who needs to be present during stakeholder engagement sessions. Identifying and working through community representatives is therefore encouraged by the IFC. Such representatives may include an area's elected officials, authorities or tribal leaders. However, communities are not homogenous and representatives from different interest groups such as women, youth and the elder will, where possible be considered.

6.5 Proposed Syrah Balama Stakeholder Engagement Plan

Community engagement will be undertaken in accordance with the requirements of the Mozambican Legislation and the IFC, through the development of a SEP including an External Communications and Grievance Mechanism procedure prior to any further project-related activities that affect the stakeholders and surrounding villages in any way. These requirements are interpreted as follows:

- When local communities may be affected by risks or adverse impacts from a project, the project sponsor will undertake consultation with them;
- Community engagement will be free of external manipulation, interference or coercion and intimidation; and conducted on the basis of timely, relevant, understandable, inclusive, culturally appropriate and accessible information;
- Stakeholder engagement must be initiated early in the environmental, social and health assessment process (scoping phase) and on continue, on an on-going basis, throughout the life of the project; and
- Affected communities must be provided with opportunities to express their views on

project risks, impacts and mitigation measures and allow the project proponent to consider and respond to them.

As part of this process, the project proponent is required to develop a list of stakeholders. The list will be considered dynamic and will need regular updating, as the relationship between stakeholders and Syrah Resources develops and changes.

The list of stakeholders for the Syrah Balama mine includes:

National

- All Government Ministries, with a focus on Ministry of Mineral Resources, Ministry of Environmental Affairs, Ministry of Public Works, and Ministry of Finance.
- National NGOs and Development Agencies, with a focus on Community Development.
- National Institute for Fisheries Research
- National Institute of Statistics
- •

Provincial

- Government of the Province of Cabo Delgado
- Provincial Directorate of Public Works and Housing
- Provincial Directorate of Agriculture
- Provincial Directorate of Tourism
- Provincial Department of Health
- Provincial Directorate of Education
- Provincial Directorate of Mineral Resources and Energy
- Provincial Directorate of Labor
- Provincial Directorate of Industry and Commerce
- Provincial Directorate for Coordination of Environmental Affair
- Provincial Department of Women and Social Affair
- ARA-Nort (Regional Water Administration)

District and Local

- The District Administrator
- Village chiefs and secretary
- School Teachers
- Traditional healers
- Women's groups
- Youth groups

Key organisations

- Centro Terra Viva Association of the Friends of Environment
- Aga Khan Foundation
- CEPAM
- Catholic University
- Unilúrio
- WWF
- Journal Notícias

Further details of the SEP are documented in the Syrah Resources Stakeholder Engagement Plan (CES, 2013).

6.6 External Communications and Grievance Mechanism

Syrah Resources will implement and maintain a procedure for external communications that includes, at a minimum, methods to:

- Receive and register external communications from the public;
- Screen and assess the issues raised and determine how to address them;
- Provide, track and document responses, if any; and
- Adjust the management program, as appropriate. In addition, Syrah Resources will make publicly available periodic reports on their E&S sustainability.

Syrah Resources will establish a Grievance Mechanism to receive and facilitate resolution of affected communities' concerns and grievances about its E&S performance. Syrah Resources' grievance mechanism will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue or concern. Judicial or administrative remedies will not be impeded by the implementation of the developed Grievance Mechanism and will inform the affected communities of the procedure and requirements of the mechanism during stakeholder engagement process.

Syrah Resources will conduct periodic reporting to the affected communities on progress with implementation of the project, issues that involve on-going risk to or impacts on affected communities and issues that the consultation process or Grievance Mechanism have identified as a concern to those communities. The frequency of these reports will be proportionate to the concerns of affected communities but not less than once annually.

7. ORGANISATIONAL REQUIREMENTS FOR IMPLEMENTATION

This section outlines the proposed organisational structures and other activities that will be required to implement the ESMPr. This organisational structure is subject to change and is meant to ensure that the various ESMPs are adequately implemented.

7.1 Senior Management

The key management positions required to manage and implement the various management instruments are shown in Figure 7.1 and discussed below. The actual titles used for each position may change once the project is implemented, but the responsibilities will largely remain unchanged.



Figure 7-1: Organisational Structure of Senior Management

7.1.1 General Manager

The EHS and Community responsibility of the General Manager (GM) will be to ensure that all personnel abide with the requirements of the ESMPs, and that all areas of the project are constructed and operated in such a manner that they meet all specified legal and contractual EHS and Community requirements. All senior mine managers will report directly to the GM, and all will ensure that all areas of the operations are designed, constructed, operated and decommissioned to meet the specified EHS and Community parameters and contractual and legal requirements.

7.1.2 Technical Manger

The role of the Technical Managers (TM) will be to ensure that all areas of the project are designed, constructed and operated to meet the specified contractual and legal requirements. The Technical Managers will report directly to the Mining Manager.

7.1.3 Environmental, Health & Safety Manager

Management of the EHS issues of the project will be the responsibility of the EHS Department headed by an EHS Manager (EHS-M). The EHS Department is responsible for

ensuring implementation and compliance of all EHS actions specified in this ESMPr relating to all project operations. The EHS-M will report directly to the GM, and is responsible for ensuring that the project operates in an environmentally and socially responsible manner in all aspects of its operations. Specific roles and responsibilities of the EHS-M are expected to be as follows:

- 1. Development of the EHS documentation required for all aspects of the project;
- 2. Implementation of the project's ESMP;
- 3. Continuous review of the suitability and effectiveness of the activities described in all EHS documentation.
- 4. Oversee liaison activities with local stakeholders.
- 5. Ongoing liaison with appropriate project personnel.
- 6. Maintain and manage the monitoring programme.
- 7. Ongoing reporting to the senior management team and the board.
- 8. Oversight function to ensure integration of health, safety and environmental management and social development activities.

The EHS-M may be assisted by three section heads:

- 1. Section Head Health & Safety
- 2. Section Head Environmental Affairs and Rehabilitation
- 3. Section Head Engineering, Procurement, Contractor Management (EPCM)

Section Head – Health & Safety

The Health & Safety Section Head (H&S-SH) will report directly to the EHS-M and will be responsible for the management of all aspects related to health and safety issues, coordinates health and safety aspects related to all aspects of the mining operation and associated facilities. The Section Head will be responsible for ensuring the successful implementation and supervision of the following Operating procedures:

- Construction Health and Safety Management Plan
- Occupational Health and Safety Management Plan

The H&S-SH will work together with the Senior Management to ensure that health and safety standards are met at all times, that emergency equipment is available at all times and ensure that appropriate management interventions are implemented during all phases of the project.

Responsibilities include:

- 1. Ensure all project activities are assessed in a systematic risk assessment
- 2. Ensure a safe working culture is adopted and embraced by all project employees.
- 3. Ensuring that health and safety of employees is a project priority.
- 4. Ensuring implementation and compliance with all safety aspects of the EMP.
- 5. Ongoing liaison with Senior Managers and contractors through the GM regarding safety compliance.
- 6. Providing appropriate training on Occupational Health & Safety (OHS) aspects for Syrah Resources' employees and contractors.
- 7. Ongoing liaison with national and provincial Government agencies and regulatory authorities.
- 8. Ensuring that all incidents are reported to the GM within 24 hours. Significant incidents (loss of life, serious injury, etc) will be reported immediately to the GM.

The H&S-SH will be assisted by a staff complement which may include Safety Officer(s) and Traffic Safety Officer(s).

Section Head – Environmental Affairs and Rehabilitation

The Environmental Affairs and Rehabilitation – Section Head (EA&R-SH) will report directly to the EHS-M, and will be responsible for the management of all aspects related to environmental compliance with the ESMP, internal Operating Procedures and policies. The Section Head will be responsible for ensuring the successful on-site implementation of the environmental aspects of the ESMP. Specifically, the EA&R-SH will be responsible for rehabilitation activities across the mine site, as well as managing the environmental aspects of the dams. The EA&R-SH will work together with Senior Management to ensure that environmental management and rehabilitation are implemented during all phases of the project.

Responsibilities include:

- 1. Ensuring that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to activities commencing on the ground.
- 2. Ensuring implementation and compliance with the ESMP and various Internal Operating Procedures.
- 3. Monitoring and regulating compliance by all personnel and contractors.
- 4. Execution of the environmental components of the Environmental and Social Monitoring Programme.
- 5. Keeping accurate and detailed records of all activities on site.
- 6. Continued and ongoing liaison with Senior Managers and contractors through the EHS Department regarding environmental compliance.
- 7. Conducting environmental awareness training.
- 8. Ensuring that all sites disturbed during all phases of the operation are effectively rehabilitated as soon as possible.
- 9. Monitoring and verifying that environmental impacts are kept to a minimum.
- 10. Reviewing and approving method statements with input from the Section Head, in order to ensure that the environmental specifications in the ESMP are adhered to.
- 11. Ordering the removal of, or issuing contractual penalties to contractors for person/s and/or equipment not complying with the specifications of the ESMP.
- 12. Ongoing liaison with national and local Government agencies and regulatory authorities.
- 13. Monitoring all contractors' compliance with the ESMP.
- 14. Recommending actions to the EHS-M in the event of non-compliance.
- 15. Ensuring operational compliance of the dams with recommendations provided in the ESIA.
- 16. Community Health and Safety Management
- 17. Environmental Emergency Preparedness Management Operating Procedure

The EA&R-SH will be assisted by a staff complement which may include Environmental Control and Monitoring Officer(s), Rehabilitation officer(s), Rehabilitation team and Driver(s).

Section Head - Engineering, Procurement, Construction Management (EPCM)

The EHS-M will appoint Engineering, Procurement, Construction Management – Section Head (EPCM-SH) who is a contractor based on site and will report directly to the EHS-M. The EPCM-SH will specifically manage the EHS issues amongst the contractors during the construction phase and ensure that the construction contractors regularly meet all the necessary requirements defined in the ESMP. The EPCM-SH will liaise with the EHS-M on day to day issues and adhere to all instructions and requests relating to ESMP requirements issued by the latter.

7.1.4 Resettlement and Social Affairs (Community) Manager

The Resettlement and Social Affairs Manager (RSA-M) will report directly to the GM and will be responsible for the management of all aspects related to resettlement, social management, community and skills development as well as stakeholder engagement. The Section Head will ensure successful on-site implementation and supervision of the OP – Resettlement, the OP - Stakeholder Engagement and coordinate the OP - Community and Skills Development.

The RSA-M will have the following roles and responsibilities:

- 1. Plan, mobilize and allocate resources for the implementation of the Resettlement Action Plan (RAP) (i.e manage the RAP's finances);
- 2. Plan, mobilise and allocate resources for the implementation of the RAP (i.e. manage the RAP's finances);
- 3. Draw up and discuss the final entitlement contracts for each affected farmer and households;
- 4. Be responsible for the finances and deliver of entitlement payments;
- 5. Play a central role in the allocation of alternative farmland;
- 6. Oversee the execution and management of the activities described in the Operating Procedure (OP) Resettlement (OP Resettlement);
- 7. Liaise with local government on the implementation of the RAP;
- 8. Coordinate the elaboration of the RAP;
- 9. Address grievances through the established Grievance Mechanism;
- 10. Providing regular feedback to the District and Provincial Government on the progress of the RAP;
- 11. Attend regular meetings and continuously engaging with the TWG;
- 12. Internal monitoring (of key function of which is to regularly engage with the established TWG and to have feedback and disclosure meetings with its members on a regular basis).

The RSA-M will be assisted with a staff complement which may include Resettlement Officer(s), Community Liaison Officer(s), Driver(s), Database clerk(s) and Enumerator(s).

8. STRUCTURE AND IMPLEMENTATION OF THE MANAGEMENT PLANS

8.1 Introduction

The purpose of this section of the ESMPr is to provide detailed recommendations aimed at mitigating negative impacts and enhancing benefits associated with the construction and operational phases of the project. As discussed in Chapter 3 of this ESMPr, the requirements have been presented as a framework to allow for a certain degree of flexibility in the development of specific mitigation measures. However, a number of specific requirements aimed at these phases of the project have also been included in the chapter and will be taken into consideration by Syrah Resources when developing the final Construction and Operational ESMPs.

8.2 Framework Requirements

The framework requirements for both the construction and operational phases for the development are detailed in Table 8-1. Included are a number of plans targeting specific phases of the project and also a number of "cross-cutting" plans. The latter are applicable to both the construction and operational phases. Once developed for the construction phases, these cross cutting plans can then be reviewed and, where required, updated to address environmental and social issues associated with the operational phase.

8.3 Specific Mitigation Measures

In addition to the framework requirements, a number of specific mitigation measures have emerged out of the E&S assessment. These requirements (Table 8-2) will, where possible, be incorporated into the relevant management plans referred to under the framework requirements. Alternatively, they may be incorporated into other forms of instructional documents such as SOPs or Method Statements for specific activities.

Further details on each of the plans referred to in Table 8-1 are provided in the IFC General EHS Guidelines (IFC 2007).

 Table 8-1: Framework Environmental and Social Management Plans – Design and Construction Phase of the Syrah Resource Balama

 Graphite Project

DOCUMENT TITLE	SCOPE	COMPLY WITH
DESIGN AND PLANNING PH	IASE	
Environmental and Social Management Plan and Monitoring Programme. <i>(This document)</i>	Provide an overview of the affected environment, the project and list impacts. Provide overview of legal requirements to be complied with, and define environmental standards. Present details on content of all management plans, as well as organisational structures - the Environmental Management Framework required for implementation.	 IFC Performance Standard 1.
CONSTRUCTION PHASE		
Site Specific Construction Environmental & Social Management plan (CESMP).	 This CESMP must deal with all E&S issues associated with establishing the project. <i>Environmental impacts</i> related to soil erosion, dust, vegetation, fauna, erosion control and management, bulk earth works, materials handling and surface water run-off will need to be covered. This ESMP will also need to deal with the <i>social impacts</i> of the construction including labour requirements and how local labour will be managed, specify the E&S contractual obligations for contractors; define the EHS and Security role of Syrah Resources and contractor staff; and apply aspects of all other ESMPs as applicable. In addition to the above, the ESMP will deal specifically with waste handling and disposal during construction (especially since there are no formalised hazardous waste sites in and around the project area), community and occupational health and safety specific to these facilities during construction, and any other specific aspects not covered elsewhere. Certain aspects will be covered by the cross cutting plans (see Table 8-3). 	 Relevant Mozambican legislation (Chapter 4) IFC Performance Standards 1, 2, 3, 4, & 6. AfDB Integrated Safeguard System (2013) Site rules for Contractors The following IFC EHS Guidelines: Air Emissions and Ambient Air Quality Wastewater and Ambient Water Quality Water Conservation Hazardous Materials Management Waste Management Noise Communication and Training Physical Hazards Chemical Hazards Personal Protective Equipment (PPE) Monitoring Water quality & Availability Life and Fire Safety Traffic Safety Disease Prevention Emergency Preparedness and Response Community Health & Safety

DOCUMENT TITLE	SCOPE	COMPLY WITH
	 With respect to the proposed facility, the following aspects will require careful consideration: Design specially adapted areas for storage of all potentially hazardous chemicals e.g. fuel and oil etc, according to international standards. A specific bunded area will be designated for the offloading and storage of chemicals/hazardous materials. All handling and disposal of hazardous waste will be undertaken in accordance with international good practice. Personnel Protective Equipment (PPE) must be supplied and used where necessary 	
	V. vvaste generated must be properly disposed of.	

 Table 8-2: Framework Environmental and Social Management Plans – Operational Phase of the Syrah Resource Balama Graphite

 Project

DOCUMENT TITLE	SCOPE	COMPLY WITH
OPERATIONAL PHASE		
Site Specific Operational Environmental & Social Management plan (OESMP).	 This OESMP will deal with all E&S issues associated with the operation of the facility. The scope of this Plan will be similar to that of the CESMP, although the priority issues requiring careful consideration will be slightly different. Based on the impact assessment, these issues are likely to be the following: <i>Environmental impacts:</i> Contamination of soil and surface water by hazardous materials Ambient and workplace air quality Ambient and workplace noise Energy and water consumption Waste management Acid Mine Drainage (AMD) Radiation Integrated Pest Management Invasive alien paInts Conservation of unaffected area 	 Relevant Mozambican legislation (Chapter 4) IFC Performance Standards 1, 2, 3, 4, & 6. Site rules for Contractors The following IFC EHS Guidelines: Air Emissions and Ambient Air Quality Wastewater and Ambient Water Quality Water Conservation Hazardous Materials Management Waste Management Noise Communication and Training Physical Hazards Chemical Hazards Personal Protective Equipment (PPE) Monitoring Water quality & Availability Life and Fire Safety Traffic Safety Disease Prevention
	 Labour requirements and how local labour will be managed, Occupational health and safety, including explosion risks Ongoing management of community expectations Influx management In addition to the above, the ESMP will need to include a specific requirement for the implementation of a formal Environmental and Social Management System (ESMS) and deal with any other specific aspects not covered elsewhere.	 Community Health & Safety Occupational Health and Safety

DOCUMENT TITLE	SCOPE	COMPLY WITH
	Certain aspects will be covered by the cross cutting plans (see Table 8-3).	
Security Management Plan	This plan provides guidelines and standards that Syrah Resources and security contractors need to adhere to during the operational phase of the project, in addition to all current laws, regulations and international conventions. Since components of project security may be out-sourced to third parties, it is important to ensure that these third party service providers also comply with the overall management plans and policies established for the project. This ESMP needs to detail how this will be achieved, and cover topics such as: • Selection of security personnel • Securing the plant and operations • Monitoring of safety and security • Physical security enhancement • Inherently safer options • Restricted access to information • Public Disclosure • Security risk assessment	 The appropriate laws of Mozambique pertaining to security and human rights. IFC Performance Standard 4 The following IFC EHS Guidelines: Communication and Training Monitoring Emergency preparedness and Response Voluntary principles on security & human rights Firearms and the use of force In addition, the following are applicable: The United Nations Universal Declaration of Human Rights (adopted and proclaimed by General Assembly resolution 217 A (III) of 10 December 1948); The United Nations Code of Conduct for Law Enforcement Officials (adopted by General Assembly resolution 34/169 of 17 December 1979); The United Nations Basic Principles on the Use of Force and Firearms by Law Enforcement Officials (adopted by the Eighth United Nations Congress on the Prevention of Crime and the Treatment of Offenders, Havana, Cuba, 27 August to 7 September 1990); The Draft Norms on the responsibilities of Transnational Corporations and Other Business Enterprises with Regard to Human Rights (approved August 13, 2003, by U.N. Sub-Commission on the Promotion and Protection of Human Rights resolution 2003/16, U.N. Doc. E/CN.4/Sub.2/2003/L.11 at 52 (2003) as amended

DOCUMENT TITLE	SCOPE	COMPLY WITH
Storm Water Management Plan	 If not managed, storm water run-off can result in the pollution and contamination of the soils and the freshwater systems in the adjacent riparian area. The objective of this plan is to: Protect the health, welfare and safety of the public and to protect property from flood hazards by safely routing and discharging storm water from developments; and Preserve the natural environment. This management plan will need to cover at least the following: Incorporate measures to divert clean storm water away from sources of potential pollution, including waste storage and disposal areas and other operation areas; and Reduce the contact between storm water and hazardous chemicals. 	 from time to time); The Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises adopted by a meeting of its Ministerial Council in Paris on 27 June 2000; The Voluntary Principles on Security and Human Rights published on 4 December 2000 by the governments of the United States of America and the United Kingdom and companies operating in the energy and mining sectors, to the extent that such principles do not contain any provisions that are in conflict with Mozambican legislation in force. IFC Performance Standards 1, 3 & 6 IFC General EHS Guidelines (2007) The following IFC EHS Guidelines: General facility design Communication and Training Monitoring Emergency Preparedness and Response IFC EHS Guidelines for mine (2007) Relevant national and international legislation / agreements (see Chapter 4)
Roads and Transport Management Plan	The operational phase of the project will result in an increase in traffic volume which could pose a risk to the health and safety of the community and the mine	 IFC Performance Standards 1, 2, & 4 IFC General EHS Guidelines (2007) The following IFC EHS Guidelines:

DOCUMENT TITLE	SCOPE	COMPLY WITH
	 employees. The objective of this plan is therefore to reduce the risk of injury to community members and employees. The management plan will cover at least the following: Emphasizing safety aspects among drivers; Improving driving skills and requiring licensing of drivers; Adopting limits for trip duration and arranging driver rosters to avoid over tiredness; Avoiding dangerous routes and times of day to reduce the risk of accidents; Regular maintenance of vehicles and use of manufacturer approved parts to minimise potentially serious accidents caused by equipment failure; Minimise pedestrian interaction with construction vehicles; and Using signage and flag persons to warn of dangerous conditions. 	 Communication and Training Physical Hazards Chemical Hazards Personal Protective Equipment (PPE) Monitoring Traffic Safety Transportation of Hazardous substances Emergency Preparedness and Response Relevant national and international legislation / agreements (see Chapter 4)
Hazardous Chemical Management Plan	 The operation of the graphite mine will involve the storage and use of hazardous chemicals. If not managed correctly, these could result in harm to the environment, in particular soil and water, as well as workers and community members. The objectives of this plan are to ensure that: The use and management of hazardous chemicals is carefully controlled; Hazardous chemicals are only used authorised personnel; The likelihood of harm to humans or the 	 IFC Performance Standards 1, 2, 3, & 4 IFC General EHS Guidelines (2007) General facility design Communication and Training Chemical Hazards Personal Protective Equipment (PPE) Monitoring Life and Fire Safety Transportation of Hazardous substances Emergency Preparedness and Response IFC EHS Guidelines for mining (2007)

DOCUMENT TITLE	SCOPE	COMPLY WITH
	environment is minimised; This management plan will need to cover at least the following: Approval and procurement of hazardous chemicals; Storage of chemicals Disposal of expired chemicals and containers Emergency response Availability of Material Safety Data Sheets (MSDS)	Relevant national and international legislation / agreements including protocols related to banned and restricted chemicals (Stockholm Convention and Rotterdam Convention).
Community Health and Safety Management Plan	 Operation of the mining facilities may present a number of hazards to local communities. As such, Syrah Resources will develop a <i>Community Health and Safety Management Plan</i>. This Plan will include a detailed assessment of all hazards associated with operation of the mine facilities that may impact negatively on local communities. It will also include a clear set of procedures aimed at minimizing harm to community members. This plan must at least cover the following: Handling and storage of hazardous chemicals, HIV/AIDS, Transport of materials and product Ambient air quality Radiation Management 	 IFC Performance Standards 1 & 4 The following IFC EHS Guidelines: General facility design Communication and Training Physical Hazards Chemical Hazards Personal Protective Equipment (PPE) Monitoring Ambient noise and air quality Waste management Transportation Emergency Preparedness and Response
Occupational Health and Safety Management	Operation of the mine facilities will present a number of significant hazards to employees. As such, Syrah	 > IFC Performance Standards 1 & 2 > The following IFC EHS Guidelines:
Plan	Resources is required to implement a comprehensive Occupational Health, Safety and Environmental Plan or	General facility designCommunication and Training

DOCUMENT TITLE	SCOPE	COMPLY WITH
Integrated Waste Management Plan	 system. This Plan will include a detailed assessment of all occupational hazards associated with operation of the mine and mineral processing and a clear set of procedures aimed at minimizing harm to employees during the course of their activities on site. This plan must at least cover the following: Handling and storage of hazardous chemicals, HIV/AIDS, Risks associated with operation of crushers and cutters Workplace air quality Workplace noise Radiation Management This Plan will include a commitment for Syrah Resources to manage all waste streams in a manner that minimizes the likelihood of harm to the environment or human 	 Physical Hazards Chemical Hazards Drinking water quality Personal Protective Equipment (PPE) Monitoring Life and Fire Safety Traffic Safety Transportation of Hazardous substances Emergency Preparedness and Response
	health. Furthermore, all waste streams will be managed according to the waste management hierarchy which requires that production of wastes is avoided and minimized. Wastes will then be re-used or recycled and where this is not possible, it will be disposed of in an environmentally responsible manner and in line with the relevant legal and other obligations. This plan will cover all solid and liquid wastes, both hazardous and non-hazardous, and will also cover the management of leachate from the woodchip and fines storage areas.	 The following IFC EHS Guidelines: Wastewater & Ambient Water Quality Water Conservation Hazardous Materials Management Waste Management Contaminated land Communication and Training Chemical Hazards Personal Protective Equipment (PPE) Monitoring Transportation of Hazardous substances Emergency Preparedness and Response

 Table 8-3: Cross-cutting Framework Environmental and Social Management Plans – Operational Phase of the Syrah Resource Balama

 Graphite Project

SCOPE	COMPLY WITH
· · · · · · · · · · · · · · · · · · ·	
pontaneous settlement and speculative in- to or within the project area, and to ensure be practices on behalf of contractors, Syrah lement a Recruitment, Procurement and In- nent Plan, which will include a Local Hiring in and a Temporary Employment Plan. will make commitments to deal with local isks, specifically maximizing local hiring for opportunities and local purchasing in the influence during the construction and b. <i>A Local Hiring and Local Purchasing</i> to govern Syrah Resources' and their processes and purchasing programmes in e. The objectives are to: procedures and practices that maximize es for hiring local workers, and to minimize in the areas of influence. ansparent procedures that allow access to by the local population in an organized and the influences in the hiring of local workers that anst unauthorized third-party job brokers, proced labour, and discrimination. mployment of women.	 Mozambique Labour legislation including: Law 3/1993 of June 24th Decree 39/2003 of November 26th Decree 199/2004 of November 24th Law no. 23/2007 of August 1st IFC Performance Standards 1 & 2 All relevant International Labour Organisation Conventions IFC (2009). Projects and People. A handbook for addressing project induced in-migration. The following IFC EHS Guidelines: Communication and Training Personal Protective Equipment (PPE) Water quality & Availability Life and Fire Safety Traffic Safety Disease Prevention Emergency Preparedness and Response
	SCOPE spontaneous settlement and speculative in- to or within the project area, and to ensure se practices on behalf of contractors, Syrah lement a Recruitment, Procurement and In- nent Plan, which will include a Local Hiring an and a Temporary Employment Plan. will make commitments to deal with local isks, specifically maximizing local hiring for opportunities and local purchasing in the influence during the construction and s. <i>A Local Hiring and Local Purchasing</i> to govern Syrah Resources' and their processes and purchasing programmes in e. The objectives are to: procedures and practices that maximize in the areas of influence. ansparent procedures that allow access to a by the local population in an organized and t. a hiring process that respects local cultural norms in order to facilitate local participation conflicts and other negative social impacts. ir practices in the hiring of local workers that ainst unauthorized third-party job brokers, orced labour, and discrimination. mployment of women. asultation with Syrah Resources will design emporary Employment Programme for the

DOCUMENT TITLE	SCOPE	COMPLY WITH
	local population that will anticipate the demand for a skilled and unskilled work force, duration of the employment, and the requirements the applicant will have to meet to be accepted. The objectives of this program are to:	
	 Maximize the number of local personnel hired in the project's direct area of influence. Minimize local expectations in terms of potential employment. Prevent the migration of unwanted people towards the project area in search of work. 	
	This programme will be provided to the authorities, the local populations and stakeholders by offices that will be opened for that purpose. Syrah Resources and Contractors will provide information to the community and local stakeholders, through local and regional communication media, on the location of offices where they may learn about job opportunities and the priorities that will be given to local workers. These offices will in turn provide information on jobs; will identify the number of available positions and application requirements. It must be made clear that no workers will be hired at the construction sites.	
	To decrease and control the flow of people seeking employment in the project area, it will be made clear that members of the population directly impacted by the project will be given preference when hiring, as long as they qualify technically and meet Syrah Resources' requirements.	
	Recruiting strategies will identify the methods used for informing candidates that equal priority will be given to project affected people for unskilled positions.	
	The above measures will serve to minimize in-migration to the project area. Furthermore, no goods and services can be	

DOCUMENT TITLE	SCOPE	COMPLY WITH
	procured from the project gate or stalls by the road. This prevents encouraging opportunistic traders into the area.	
Emergency Preparedness Management Plan	Emergency preparedness strategies are required to deal with general spillages, as well as the spillage of any hazardous materials. This is particularly important in areas adjacent to riparian environment where spillages may easily enter these waters. Identification of service providers and required facilities will need to be identified. The identification of upset conditions that can cause major environmental impacts (e.g. major storm events, catastrophic fires, explosions etc) is required, and measures to effectively handle these will be developed. A number of action plans or SOPs are therefore anticipated, such as: • Emergencies Preparedness for Spillages action plan; • Facility Evacuation Plan Preparation of this plan will include an assessment of the emergency response capabilities of local authorities and ensure that deficiencies are identified and addressed.	 IFC Performance Standards 1, 2 & 4 The following IFC EHS Guidelines: General facility design Communication and Training Personal Protective Equipment (PPE) Monitoring Life and Fire Safety Transportation of Hazardous substances Emergency Preparedness and Response
Environmental & Social Monitoring Plan	 The objectives of monitoring are to: Characterise environmental features (e.g. surface water) and identify changes or trends in their condition or state over time. Identify specific existing or emerging problems in condition or state. Gather information to design specific impact prevention or remediation programmes. Determine whether project goals, such as compliance with regulations or implementation of effective control actions, are being met. Provide early warning for emergencies such as floods. It is anticipated that at least the following environmental and 	 IFC Performance Standards 1, 2, 3, 4, 6 & 8 IFC General EHS Guidelines (2007) IFC EHS Guidelines for mining (2007) Relevant national and international legislation / agreements (see Chapter 4)

DOCUMENT TITLE	SCOPE	COMPLY WITH
	 social components will need to be monitored: Water quality (Rivers, wetlands, wells and boreholes for water quality and quantity). Meteorological conditions (important for management of leachate and interpretation of ambient air quality data and will include wind speed and direction; relative humidity; ambient temperature; rainfall and evaporation. Use of natural resources, including power and water. Waste disposal monitoring will need to be implemented during the construction and operational phase to confirm the effectiveness of the Integrated Waste Management Plan. Ambient noise and air quality to ensure compliance with the required limits. Occupational health and safety monitoring including entrance, exit and surveillance medicals for employees, workplace noise, lighting and air quality etc. Storm water quality Social monitoring to ensure that grievances are being attended to and that any necessary changes to the overall process are being timeously and sensibly made. It is proposed that monitoring takes place at two levels, namely Internal Monitoring by a suitably qualified person within Syrah Resources, and External Monitoring through a contracted independent body. 	
Closure and Rehabilitation Management Plan	Closure and rehabilitation plan provides guidelines and measures required to restore the mined land and explore the options, possibilities and end-points along the path towards restoration. The monitoring of successful	 Good Practice Guidelines on Mining and Biodiversity (International Council on Mining & Metals, 2006). IFC EHS Guidelines for Mining (2007).

DOCUMENT TITLE	SCOPE	COMPLY WITH
	 rehabilitation should include monitoring of soil fertility and vegetation cover, erosion and alien invasive species. Thus land rehabilitation is a continuous process and should commence during operation through to closure phase. It may not always be possible to restore the land to its initial status at closure. These rehabilitation concepts to be explored are defined as follows: Restoration: The return of a damaged ecosystem to its original state. Rehabilitation: The return of a damaged ecosystem to its original state. Rehabilitation: The return of a damaged ecosystem to its original state. Rehabilitation: The return of a damaged ecosystem to its original state. Revegetation: The process of establishing vegetation on the degraded environment. Replacement: The process where vegetation is established on the degraded environment, but this vegetation differs from pre-mining vegetation. Such an option would most often result from postmining conditions being incompatible with the original land-use. An example would be to plant economically or socially important crops instead of the original vegetation due to changed soil properties. 	 Guidelines for Monitoring and Evaluation for Biodiversity Projects (World Bank, 1998).
Greenhouse Gas and Energy Management Plan	The significance of a project's contribution to GHG emissions varies between industry sectors. The threshold for this Performance Standard is 25,000 tons CO ₂ equivalent per year for the aggregate emissions of direct sources and indirect sources associated with purchased electricity for own consumption. This or similar thresholds will apply to such industry sectors or activities as energy, transport, heavy industry, agriculture, forestry, and waste management in order to help promote awareness and	IFC Performance Standard 3

DOCUMENT TITLE	SCOPE	COMPLY WITH
	 reduction of emissions. Performance Standard 3 (Pollution Prevention and Abatement) sets the following standard for Greenhouse Gas Emissions: The client will promote the reduction of project-related greenhouse gas (GHG) emissions in a manner appropriate to the nature and scale of project operations and impacts. During the development or operation of projects that are expected to or currently produce significant quantities of GHGs, the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary and indirect emissions associated with the off-site production of power used by the project. Quantification and monitoring of GHG emissions will be conducted annually in accordance with internationally recognized methodologies. In addition, the client will evaluate technically and financially feasible and cost-effective options to reduce or offset project-related GHG emissions during the design and operation of the project. These options may include, but are not limited to, carbon financing, energy efficiency improvement, the use of renewable energy sources, alterations of project design, emissions offsets, and the adoption of other mitigation measures such as the reduction of fugitive emissions and the reduction of gas flaring. 	
Cultural Heritage	The construction and operation of the mine may result in	IFC Performance Standard 8
Management Plan	the loss of sites of cultural and/or heritage value such as	
	graves. The Cultural Heritage Management Plan will	
	attempt:	

DOCUMENT TITLE	SCOPE	COMPLY WITH
	 To protect cultural heritage from the adverse impacts of project activities and support its preservation. To promote the equitable sharing of benefits from the use of cultural heritage. 	
Table 8-4: Design/Planning and Construction Phases Environmental and Social Mitigation Measures for the Syrah Resources Balama

 Graphite Project

Potential Impact Area	Sources of Impacts	Mitigation Measures
		Impact category - Air Quality
Localised	Site Clearing: Removal of topsoil & vegetation and stockpiling of overburden topsoil.	 Where practical, those activities involving removal of topsoil will be scheduled for non-windy months in order to reduce exposure of loose surface material to wind erosion. The area of disturbance will be kept to a minimum at all times and no unnecessary clearing of vegetation will occur. Water or a binding agent will be used for dust suppression on roads.
Localised	Construction of any surface infrastructure	 The area of disturbance will be kept to a minimum and no unnecessary digging or scraping will occur. Drop heights when loading or dumping soil to be minimised. Water or a binding agent will be used for dust suppression on roads.
Localised	Transportation of materials & workers on site	 Water or a binding agent will be used for dust suppression on roads. If no dust suppression is applied then vehicular traffic will aim to minimise travel speed and distance. For example, Reducing the average vehicle speeds from 64.4 km/h to 48.3 km/h to 35 mph will reduce dust emissions by 40% (Wisconsin Transportation Bulletin, 1997).
	-	Impact category- Aquatic Ecology
Localised and Study Area	Water Quality: Sedimentation runoff	 It is essential to prevent sediment-laden run-off from all cleared areas, or areas associated with the mining activities (open pits, waste rock dump (WRD) and tailing storage facility (TSF) sites, etc.) from entering drainage lines and adjacent rivers. The following mitigation measures will be considered during the design of the project: The TSF) and WRD sites will be located in suitable areas away from drainage lines or rivers and good industrial practice put in place in terms of design and operation. Mine-water and surface run-off from the mining areas will be detained in sedimentation ponds before the clear surface water (if uncontaminated) is allowed to flow into the adjacent drainage lines or streams. Contaminated water from the process plant will be stored in either the process water pond or pumped back for storage in the TSF and the supernatant or decant water from the TSF will be fed back to the process water reticulation system.

Localised and Study Area	Water Quality: Contamination from non-ore pollutants	 Domestic effluent from the mine camps will be treated in on-site waste water treatment works and final effluent will meet the legislated limit and, where practical, used for beneficial purposes. Contain and treat contaminated water from mine and associated infrastructure. 				
Study Area	Hydrology: Alteration of river flow dynamics	Little can be done to mitigate this impact apart from attempting to ensure that surface run-off within the project areas is kept as natural as possible and natural drainage lines remain functional.				
Study Area	Habitat Modification: Aquatic habitat modification	 The opportunity for mitigating these impacts and protecting the riparian corridor and river channel will be greater within the designated project area. The following actions will be undertaken: Road and causeway construction will incorporate specific impact assessment studies and where possible ensure eco-friendly designs incorporating bank stabilization structures, as well as the development and implementation of CEMPs. Where possible riparian buffer zones (no-development areas) of 30 to 50 m on either bank will be demarcated on all watercourses within the project area (and adjacent areas if feasible). 				
Localised, study area	Habitat Modification: Loss of species of special concern	 A whole range of mitigation measures to reduce the negative impacts on aquatic habitats and fish biota in the Study Area are described in this report. However, effective mitigation may be difficult, and in spite of these efforts, it is possible that both newly discovered and as yet unidescribed fish species would be at risk of being lost within the Study Area due to impacts associated with the proposed mining venture, including inevitable environmental degradation outside the mine project area. 				
Localised & Study Area	Aquatic Habitat Fragmentation: In- stream structures blocking migrations (bridges, causeways)	 Ensure the provision of suitably designed bridges across rivers in the Study Area that allow free movement of fish and other aquatic biota. Incorporate suitably designed fish-ways on any in-stream dams or weirs, as required. 				
Local & Study Area	Fisheries Resource: Over-utilization of fish resources	 Fishing only takes place on Chipembe dam, which falls outside the mining area. Managing this impact will be very difficult through law-enforcement as this is not a declared fisheries area and currently environmental law-enforcement in this locality is virtually non-existent. 				
		 A series of practical, common sense rules and restrictions to regulate fishing activities may be developed in consultation with the local Chief, village elders and local fishermen. If these rules are in place before the population increases, it will go a long way to help manage the fisheries resources in a sustainable way. The fisheries potential of Chipembe Dam may be investigated and possibly enhanced and developed. This could create work opportunities and catches from Chipembe Dam may provide a more sustainable all-year round source of fish for the local villages. 				
	Impact category – Health Impacts					

Municipal Area	Communicable Diseases linked to Housing Design : Transmission of communicable diseases due to overcrowding	•	Support community based information campaigns related to TB symptoms and the need to seek care. The campaign may address the risk of co-infection between the human immunodeficiency virus (HIV) and Tuberculosis (TB). This can be managed through community-based peer health educators; Labour policies will encourage hiring of local staff to avoid job seeking migrants. The project will not hire at the front gate but consider a recruitment office at an off-site location; Influx management and advice with regards to town planning to prevent overcrowding; Develop partnerships to support the community based TB control programs in conjunction with the authorities
		•	and any agencies/Non-Governmental Organization (NGO). This needs to include case detection, management and surveillance activities under the national TB program policy and strategy; and Support the health management information system and collect longitudinal data on key TB indicators. This will require health systems strengthening to get this essential data.
Municipal Area	Vector-related diseases : Malaria burden	•	Collect baseline data that will inform planning related to the integrated programs. Develop monitoring and evaluation programs based on this data. The following data is proposed to be collected: Facilitate a baseline malaria indicator survey in the communities (children aged 6-59 months) to determine the burden of malaria in the community, and also serve as an indicator to monitor the impact of the disease and interventions; and A knowledge, attitude and practice (KAP) study in the community to support the design and implementation of information, education and communication programs to promote behaviour change and monitor interventions.
		•	Ensure project designs reduce the potential for sources of vector breeding; Develop community based programs in partnership with the local authorities that are based on the strategy of the national malaria control program e.g. Insecticide-treated BedNet (ITN) distribution; and Any workplace malaria and vector control program will include measures for reducing the potential for increasing vector densities and thus decrease disease transmission in the communities.

Province/Regio nal	Sexually Transmitted Infections, including	•	Develop a HIV/AIDS policy that incorporates both the workplace and community considerations; Develop an integrated HIV management program that considers both the workplace and the community but
	HIV/AIDS : Transmission of STIs and HIV/AIDS		with different levels of intervention. The workplace will include a comprehensive program while the community program is to focus on awareness and prevention activities. Tuberculosis(TB) and Sexually Transmitted Infection (STI) will be integrated into this:
		•	Conduct a KAP study to understand levels of awareness and knowledge in both the workplace and community. This needs to have an emphasis on practices so that appropriate behaviour change programs are developed;
		•	Conduct a sero-prevalence study in the area in partnership with the local health authorities;
		•	Support the local health authorities in extending care and treatment programs in the area. Support the local health authorities with the establishment of VCT (Voluntary Counselling and Testing) centres in the area;
		•	Support information campaigns and community based peer educator programs in both the workforce and community. These need to use locally acceptable tools and are to be based on the finding of the KAP study. These are to serve as indicators to monitor the impact of the behaviour change and will have a gender focus. Community based peer health educators will play a key role;
		•	Develop an Influx Management Plan that also considers HIV;
		•	Support equal employment opportunities for women and support livelihood programs to reduce risk for opportunistic sexual encounters;
		•	Support NGO groups active in area on gender-based sexual violence; and
		•	Prevent fraternization of external contractors with the community through codes of conduct and reduce the number of external people sleeping in the community at night.

Local	Soil-, water- and	• The quality of groundwater and surface water will be monitored to ensure that the project does not have any
	waste-related	detrimental effects on community water sources;
	diseases	 Develop and implement and Influx management plan;
		 Restrict access to project created water bodies;
		 Conduct baseline water and sanitation studies on practices based on accepted health indicators;
		 Perform end user analysis of water quality. This serves as an indicator for monitoring water quality where it is consumed and determines the level of general sanitation and hygiene even if water is collected from clean sources;
		 Conduct baseline soil transmitted helminths and schistosomiasis studies to provide an indicator for
		monitoring sanitation in the communities. This will be used to inform a proper baseline in the communities so the potential impact of increasing the disease burden from schistosomiasis can be monitored. Soil Transmitted Helminthiasis (STH) are a good indicator for the baseline status of sanitation in the area and an important cause for co-morbidity;
		 Ensure proper disposal of human waste that is generated from the project. There will be proper waste water treatment plants with the capacity to manage the expected throughput with required contingencies. The design will be such that if there is a failure that the risk of direct exposure to communities and their water sources is minimised; and
		• Ensure proper waste management from project generated waste according to waste management principles.
Local	Road traffic accidents and other accidental injuries	 In collaboration with the local authorities, develop Community Health and Safety Management Plan for the project related to the different activities. This will include emergency response plans for both community related accidents and also for the workplace. This will include a fire, rescue and chemical spill response capability, as well as medical emergency response strategies;
		 Conduct a traffic impact assessment to assess the impact of increased traffic within the project area;
		 Develop a clear policy for the management of emergencies or accidents in the community as a direct result of the projects activities;
Local	Air pollution, noise and mal-odours	 Evaluate and manage air, water and noise issues as part of the environmental impact assessment and environmental management plan requirements. Human health considerations will be considered based on results of the surveillance activity;
		 Collect data on a longitudinal basis from the local health centres on incidence of increased respiratory disease especially upper respiratory tract infections that may be ascribed to dust. While these may not be specifically ascribed to the project the prevailing trends are useful to monitor so that any concerns can be addressed. This may require health systems strengthening to support recording;
		Develop a Road and Transport Management Plan to minimise dust exposure.
Local	Gender-based violence, alcohol and drugs	 Develop social management plans and recommendations as part of the social impact assessment and gender empowerment will be considered through these programs.

Local	Social Cohesion and Well-being	 Many elements will be addressed in the social management plan including influx management and resettlement management. It is essential that where possible health is integrated into social programs; Gender empowerment and equity. This will include programs and employment opportunities; and Extensive communication and management of expectations will need to be conducted with stakeholders. Community expectations will need to be managed carefully.
Municipal area	Health system strengthening	 Influx management and supporting already limited health facilities to cope with the increased population if related to project; Support community volunteer programs through expansion of the community based peer health educator.
		aroup: and
		 Support the health information management system at the local health facilities as a means to support the monitoring of specific health impacts. This will provide a longitudinal tool to track specific health conditions and through the partnership provide access to information. The project proposes to set up a basic monitoring tool with support of the local health facilities.
		Impact category – Land and Natural Resources
Study Area	Removal of topsoil and soil erosion	 Topsoil will be stockpiled and replaced as a final graded layer over the subsoil contouring; Haul road contouring to assist in dispersing water run-off instead of concentrating it and increasing the risk of erosion;
		 Disturbed areas to be rehabilitated as soon as construction has been completed. Rehabilitation will be undertaken progressively.
		 Control the amount of runoff crossing exposed areas by using berms or temporary or permanent drainage ditches to divert water flow around the cleared areas.
		• The access road to be designed no wider than necessary to accommodate the immediate anticipated use.
		 Rivers and lakes to be kept in a natural state as far as possible.
		Minimise the alteration to topography. Minimise the area of importions surfaces
		 Within the area of impervious surfaces. Grade impervious surfaces to drain into vegetated areas
		 Where practical ensure fine materials being transported are covered with tarps or equivalent material.

Study Area	Soil contamination	•	A hydrocarbon management Operating Procedure to be designed and implemented. Copies of this document will be made available at designated facilities where hydrocarbons are used or stored. The purpose of this procedure is to provide for the proper storage and handling of hydrocarbons, including waste hydrocarbons, on site and hence prevent any form of contamination; Soil contaminated with hydrocarbon will be immediately removed and disposed of at a soil bioremediation facility on site; Train staff on the correct management of bunded facilities, including the discharge of collected liquids; Spill kits to be readily available at strategic points throughout the site and staff to be trained on the correct use of these kits; Prevent spillage and seepage of contaminants at all times through the implementation of good housekeeping and management procedures. Define a monitoring program in the EMP. Implement immediate remedial measures in the case of accidents . Storage facilities to be adequately bunded and inspected on a regular basis.
Study Area	Disturbance to the existing soil profile will result in a decrease in agricultural capability	•	Top soil must be stripped and stockpiled. It is to be retained for re-spreading over disturbed surfaces during rehabilitation. An Environmental Control Officer (ECO) to monitor all excavations to ensure backfilling with subsoil first and then topsoil afterwards takes place. An ECO to monitor depth and cover of topsoil spreading during rehabilitation.
Study Area	Loss of agricultural land due to establishment of mining infrastructure	•	In accordance with the IFC PS 5, a RAP will include a detailed agricultural valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes; and Livelihood restoration strategies will be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options include supporting the cotton and maize production capacity of the area by investing in market access, seed provision and agricultural training programmes. A key focus of such programmes will be the empowerment of vulnerable children and youth, as well as women (especially female-headed households).
Study Area	Loss of subsistence crops due to establishment of mining infrastructure	•	In accordance with the IFC PS 5, an RAP will include a detailed agricultural valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes; and Livelihood restoration strategies will be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options include supporting the cotton and maize production capacity of the area by investing in market access, seed provision and agricultural training programmes. A key focus of such programmes will be the empowerment of vulnerable children and youth, as well as women (especially female-headed households).

Study Area	Permanent loss of fruit trees, wood sources and other natural resources	•	In accordance with the IFC PS 5, an RAP will include a detailed agricultural valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes; and Livelihood restoration strategies will be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options include supporting the cotton and maize production capacity of the area by investing in market access, seed provision and agricultural training programmes. A key focus of such programmes will be the empowerment of vulnerable children and youth, as well as women (especially female-headed households).
		Imp	act category – Noise
Study Area	Impact of noise on surrounding noise sensitive receptors in terms of annoyance.	• • • •	There are standard mitigation measures to ensure that vehicle noise is kept within acceptable limits. Vehicles will be kept in good repair; will use standard exhaust and silencing equipment. Drivers will stick to designated speed limits. Roads will be kept in good condition. Construction activities will stick to daylight hours as far possible. Fixed noise sources such as generators will where practical be enclosed.
		Imp	act category – Social Impact
Study area	Influx : Temporary or permanent in- migration in search of job opportunities	•	 Developing a Labour, Recruitment Procurement and In-migration Management Plan: The following guidelines are proposed to be used in developing such a plan: Information dissemination: Employment opportunities will be advertised and the procurement and procedures for such employment made available to the public. Regular briefings to the wider public with regard to recruitment and procurement will be conducted; Recruitment and procurement rules and opportunities will be transparent and accessible to the public. Influx management and security arrangements: Security measures can have implications on the surrounding villagers' safety and mobility. Regular workshops and meetings between the local villagers and security personnel, , will aim to build a good relationship between these parties, to collectively produce a workable solution to influx management and security.

Study Area	Study Area Physical	Some RAP specific mitigation measures include:
	Resettlement: Involuntary resettlement of some	 In the event that physical resettlement is required (which is presently not the case) households that need to be resettled must be identified through a consultative process;
	households and structures	 As part of the RAP, a detailed asset and agricultural inventory has been undertaken with each affected household, in order to develop appropriate compensation and development strategies. These were developed through mutual consensus;
		• During the RAP process, a Technical Working Group (TWG) has been established with the affected villages. The TWG has representation from the affected villages, relevant Mozambique ministries and client representatives [as per the Regulations for the Resettlement Process resulting from Economic Activities (Government of Mozambique, 2012)]. The role for the affected villages is to discuss future resettlement and displacement issues with the developer, and to establish ways to deal with project impacts; and
		 As part of this RAP, village access to natural resources has been considered, and mine infrastructure will be designed in order to ensure continued access to such resources;
		 Livelihood restoration strategies will be considered, aimed at assisting households with re-establishing and improving their livelihoods. As the villagers are primarily involved in subsistence agriculture, it makes sense to provide agricultural support and/or training as a livelihood restoration strategy. Options are being considered by the client; and lastly
		 In compliance with IFC PS 5, a grievance mechanism has been established through which the affected villages can engage with the developer throughout the RAP process.
Study Area	Reduced Access to and Loss of	In addition to the mitigation measures proposed under Section 2.1 ("Physical Resettlement: Involuntary resettlement of some households and structures"), additional measures include:
	Agricultural Land and Farming Practices: Reduced access to productive land and economic displacement	 In accordance with the IFC PS 5, an RAP needs to include a detailed agricultural valuation of all the affected farmlands and owners' possessions in order to develop appropriate compensation strategies and entitlement matrixes;
		 Prior to acquiring land for the mine development, those farmers or households affected by the loss of farms will be assisted by the client and Ministry of Agriculture with finding alternative farmland and preparing their 'new' fields. This is a requirement of the IFC under its PS 5 which is called 'transitional support'; and
		 An established TWG will be the primary vehicle for engagement between the developer and the affected households and farmers, which will be used to establish crop and tree compensation rates, the provision of alternative agricultural land, as well as livelihood restoration/development strategies (such as agricultural programmes). As part of this TWG, the relevant Mozambique ministries will be part of the process, as per the Regulations for the Resettlement Process resulting from Economic Activities.

Regional	egional Reduced Access to and Loss of Productive Agricultural Land and Farming Practices: Heightened food insecurity	•	Apart from compensation for crops and trees to be lost, the developer will assist the affected households with alternative farming land of at least the same quality;
		•	The affected villagers will be encouraged to continue their agricultural practices, despite the possibility of employment opportunities. To assist farmers with their new farms, the developer will investigate the possibility of providing agricultural extension services to smallholder farmers (plans are being drafted by the developer). This may entail a variety of means discussed throughout the SIA. For example, agricultural assistance can range from the provision of seeds to agricultural equipment, water provision, or working in alliance with established organisations in the area (such as Plexus). Another promising means of intervention is to support the primary schools with food and vegetable gardens. School vegetable gardens, together with a school agricultural training programme, allow children to be educated in agriculture and food security (knowledge which they can pass on to their household members);
		•	As far as practically possible, farmland will not be acquired prior to allowing the affected farmer and/or household to harvest the field; and lastly
		•	A food security/nutritional monitoring programme will be implemented in future with a sample of households. This monitoring programme will have a key focus on farmers' ability to re-establish themselves in the cotton industry subsequent to economic displacement, as this is a significant economic income-stream in the area.
Study Area	Reduced Access to Natural Resources as Ecosystem Services: Reduced access to the Inselberg's forest cover and small wildlife	•	A RAP is currently being conducted by CES. As part of the RAP, village access to natural resources will be documented and specific sites and/or trees that are used by villagers will be recorded;
		•	According to international guidelines, the loss of access to natural resources is seen as economic displacement, especially if local residents derive an income from such resources (IFC, 2012). Consequently, through discussions with the TWG, the RAP will establish compensation and entitlement frameworks for such losses in consultation with the MoA (represented at district-level by the District Services of Economic Activities);
		•	As part of a RAP, a grievance mechanism was established, through which the affected villages and farmers can engage with the developer throughout the RAP process and lodge complaints;
		•	A TWG has already been established with representation from the affected villages, relevant Mozambique ministries (such as the MoA) as well as a representative from the project developer. The role of the TWG would be for the affected villages and farmers to discuss future resettlement and displacement issues with the developer, and to establish mitigation measures for such losses (including livelihood restoration strategies and project benefits); and
		•	Lastly, as mentioned previously, the developer is encouraged to offset the impacts of reduced access to natural resources by providing agricultural services to the affected villages and farmers. Refer to recommendations made under " Reduced Access to and Loss of Productive Agricultural Land and Farming Practices: Heightened food insecurity"

Study Area	Loss of Sacred and Culturally Significant Sites : Loss of sites for cultural practices	•	The SIA recorded all the affected villages' sacred and cultural sites, and indicated whether the current mine layout plans should be re-considered and amended to avoid these sites entirely. Subsequent to the compilation of this report, the client has amended the mine's infrastructural layout plans with due consideration of the sacred sites identified;
		•	A Grievance Mechanism has been developed to allow the affected villagers to voice their concerns. This mechanism allows the developer to take appropriate mitigation measures in accordance with the issues and/or concerns of the villages;
		•	As part of the RAP, compensation measures have been established between the developer and the Government of Mozambique (GoM) through open and transparent engagement with the villages, interested parties and relevant stakeholders;
		•	The developer will develop a Cultural Heritage Management Plan in consultation with the affected villages. This plan should:
			 Protect the cultural heritage of the area;
			 Identify sacred sites in the area and propose ways to protect and/or relocate these sites;
			 Assist the developer to understand the cultural norms and values of the locals in the area; and
			 Consider these cultural norms and values when developing a recruitment strategy.
		•	The RAP recorded each affected graveyard and gravesite in the area with the assistance of the villagers;
		•	As part of the RAP, a TWG and grievance mechanism has been established. In the event that gravesites need to be exhumed and relocated, the affected villagers need to state their preference, which could include compensation or assistance with re-burial and related expenses; and
		٠	Preparing new burial sites and appropriate means of transporting and re-interring the dead.

Study Area	Study Area Health, Safety and Security : Personnel	•	If a private security company is used, the client should sign an agreement with the private security company which should allow for the following:
	Salety lisk		o ;
			 Security personnel will be properly trained in the use of force and appropriate conduct towards farm- owners and farm labour;
			 There will be instant dismissal for any security personnel involved in theft or abuse;
			 A code of conduct will be developed for the security personnel;
			 The above-mentioned code of conduct will be consistent with the United Nation's (UN) Code of Conduct for Law Enforcement Officials, the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials and the Voluntary Principles for Security and Human Rights; and
			 All the PAF-owners will be informed about the roles and responsibilities of the security personnel.
		•	A Grievance Mechanism has been established through which affected villagers can voice their concerns to the developer;
		٠	Particular risks reported will be assessed by the developer who will implement appropriate measures;
		•	All the Project-Affected Communities (PACs) will to be informed about the roles and responsibilities of the security personnel.
Regional	The Provision of Basic Social Services:	•	The developer may consider formulating and implementing a Community Development Plan (CDP) aimed at building local capacity for local people to develop beyond the mine's life cycle; and
	conditions	•	Through an SEP, on-going consultations with the PACs and stakeholders will take place on a regular basis.
Study Area	The Provision of Basic Social Services: Health services and water provision	•	The developer may provide some support with regard to healthcare. Although the developer will not be seen as performing a government duty, it is reasonable to expect the developer to provide healthcare support of their choice, which could enhance government provision of healthcare. For example, the mine's clinic may offer an ambulance service to the surrounding villages, or regular nurse visits;
		•	The developer proposes to have a CDP in place which will include basic service provision programmes as well. This may include well provision or the creation of water well committees; and
		•	As the usage of expats cannot be avoided by the project, the developer will where possible to take steps to skill-up the local population. This may involve the provision of apprenticeship opportunities on the mine, but also active support for the local schools and the provision of scholarships for students to pursue their studies further, possibly with the opportunity to obtain degrees relevant to the mining industry.

Study Area Emplo oppor stimu	Employment opportunities and the stimulation of	 In addition to appropriate Human Resources (HR) policies and procedures, a labour desk/employment committee will be established to design and implement an Employment Enhancement Plan. This will ensure that recruitment is done in a fair and transparent way, and that job creation opportunities are maximised;
	the region	Provide scholarships and work apprenticeships to the local population (especially the youth);
	and region	• Support the primary schools and, especially, learners who need financial support (such as bursaries) to enrol in higher education;
		 The recommendations contained in IFC PS 2 (Labour and Working Conditions) will be adhered to in developing labour policy and operational guidelines. These include:
		 Developing appropriate HR policies and procedures (Nr 8); Establishing appropriate working conditions (Nr 10);
		 Ensuring non-discrimination and providing equal opportunities (Nr 15); Establishing a Grievance Mechanism for labour issues (Nr 20);
		• Protecting the work force (Nr 21-22); and
		 Occupational Health and Safety (Nr 23). The following International Labour Organization (ILO) conventions must be adhered to:
		\sim II O Convention 87 on freedom of association and protection of the right to organise:
		 ILO Convention 98 on the right to organise and collective bargaining:
		 ILO Convention 29 on forced labour;
		 ILO Convention 105 on the abolition of forced labour;
		 ILO Convention 138 on the minimum age of employment;
		 ILO Convention 182 on child labour;
		 ILO Convention 100 on equal remuneration; and ILO Convention 111 on discrimination
		 As far as possible, those labourers involved in the construction phase will be incorporated into permanent staff for the operational phase;
		 Attention will be paid to employment opportunities for women and disabled persons;
		 Differential treatment will be considered for villages which are differentially affected by the project. Directly affected residents will be given first priority in job offers and training opportunities; and
		 As far as reasonably possible, a plan for gradual replacement of expats and outsiders by local people will be developed and implemented.

Localised	Stakeholder and Community Engagement	 Implementation of the ESMP; Drafting and implementing a SEP; and Drafting and implementing a Grievance Mechanism. Two separate grievance mechanisms are required. One for labour and one for community issues. The community Grievance Mechanism has been introduced as part of the RAP.
		Impact category - Terrestrial Faunal
Study Area	Loss of Biodiversity: Loss of Amphibian Diversity	 Avoid clearing or damaging wetlands, and limit river and stream crossings as far as possible. Associated infrastructure, particularly transport linkages, should avoid these areas. Including a buffer distance of 30 m. Wetlands must be protected and/or rehabilitated if damaged. Maintenance of water quality and flow dynamics
Study Area	Loss of Biodiversity : Loss of Reptile Diversity	 Avoid clearing or damaging pristine habitats. Protect abiotic habitats, such as rock outcrops, which shelter many reptile species. Curtail unnecessary night driving on roads Prohibit exploitation of sensitive reptiles, e.g. chameleons. Educate mine staff about the necessity of protecting snakes.
Study Area	Loss of Biodiversity : Loss of Bird Diversity	 Avoid clearing or damaging pristine habitats. Maintain habitat connectivity, particularly to protected areas, via habitat corridors. Undertake habitat clearance during winter when birds are not breeding.
Study Area	Loss of Biodiversity : Loss of Mammal Diversity	 Avoid clearing or damaging pristine habitats. Maintain habitat connectivity, particularly to intact habitats, via habitat corridors. Protect abiotic habitats, such as rock outcrops, which shelter many small mammals, particularly bat roosts.
Study Area	Loss of Biodiversity : Loss of Species of Conservation Concern	 Avoid clearing or damaging pristine habitats. Maintain habitat connectivity, particularly intact habitats, via habitat corridors. Protect abiotic habitats, such as rock outcrops, which shelter many small faunal species, including reptiles and bats. Design of project structures and transport linkages to avoid where possible sensitive habitat corridors, e.g. drainage lines and wetlands. Design roads to incorporate, where possible, underpasses and culverts that allow the movement of animals. Where possible road traffic should be limited after dark, as much of the surviving fauna is nocturnal, e.g. bats, most snakes, small rodents, amphibians, etc. Vehicle speed should be limited and will not exceed 50km/h within the project area. Drivers will be educated regarding their role in impacting on animals and the need to minimize collisions with animals at all times.

Study Area	Loss of Biodiversity : Faunal impact of habitat fragmentation and loss	 The negative impact of habitat loss associated with the development of the mine cannot be fully mitigated. But the following can assist in reducing the severity of the impact: Project actions associated with construction, access roads, borrow pits and cut-and-fill construction to avoid sensitive habitats as far as is practicable. Natural drainage to be maintained and the silt loads into rivers, streams and wetlands to be maintained within normal limits. Avoid clearing or damaging pristine habitats. Maintain habitat connectivity, particularly to intact habitats, via habitat corridors. Protect abiotic habitats, such as rock outcrops, which shelter many small faunal species, including reptiles and bats. The design of project structures and transport linkages to avoid where possible sensitive habitat corridors, e.g. drainage lines and wetlands.
Study Area	Loss of Biodiversity : Ecological impacts from dust	 The haul road will be watered down as required to minimise dust. Road speeds in sensitive regions e.g. near wetlands, across drainage lines, and during extreme dry climatic conditions, to be limited to curtail dust production. Vehicle speed will not exceed 50km/h within the project area. Where possible material transported to be covered or placed in containers to avoid contamination of the surrounding area.
Study Area	Loss of Biodiversity : Disruption to fauna from increased noise levels	 Mitigation of this impact is difficult, but where possible noise reduction measures to be implemented in sensitive areas (e.g. adjacent to wetlands) at sensitive times (e.g. at night). Construction activities, after dark, will only occur in special circumstances.
Study Area	Loss of Biodiversity : Chemical Pollution	 Storage facilities for chemicals will be bunded so that in the event of spillage their contents are contained within the bund for decontamination. The use of insecticides and herbicides will be closely monitored and dosages and application detailed in this document.
		Impact Category – Traffic and Transport
Regional	Increase in traffic frequency through villages	 Drivers to obey the speed limits in force in these settlements. Drivers will proceed slowly and with patience through villages. Schedules for deliveries will be reasonable, and take account road, and local pedestrian and vehicular traffic conditions en route, so that drivers can travel within speed limits, and exercise due patience when travelling through for instance, trading areas. Drivers will be encouraged to use their hooter liberally. An action plan will be in place in the event that an accident involving a mine related vehicle and a pedestrian occurs. Details will be documented in the Emergency Management Response plan.

Regional	Transport of abnormal loads	 Trucks with abnormal loads will be escorted by at least two vehicles (one before and one behind). The truck is to pull off the road periodically to allow trailing vehicles to overtake. All bridges are to have their structural integrity assessed prior to passing heavy loads over it. If these trucks need two lanes to turn, traffic authorities will be consulted with regards to the passing of these large trucks through Pemba / Nacala and Montepuez.
Regional	Dust generation	 Speed reduction – all mine vehicles will be required to obey reasonable speed limits through urban settlements to prevent potential accidents as assessed in "Increase in traffic frequency through villages" impact from occurring, as well as to reduce dust emissions, especially during windy conditions; The road may be surfaced with gravel, if this can be sourced locally; The road may be treated with chemical binders.
Impact category - Vegetation and floristic		
Localised and Study Area	Loss of Riparian Woodland	 Detailed inventory in these areas to facilitate restoration; Reduce the number of crossings through careful planning and design; Use bridge designs that afford the lowest impact on this vegetation; Locate project infrastructure away from sensitive areas where feasible; Locate bridges and river crossings at existing crossings and in areas that are already impacted; Design and implement a Biodiversity Monitoring Plan during the operational phase to ensure that the project has no unnecessary negative impacts on this plant community; and Design and implement a Closure and Rehabilitation Management Plan.
Localised and Study Area	Loss of Miombo Woodland: Graphite	 Detailed inventory in these areas to facilitate restoration; Where possible create no-go areas and ecological corridors on Mount Nassilala to preserve this area and facilitate the inselberg's continued function as a stepping stone and refugia for biodiversity (plants and animals); Demarcate and implement a 50 m buffer around this area; Avoid locating unnecessary infrastructure within this 50 m buffer. Design and implement a Closure and Rehabilitation Management Plan. Design and implement a Conservation Management Plan.

Localised and Study Area	Loss of Miombo Woodland: Granite	 Restore this vegetation type to its natural state after mining; Areas impacted by construction activities that are no longer required during the operation phase will be restored to their natural state; Avoid locating infrastructure in areas with large numbers of <i>Sterculia appendiculata</i>; Design the mining pits to reduce the amount of vegetation that needs to be cleared; Where possible create no-go areas and ecological corridors on Mount Coronge to preserve the areas that will not be mined. This will allow this inselberg to continue functioning as a stepping stone and refugia for biodiversity (plants and animals) and will continue to provide important ecosystem services to the local communities;
		 Demarcate and implement a 50 m buffer around this area; Move infrastructure such as the new mine camp, outside of this 50 m buffer.; and Design and implement a Closure and Rehabilitation Management Plan.
Localised and Study Area	Loss of Intact Miombo Woodlands: Plains	 Employ members of the local community instead of outsiders. This will reduce the level of in migration from outside areas thereby reducing the pressure on the natural resources found in this vegetation type. Where possible implement more efficient and intensive agricultural practices that reduces the amount of land cleared for agriculture. Possible irrigation systems using water from Chipembe dam may be a viable solution. Where possible introduce cash crops that are more economically viable than the cotton industry and produce greater yields per hectare. This will reduce the amount of clearing of natural vegetation.
Study Area	Loss of Degraded Miombo Woodlands: Plains	 Where feasible, reduce the footprint of the infrastructure to the minimal required area; Areas impacted during the construction phase will be rehabilitated if not required during operation; and It is possible that individuals who have had their agricultural land displaced by the mine will make up for this by clearing additional land within this vegetation type. Further clearing will result in induced secondary impacts which may be prevented through the introduction of more efficient agricultural practices as well as introducing cash crops that are more economically viable.
Localised and Study Area	Loss of Biodiversity (general)	 Set aside key representative portions of each vegetation type, as conservation areas within the mining area; Maintain ecological corridors within the mining area; and Design and implement a Closure and Rehabilitation Management Plan. Design and implement a Conservation Management Plan.

Localised and Study Area	Loss of Species of Special Concern	 Set aside key representative portions of each vegetation type as conservation areas within the mining area; Maintain an ecological corridor within the mining area; Avoid locating infrastructure such as the mine camp and TSF in areas with high numbers of species of special concern such as on the southern slopes of Mount Coronge where a number of <i>Sterculia appendiculata</i> trees were noted; and Collect seeds from established trees and where feasible relocate samplings of species of special concern.
Localised and Study Area	Disruption of Ecosystem Function and Process : Fragmentation of vegetation and edge effects	 Set aside an ecological corridor within the project area that encompasses all of the vegetation types defined in this report; Use existing access roads where feasible; Align roads and pipelines within a single corridor and keep this as narrow as feasible; and Avoid locating linear infrastructure (such as roads and pipelines) through areas of high and moderate sensitivity.
Localised and Regional	Invasion of alien species	 Prepare an Alien Management Plan Eradicate alien plants as they appear; Put in place environmentally acceptable procedures for waste management; Do not use exotic species that are known to be invasive for rehabilitation purposes but rather use indigenous species and exotic species that are not invasive; and Monitor the project area for any new invasive plants.
Localised and Study Area	Loss of ecosystem services provided by the plant communities identified in the project area	 If possible alternatives such as improved health care, woodlots for charcoaling, construction materials and fuel wood may be implemented to offset the loss of ecosystem service to the affected communities. These actions will be aligned with recommendations made in the Social Impact Assessment and Natural Resource use Assessment; and
	-	Impact Category - Visual Impact
Study Area	Visual intrusion on views of sensitive visual receptors due to mine construction	 The construction contractor will clearly demarcate areas for roads, clearing and stockpiling so as to minimise site disturbance. If possible locate stockpiles for the construction phase, in the same areas that will need to be cleared for mining activities during the operation phase. Treat roads to reduce dust emissions. This impact has been investigated thoroughly in the Air Quality Assessment of the EIA.

	Impact Category – Waste			
Localized	Disposal of waste rock and tailings: Health and safety of employees and local communities	 The management of waste rock and tailings will conform to the requirements of the IFC's EHS Guidelines for Mining (IFC, 2007); Select sites for stockpiling and waste rock dumps so as to minimise negative impacts to vegetation and water resource. Seepage water will be channelled to a central collection point to avoid water resource contamination. Best practice requires that designers take into consideration the location and proximity to water resources, human settlements and sensitive ecological areas when determining the location of the waste rock dump; As above, as far as practical, the waste rock dump must be sited in a location such that in the event of failure, pollution of soil and water as well as physical risk to communities is minimised; The integrity of the waste rock dump and tailings facility to be inspected regularly by suitably qualified personnel throughout the life of the mine; Access to the TSF and waste rock dump to be restricted as far as practical and all local communities will be informed of the potential risks associated with these facilities through site notices and community meetings. 		
Localised	Spillage of Run of Mine while Trucking: Disruption of ecological function	 The trucks will not be overloaded with waste or ore; and In the event of significant spillages, these will be cleared up as soon as possible; 		

Study area and	Management of non-	Mitigation measures (General wastes)
District	process general and hazardous wastes: Pollution of land and	• All wastes will be managed according to the requirements of Mozambican legislation and, preferably, the requirements of the IFC General EHS Guidelines (2007);
	water	 As far as practicable, the philosophy of the waste management hierarchy will be applied to the management of all waste streams;
		 All general wastes that cannot be reused or recycled will be stored temporarily in a dedicated area and then transported regularly to the proposed landfill for disposal;
		 The proposed general landfill site will be sited, designed and operated to international standards in order to isolate the wastes and prevent environmental contamination, particularly groundwater contamination (EHS Guidelines for Waste Management Facilities 2007 and EPA 2000) and must be licenced by the developer early in the construction phase. Until this facility is fully operational, all general waste produced during the construction phase will be stored on site in a secure access control area, in a legally-compliant manner that minimises environmental impacts;
		 The project will implement a ground water monitoring system in the vicinity of the constructed landfill site in order to detect any changes to the quality of sub-surface water;
		 All bins for temporary storage of waste that are located outdoors will be covered to prevent ingress of water and access by animals;
		 A comprehensive Integrated Waste Management Plan will be developed for the site and it should include Key Performance Indicators (KPIs) against which the management of wastes can be audited;
		 All employees, contractors and visitors to the site will be informed of correct waste management procedures, including separation of general and hazardous waste at source;
		 Waste storage and disposal areas will be located at least 100m from surface water resources or important drainage lines.

		Mitigation measures (Hazardous wastes)		
		 The Integrated Waste Management Plan for the facility will cover the management of hazardous wastes; Prior to safe disposal, all hazardous wastes will be temporarily stored at the temporary hazardous waste storage facility. This facility will be designed to include secondary containment lined and covered to protect the contents from weather (sunlight and rain). If wastes are corrosive, the base of the storage facility will be lined with an acid-resistant coating; Where possible, empty containers for hazardous chemicals will be returned to suppliers. Where empty containers for hazardous chemicals (hydrocarbons, pesticides, laboratory chemicals, degreasing agents etc.) cannot be returned to the suppliers, they will be triple-rinsed, punctured and stored in a secure area until such time as they can be disposed of safely. Rinse water may not be discharged directly to the environment; Empty pesticide containers will be disposed of according to the Food and Agricultural Organisation's Guidelines on Management Options for Empty Pesticide Containers (Food and Agriculture Organisation (FAO) 2008); As per the FOA (2008) guidelines, empty pesticide containers will not be burned. Specific guidance on the management of enstrument is enstrine in annulated burther EAO (2000); 		
		 management of empty pesticide containers is provided by the FAO (2008); A hydrocarbon management Operating Procedure will be designed and implemented. Copies of this document will be made available at designated facilities where hydrocarbons are used or stored. The purpose of this procedure is to provide for the proper storage and handling of hydrocarbons, including waste hydrocarbons, on site and hence prevent any form of contamination; Soil contaminated with hydrocarbon will be immediately removed and disposed of at a soil bioremediation 		
		 facility on site or else disposed of as hazardous waste; MSDS for chemicals will be readily available on site and the precautions stipulated in these will be adhered to at all times. Relevant staff will be trained on the correct management of bunded facilities, including the management of collected liquids; Spill kits will be readily available at strategic points throughout the site and staff will be trained on the correct was af these will be trained on the correct bunded facilities. 		
		 No hazardous wastes will be disposed of into drains as this may impact negatively on the performance of the septic tanks; 		
		 There are two potential disposal options for medical waste which will be managed according to the management procedure described in Annex 3 of the ICRC Medical Waste Management (2011) and the requirements of the Mozambican legislation. The first is to transport this material to the Balama regional clinic for safe disposal. The second is to incinerate the material on site to render it harmless and then dispose of it at the on-site landfill. 		
Localised	Spillage of Run of Mine while Trucking: Disruption of ecological function	 The trucks will not be overloaded with waste or other materials ore; and speed limits will be set to prevent the spillage of waste and other material during trucking; In the event of significant spillages, these will be cleared up as soon as possible; 		

District	Nuisance impact (Production of odours, visual impact and attraction of pest and vermin)	 Refer to mitigation measures for Impact source: "Management of non-process general and hazardous wastes: Pollution of land and water" above.
Study Area	Disposal of domestic wastewater and sewage sludge: Pollution of soil and water	 All domestic wash water and sewage from site will be diverted to the septic tanks or packaged sewage treatment plants for treatment. Discharge from these facilities will meet the discharge standards as indicated in the AfDB (1995) for release into the process water pond. Sewage sludge from these facilities will be managed as described in the EHS Guidelines for Water and Sanitation (2007), that is stabilize by drying in purpose-build beds or composting. The stabilized sludge can then be dried and either disposed at the proposed landfill or alternatively, applied as a soil conditioner during rehabilitation of the mine, provided that levels of toxic constituents is sufficiently low. If soil application is adopted, soil contamination will be avoided and the soil standard prescribed by the AfDB (1995) will be adhered to. The pre-treatment of oil and grease containing effluents from canteens by the use of a grease trap prior to discharge into sewage treatment facilities; Chemical toilets will not be used during the construction period unless the contents can be disposed of in a manner that does not pose a threat to the environment. Instead, alternatives such as Ventilated Improved Pit s (VIPs), composting toilets or similar will be considered as preferred alternatives; If VIPs are used, they will be lined, maintained and sited in a way that minimises the risk of contamination of surface and sub-surface water resources; All sewage treatment facilities will be well maintained. To this end, at least one employee on site will be trained to maintain the system(s); The performance of the sewage treatment systems will be investigated timeously and remediation measures put in place to restore performance; In the event that sludge must be removed from the system(s), it will be disposed of in a manner that minimises potential risk to human health and the environment and will comply with the National legislation; The environmental monitoring programme for t
District	Health impacts to employees and	 Refer to mitigation measures for "Disposal of domestic wastewater and sewage sludge: Pollution of soil and water" (above)
	communities	
Study Area	Nuisance impacts (odour and flies)	 Refer to mitigation measures for "Disposal of domestic wastewater and sewage sludge: Pollution of soil and water" (above)

Study Area	Disposal of run-off / storm water : Pollution	 The management of run-off and effluent will comply with the requirements of Mozambican legislation and the IFC's General EHS Guidelines (2007);
	of land and water	 A Storm Water Management Plan will be developed for the mine and it should incorporate measures to divert clean storm water away from stockpiles, waste storage and disposal areas and other operation areas;
		 Mitigation measures to be aimed at reducing contact between storm water and hazardous chemicals. This will be considered during the planning of the storm water drainage system for the mine facilities:
		 To minimise discharge of pollutants and the volume of water to be treated prior to release, storm water run- off must be segregated so as to prevent clean water run-off from mixing with water containing a high solids content;
		 Run-off from machine wash down areas will be treated as hazardous due to the potential presence of hydrocarbon and will pass through an oil trap to remove any hydrocarbons All other run-off water must pass through a sediment trap to remove the majority of suspended solids prior to discharge to the environment. All settled material must be disposed of at the landfill; and
		 The quality of liquid waste streams discharged from the site, including storm water, will be monitored regularly to ensure compliance with the requirements of relevant legislation and standards.
District	Regional waste profiles and community awareness : Local knowledge of waste management practices	 Train employees on the importance of proper management of waste streams and sanitation; Consider options to facilitate improved management of solid waste in local communities. This may include training local communities on composting techniques. This may be incorporated into an urbanisation plan for the area. Consider involving local communities in waste recycling initiatives if these are considered practical within the context of the project.
District	Regional waste profiles and community awareness : Change to waste profiles in the local communities	 The project may assist in the facilitation of the development of an urbanisation plan for the local communities; Consider options to facilitate improved management of solid waste in local communities. This may include training local communities on composting techniques or investigating and, if considered feasible, supporting recycling initiatives.
		Impact category - Radiation

Study Area	during drilling and	٠	Training/education programme to be presented to workers;
	exploration activities,	•	Implement a Radiation Management Plan as per the NORM guidelines of the Department of Mines and
	and future mining and		Petroleum of Western Australia.
	processing activities	•	Obtain appropriate instrumentation to perform radiation and contamination surveys and monitoring;
		•	Issue appropriate dosimetry;
		•	Maintain records of accumulated radiation exposure of workers handling the material;
		•	Segregate material with enhanced levels of radioactivity from the rest of the material;
		•	Post signage at areas where such material is handled and stored;
		•	Ensure the physical security of the core samples and contaminated scrap steel (pipes, vessels, pumps,
			valves, flanges, etc.) during all stages of the process. This could include a dedicated shed or storage area,
			with security fencing for material with enhanced levels of radioactivity, access control to the area, protection
			of the material against the elements and prevention of contamination of the surrounding soils and
			groundwater, appropriate recordkeeping of quantities of such material, etc.;
		•	Implement International Atomic Energy Agency (IAEA) transport regulations during the transport of the core
			samples, specifically those containing enhanced levels of radioactivity, to various laboratories abroad;
		•	Availability of emergency control measures should any incident or accident happen to material containing
			enhanced levels of radioactivity, i.e. during handling, during transport, etc.

 Table 8-5: Operational Phase Environmental and Social Mitigation Measures for the Syrah Resources Balama Graphite Project

Potential Impact Area	Sources of Impacts	Mitigation Measures
		Impact category - Air Quality
Local	Removal of ore material (opencast mining process) and ROM Stockpile	 Establish weather stations at strategic locations around the site. Haul roads will be used for transporting waste rock and ore, therefore water or dust suppressant will be applied as require to minimise dust A speed limit of 50 km/hr will be enforced. Conduct an evaluation of dirt and haul roads within the mine concession area to determine an economical tailored made solution with regards to dust suppression. This will then be incorporated into the operational plan. As far as practicable drop heights when loading or dumping materials are to be minimised. If dust emissions are above accepted limits than additional measures will be applied. The form of these will be determined by a future evaluation.
local	Storage, handling and treatment of hazardous products	 Develop a Integrated waste management plan and a Hazardous Chemical; Management Paln. This will identify anticipated waste streams and waste minimisation procedures, storage locations, and waste-specific management and disposal requirements. Develop an operations phase hazardous waste recycling strategy. Hazardous substances and chemicals will be stored and handled in accordance with the local regulations and stored in clearly labelled containers. Employees will be trained on the hazards and emergency procedures of handling and storing hazardous chemicals. Conduct periodic assessments to understand the processes that generate waste with the aim to reduce waste output.
		Impact category- Aquatic Ecology
Localised and Study Area	Water Quality: Sedimentation and elevated turbidity in rivers	Refer to the recommended mitigation Measures provided in Table 8-4
Localised and	Water Quality: Contamination from	Refer to the recommended mitigation Measures provided in Table 8-4

Study Area	non-ore pollutants	
Study Area	Water Quality: Ore contamination	 Water contaminated by sulphide bearing ores from the mining operations and WRD sites will be retained and pumped to the TSF or process water tank. Effluent from the mine will be subjected to regular chemical analyses. Details are to be defined in the monitoring programme To prevent pollution from the TSFs and WRDs full containment and treatment of contaminated run-off will be implemented. This will apply to all phases of the operation.
Study Area	Hydrology: Alteration of river flow dynamics	 Little can be done to mitigate this impact apart from attempting to ensure that surface run-off within the project areas is kept as natural as possible and natural drainage lines remain functional.
Study Area	Habitat Modification: Aquatic habitat modification	Refer to the recommended mitigation Measures provided in Table 8-4
Localised, study area	Habitat Modification: Loss of species of special concern	Refer to the recommended mitigation Measures provided in Table 8-4
Localised & Study Area	Aquatic Habitat Fragmentation: In- stream structures blocking migrations (bridges, causeways)	Refer to the recommended mitigation Measures provided in Table 8-4
Local & Study Area	Fisheries Resource: Over-utilization of fish resources	Refer to the recommended mitigation Measures provided in Table 8-4
		Impact category - Hydrogeology
Localised Study Area	Mine dewatering Mine water	 If proven that there is impact on specific users, the mine will supply an equal/better amount of water to affected communities that rely on groundwater in the receiving environment; A comprehensive hydrogeological monitoring programme will be established for the site and it will include all community water resources that may be impacted upon by the mining operations; The monitoring plan will cover both water quality and quantity; A comprehensive pre-construction ground water baseline will be established; and Where it is indicated that the mining operations or associated activities have impacted negatively (as discussed in the ESHIA) on either the quality or availability of water resources, measures will be implemented to address the impacts. Abstraction from boreholes close to the mine workings will be avoided so that contaminants do not migrate
	contamination	 away from the mine, towards the abstraction boreholes; If proven that there is impact on specific users, the mine will supply equal/better quality water to affected parties that rely on groundwater in the receiving environment. The baseline water quality of private boreholes

		 in and around Balama has been analysed as discussed in the Water Quality Section (3.6) of the hydrogeology EIA. These results will be used for future comparisons to evaluate if the proposed mine has impacted the groundwater; The TSF and waste stock pile will be lined to prevents seepage of contaminants to the groundwater system; Storm water and runoff management through diversion channels and sedimentation ponds will be built around and downstream of the waste stock pile and TSF; Seepage interception boreholes downstream of the TSF will be drilled to intercept and capture any seepage that may enter the groundwater system. Any captured contaminated water will be pumped back onto the TSF; Install monitoring boreholes upstream and downstream of the TSF and waste stock pile; Monitor groundwater quality and water levels both up gradient and down gradient of TSF, waste stock pile and down gradient of the mine site. Continuous refining and updating of the monitoring network will be based on the results obtained. The operational phase will take place over a prolonged period compared to the construction phase, therefore more monitoring boreholes may be required; The conceptual and numerical models will be refined every six months in the first four years and thereafter every five years, based on groundwater monitoring results; and Annual audits of monitoring and management systems will be conducted by independent environmental consultante.
Localised	Hydrocarbon spillage	 Diesel and other chemicals will be handled properly and not spilled; If a considerable amount of fluid is accidentally spilled, the contaminated soil will be scraped off and disposed of at an acceptable dumping facility; The excavation will be backfilled with soil of good quality; Both groundwater level and quality will be monitored to detect any changes in water during the all phases of the project.
		Impact category - Geochemistry
Localised	AMD formation from WRD and TSF	• Lining of WRD and TSE to prevent contaminated seenage entering the groundwater systems with clay
Localised	Potential trace element contamination from WRD and TSF seepage into the receiving environmentPotential radioactivity from WRD and TSF with high trace element concentrations like U	 Eming of WRD and For to provent containing of seepage entering the groundwater systems with day material or geo-liners; Storm water and runoff management through diversion channels and sedimentation ponds around and downstream of WRD and TSF and/or the diversion of dirty water to the plant for re-use; Monitoring boreholes upstream and downstream of TSF and WRD; Seepage capturing boreholes downstream of TSF to intercept and capture any seepage to be pumped back
Localised		 Into the TSF if picked up in monitoring data; and Rehabilitation of TSF and WRD post-closure Radioactive waste management and disposal at appropriate sites in accordance with the IAEA.

	and Se	
Localised	Potential for AMD formation from ore material	
Localised	Trace element contamination from ore stock piles and exposed ore zones with high potential of metal contamination entering the receiving environment;	 Flooding of the pit post-closure to stop any oxidation of sulphide minerals in the pits to continue. This option is assessed in the groundwater model; Storm water management to divert water away from stock piles or to divert water back to the plant for re-use; In pit sumps to capture seepage and runoff to be pumped to dirty water dams and treated before discharged into the environment.
Localised	Potential contamination from ore with high trace element concentrations like U, and Se.	• Radioactive waste management and disposal at appropriate sites in accordance with the IAEA.
		Impact category – Health Impacts
Municipal Area	Communicable Diseases linked to Housing Design : Transmission of communicable diseases due to overcrowding	Refer to the recommended mitigation Measures in Table 8-4
Municipal Area	Vector-related diseases : Malaria burden	Refer to the recommended mitigation Measures in Table 8-4
Regional	Sexually Transmitted Infections, including HIV/AIDS : Transmission of STIs and HIV/AIDS	Refer to the recommended mitigation Measures in Table 8-4
Local	Soil-, water- and waste-related diseases	Refer to the recommended mitigation Measures in Table 8-4
Local	Malnutrition	• Perform a baseline nutritional assessment through anthropometric measures in children under 5 and also

		micronutrient deficiencies (anaemia as an indicator). Perform surveillance on nutritional status through this	
		data set as means to track well-being;	
		 Reduce project related communicable diseases that may impact nutrition; 	
		 Minimise agricultural land loss through resettlement programmes; 	
		 Inflation management as part of social program; and 	
		 Favour local procurement of food items in combination with incentives to increase local production. 	
local	Road traffic accidents and other accidental injuries	Refer to the recommended mitigation Measures in Table 8-4	
local	Air pollution, noise and mal-odours	Refer to the recommended mitigation Measures in Table 8-4.	
Local	Chemicals, pesticides and heavy metals	 Hazardous chemical substance management as part of the environmental impact assessment and environmental management plan requirements; Determine baseline values of arsenic and mercury in PACs. These should be sampled in communities 	
		across similar exposure groups to determine background community exposures. Hair samples are preferred but otherwise urine will be adequate;	
		 Conduct water monitoring as recommended in the environmental management plan this will include surveillance for heavy metals; 	
		 Background naturally occurring radiation levels should be measured; and 	
		 Ensure the project complies to IFC performance standard 3: Pollution prevention and abatement. These standards will apply to the planned integrated vector control programs. The least hazardous product will be chosen for control and selected based on the World Health Organization Recommended Classification of Pesticides by Hazard Class. The guidelines of the FAO will be followed for procurement, storage, application and disposal of insecticides for malaria control. 	
local	Gender-based violence, alcohol and drugs	Refer to the recommended mitigation Measures in Table 8-4.	
local	Social Cohesion and Well-being	Refer to the recommended mitigation Measures in Table 8-4	
Municipal area	Health system strengthening	Refer to the recommended mitigation Measures in Table 8-4	
Municipal area	Non-communicable diseases	 Collect indicator data on Non-communicable diseases (NCD) in area. Focus on hypertension and diabetes as most common conditions; and 	
		 Support health education programs as part of a community based peer health educator program. These will focus on lifestyle risk factors such as diet, exercise, smoking and alcohol consumption. 	
Impact category – Land and Natural Resources			

Regional	Soil contamination	 A hydrocarbon management Operating Procedure will be designed and implemented. Copies of this document will be made available at designated facilities where hydrocarbons are used or stored. The purpose of this procedure is to provide for the proper storage and handling of hydrocarbons, including waste hydrocarbons, on site and hence prevent any form of contamination; Soil contaminated with hydrocarbon will be immediately removed and disposed of at a soil bioremediation facility on site; Staff will be trained on the correct management of bunded facilities, including the management of collected liquids; Spill kits will be readily available at strategic points throughout the site and staff will be trained on the correct use of these kits;
		 Spinage and seepage of contaminants will be prevented through the implementation of good housekeeping and management procedures;
		A monitoring program will be defined in the EMP;
		 In the case of accidents immediate remedial measures will be implemented; and Storage facilities will be adequately bundled and inspected on a regular basis
Degional		Storage facilities will be adequately builded and inspected on a regular basis.
Regional	Energy eniciency	Energy management programme should be developed and will include.
		Identification, and regular measurement and reporting of principal energy nows within all facilities, Dreparation of mass and energy belance:
		 Preparation of mass and energy balance, Definition and regular review of aperaty performance targets, which are adjusted to account for changes in
		maior influencing factors on energy use:
		 Regular comparison and monitoring of energy flows with performance targets to identify where action should be taken to reduce energy use; and
		• Regular review of targets, which may include comparison with benchmark data, to confirm that targets are set at appropriate levels.
		Impact category – Noise
Regional and	Impact of noise on	Constructing of earth berms around the opencast areas, especially the west pit operations.
Localised	surrounding noise	 Locations of processing plant to be located to minimise impact on communities.
	sensitive receptors in	Drivers to stick to designated speed limits.
	terms of annoyance.	Roads to be kept in good condition.
		Fixed noise sources such as generators to be enclosed, if practical.
		•
	-	Impact category – Social Impact
Regional	Influx : Temporary or permanent in- migration in search of job opportunities	Refer to the recommended mitigation Measures provided in Table 8-4

Study Area	Physical Resettlement: Involuntary resettlement of some households and structures	•	Refer to the recommended mitigation Measures provided in Table 8-4
Study Area	Reduced Access to and Loss of Productive Agricultural Land and Farming Practices: Reduced access to productive land and economic displacement	•	Refer to the recommended mitigation Measures provided in Table 8-4
Regional	Reduced Access to and Loss of Productive Agricultural Land and Farming Practices: Heightened food insecurity	•	Refer to the recommended mitigation Measures provided in Table 8-4
Study Area	Reduced Access to Natural Resources as Ecosystem Services: Reduced access to the Inselberg's forest cover and small wildlife	•	Refer to the recommended mitigation Measures provided in Table 8-4
Study Area	Loss of graveyards/sites	•	Refer to the recommended mitigation Measures provided in Table 8-4
Study Area	Health, Safety and Security: Personnel safety risk	•	Refer to the recommended mitigation Measures provided in Table 8-4
Regional	The Provision of Basic Social Services: Improving road conditions	•	Refer to the recommended mitigation Measures provided in Table 8-4
Regional	The Provision of Basic Social Services: Health services and	•	Refer to the recommended mitigation Measures provided in Table 8-4

	water provision	
Regional	Employment opportunities and the stimulation of economic growth in the region	Refer to the recommended mitigation Measures provided in Table 8-4
Regional	Stakeholder and Community Engagement	Refer to the recommended mitigation Measures provided in Table 8-4
		Impact category - Terrestrial Faunal
Study Area	Loss of Biodiversity: Loss of faunal biodiversity	 Mitigation of the impact entails protection and where necessary, rehabilitation of adjacent habitats as an environmental off-set, particularly wetland and riparian habitats. Avoid clearing or damaging wetlands, and limit river and stream crossings as far as possible. Associated infrastructure, particularly transport linkages, to avoid these areas. Where possible, includie a buffer distance of 30 m. Maintenance of water quality and flow dynamics. Protect abiotic habitats, such as rock outcrops, which shelter many reptile and mammal species. Curtail unnecessary night driving on roads Prohibit exploitation of sensitive species e.g. chameleons and birds. Educate mine staff about the necessity of faunal groups such as crocodiles and snakes.
Study Area	Loss of Biodiversity: Loss of Species of Conservation Concern	Refer to mitigation measures for Impact source "Loss of Biodiversity : Loss of Species of Conservation Concern " Table 8-4
Study Area	Loss of Biodiversity: Introduction of Alien fauna	 The deliberate introduction of alien species will be prohibited, unless a full environmental assessment is undertaken and control methods for escapees detailed. Eradication programs of problem animals should be undertaken in consultation with conservation authorities.
Study Area	Loss of Biodiversity : Faunal impact of habitat fragmentation and loss	 Where possible the planning of the mine path, roads and the location of buildings should ensure minimal fragmentation of sensitive habitats. Road designs will incorporate, where feasible, underpasses and culverts that allow the movement of animals. This is of particular importance along drainage lines, which form natural corridors for faunal movements.
Study Area	Loss of Biodiversity : Increased Dust Levels	 The haul road will be watered down to inhibit dust production. Road speeds in sensitive regions e.g. near wetlands, across drainage lines, and during extreme dry climatic conditions, may be limited to curtail dust generation if roads are not watered down.
Sludy Area	Loss of Biodiversity :	 willigation of this impact is difficult and unlikely to be effected, but may involve noise reduction measures in

	Noise Pollution	sensitive areas (e.g. adjacent to wetlands) at sensitive times (e.g. at night).
Study Area	Loss of Biodiversity : Chemical Pollution	Refer to the recommended mitigation Measures provided in Table 8-4
Study Area	Impacts from Product Transport: Threats to Animal Movements	 Mitigation depends firstly on on-going assessment of the significance of animal road mortalities, levels of which will be monitored during the construction and operational phases. The design of project structures and transport linkages will avoid where possible sensitive habitat corridors, e.g. drainage lines and wetlands. Road designs will incorporate, where feasible, underpasses and culverts that allow the movement of animals. This is of particular importance along drainage lines, which form natural corridors for faunal movements. Where possible the road traffic will be limited after dark, as much of the surviving fauna is nocturnal, e.g. bats, most snakes, small rodents, amphibians, etc. In addition to this dipped headlights to reduce light pollution into adjacent habitat are required, and lower speeds will be enforced. These measures will help reduce night driving impacts. Vehicle speed will be limited and not exceed 50km/h. Drivers will be educated regarding their role in impacting on animals and the need to minimize collisions with animals at all times.
		Impact Category – Traffic and Transport
Regional	Increase in traffic frequency through villages and Nacala	 Heavy vehicles should not travel the road between 10pm and 6am unless it is absolutely unavoidable. Within the urban area, trucks should observe appropriate speed limits. Drivers should have knowledge of how to react in the event of an accident.
Regional	Dust generation	 Speed reduction – all mine vehicles will be required to obey reasonable speed limits through urban settlements to prevent potential accidents assessed in Impact source: "Increase in traffic frequency through villages" above from occurring, as well as to reduce dust emissions, especially during windy conditions; If dust generation problems persist during the operational phase, further mitigation measures will need to be considered.
	-	Impact category - Vegetation and floristics
Localised	Loss of Riparian Woodland	Refer to the recommended mitigation Measures in Table 8-4
Study Area and Localised	Loss of Miombo Woodland: Graphite	Refer to the recommended mitigation Measures in Table 8-4
Localised	Loss of Miombo	Refer to the recommended mitigation Measures in Table 8-4

	Woodland: Granite	
Study Area and	Loss of Intact Miombo	Refer to the recommended mitigation Measures in Table 8-4
Localised	Woodlands: Plains	
Localised	Loss of Degraded Miombo Woodlands: Plains	Refer to the recommended mitigation Measures in Table 8-4.
Localised	Loss of Biodiversity (general)	Refer to the recommended mitigation Measures in Table 8-4
Study Area and Localised	Loss of Species of Special Concern	Refer to the recommended mitigation Measures in Table 8-4
Study Area and Localised	Disruption of Ecosystem Function and Process : Fragmentation of vegetation and edge effects	Refer to the recommended mitigation Measures in Table 8-4
Regional	Invasion of alien species	Refer to the recommended mitigation Measures in Table 8-4
Study Area and Localised	Loss of ecosystem services provided by the plant communities identified in the project area	Refer to the recommended mitigation Measures in Table 8-4
		Impact Category – Visual Impact
Study Area	Impact of introducing highly visible mine infrastructure into a rural, undeveloped landscape.	 Maintain as much natural vegetation as possible between the mine buildings and the edge of the mine area. Non-reflective paint will be used on all buildings and roofs of buildings. Galvanised steel structures should be darkened to prevent glare. Rehabilitate areas that have been cleared of vegetation during the construction phase. Treat roads to reduce dust emissions. An Air Quality Assessment conducted as part of this EIA will investigate this impact more thoroughly. Light fixtures installed will not spill light beyond the mine area, where they are needed for 24 hour mine operation. Direct the light beams downwards, and use blinds as necessary. Use timer switches or motion detectors to provide light in areas where light is not needed continuously.
		Impact Category – Waste

Localized	Disposal of waste rock and tailings: Health and safety of employees and local communities	•	Refer to the recommended mitigation Measures in Table 8-4
Study area and District	Management of non- process general and hazardous wastes: Pollution of land and water	•	Refer to the recommended mitigation Measures in Table 8-4
District	Nuisance impact (Production of odours, visual impact and attraction of pest and vermin)	•	Refer to mitigation measures for Impact source: "Management of non-process general and hazardous wastes: Pollution of land and water "in Table 8-4.
Study Area	Disposal of domestic wastewater and sewage sludge: Pollution of soil and water	• • • • • • • •	All domestic wash water and sewage from all sites will be diverted to the septic tanks or packaged sewage treatment plants for treatment and discharge from these facilities will meet the discharge standards as indicated in the AfDB (1995) prior to release into the process water pond. Sewage sludge from these facilities will be managed as described in the EHS Guidelines for Water and Sanitation (2007), that is to stabilise by drying in purpose-build beds or composting. The stabilised sludge can then be dried and either disposed at the proposed landfill or alternatively, applied as a soil conditioner during rehabilitation of the mine, provided that levels of toxic constituents is sufficiently low. If soil application is adopted, soil contamination will be avoided and the soil standard prescribed by the AfDB (1995) should be adhered to. Prior to discharge into sewage treatment facilities, effluents from canteens containing oil and grease will be pre-treated by the use of a grease trap; Chemical toilets will not be used during the construction period unless the contents can be disposed of in a manner that does not pose a threat to the environment. Instead, alternatives such as VIPs, composting toilets or similar will be considered as preferred alternatives; If VIPs are used, they will be lined, maintained and sited in a way that minimises the risk of contamination of surface and sub-surface water resources; All sewage treatment facilities will be well maintained. To this end, at least one employee on site will be trained to maintain the system(s); The performance of the sewage treatment systems will be investigated timeously and remediation measures put in place to restore performance; In the event that sludge must be removed from the system(s), it will be disposed in a manner that minimises potential risk to human health and the environment and will comply with the National legislation; The environmental monitoring programme for the facility must incorporate monitoring points that are able to

		detect a negative impact on the environment associated with the discharge of treated sewage.
District	Health impacts to employees and communities	 Refer to mitigation measures for "Disposal of domestic wastewater and sewage sludge: Pollution of soil and water" (above)
Study Area	Nuisance impacts (odour and flies)	 Refer to mitigation measures for "Disposal of domestic wastewater and sewage sludge: Pollution of soil and water" (above)
Study Area	Disposal of run-off / storm water: Pollution of land and water	Refer to the recommended mitigation measures in Table 8-4
District	Regional waste profiles and community awareness: Local knowledge of waste management practices	Refer to the recommended mitigation measures in Table 8-4
District	Regional waste profiles and community awareness: Change to waste profiles in the local communities	Refer to the recommended mitigation measures in Table 8-4
		Impact category - Radiation
Study Area	During drilling and exploration activities, and future mining and processing activities	 Refer to the recommended mitigation measures in Table 8-4 For areas where material with enhanced levels of radioactivity are handled the following recommendations are made: A comprehensive radiation baseline survey will be conducted to address all the aspects as mentioned in section 10 below prior to the commencement of any mining operations on the site, but subsequent to the clearance of the vegetation on these areas, to allow easy access; A detailed Radiation Management Plan that includes a monitoring programme should be developed and implemented; Prior to the commencement of mining and processing activities on site, a prospective worker safety assessment will be performed to identify the potential radiation exposure to workers, and to establish and implement appropriate mitigation measures. Such assessment will be repeated once operations have commenced; All redundant equipment (valves, pipes, pumps, flanges, etc. to be generated during mining operations) will be identified and monitored, specifically on the inside, for any concentrations of radioactive material. If any contamination above background is detected, then the equipment will be isolated from the rest and be stored
in a dedicated and secured storage area, e.g. a dedicated container. The container will be signposted with radiation signs and access will be controlled. Records will be kept of all items stored inside such a container. Items that have been exposed to the process, and that require repaire in future, may also be contaminated, and need to be identified and handled in the same way as the contaminated redundant scrap;		
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In terms of radiation, to allow for the possibility of exposure from other sources, operators are required to apply constraints to the exposure levels and limit the annual public exposure to 1 mSv per annum from all (their) operations, the international level for this constraint is 0.3mSv/annum from a single source. This is in line with the IFC and is derived from the International Atomic Energy Agency (IAEA). It is important to note that international radiation protection programs do not hold the operator responsible for background induced radiation doses. However such programs do hold the operator responsible for any radiation dose above the natural background. Therefore the main purpose of any radiation management programmes that will be implemented in the future is to ensure that the exposures to both workers and members of the general public are kept as low as reasonably achievable above the existing natural background.		
 Core samples that exhibit enhanced levels of uranium, will be stored separately from the rest of the cores to prevent access to such cores and the unauthorized removal of such cores; 		
 Provide Radiation Protection Officer and Radiation Protection Monitor training to specific individuals, and alternatives to perform the duties in their absence 		
 Appropriate radiation monitoring instruments will be purchased. These instruments will be capable of monitoring all the potential pathways of exposure that would be encountered at the mine, e.g. alpha, beta contamination, long-lived alpha and dose rate; 		
 The possible radiation exposure that can be incurred by members of the public living adjacent to the site will also be assessed. All possible pathways will be established. 		

Table 8-6: Decommissioning Phase Environmental and Social Mitigation Measures for the Syrah Resources Balama Graphite Project

Potential Impact Area	Sources of Impacts	Mitigation Measures
Study Area	Tailings Storage Facility	 During the construction phase topsoil must be stripped where possible by at least 300 mm before the TSF is constructed. Where the topsoil layer is less than 300 mm all topsoil must be removed from the A-horizon. These materials will be used to cover the WRD/TSF post closure; Construct a permanent spillway to ensure physical stability of the facility during storm events. This will be done during the construction phase of the dam, therefore not accounted for in the closure costs; Fill the tailings pond area to eliminate water ponding (no water will pond on the surface of the TSF post closure). This can be achieved by spigotting the final tailings so as to greatly reduce the final pond size, then infilling with additional saprolite to ensure a free-draining surface. This will be done during the final stages of the mine's operation and hence not accounted for in the closure costs; Cover the TSF with a saprolite layer (at least 300mm thick, but contoured to ensure free drainage of surface runoff post-closure); followed by at least 150 mm of topsoil (or thicker if available), and then establish vegetation. It is proposed that the placement of saprolite and topsoil cover on the TSF should take advantage of the dry season in which little rainfall occurs. However, other options of placing the cover may be explored in the future versions of thieClosure and Rehabilitation Management Plan; and Monitoring of groundwater and surface water gualities around and downstream of the TSF area.
Study Area	Waste Rock Dump	 The shaping of the WRD slopes will be undertaken during the operational phase of the mine and that if acid generating waste rock has been identified, that this be separated from non-acid generating waste rock. Acid generating waste rock can be encapsulated within non-acid generating waste rock in order to prevent/minimise the risk of acid mine drainage formation. Shaping of the WRD will should be undertaken during the operational phase of the mine to reduce closure costs. The final design out slope angle of 1:5 of the WRD will not be exceeded during the Life of Mine. At closure the sides and tops of these dumps will be covered with at least 150 mm of topsoil (or thicker if available), and vegetated with indigenous species during the wet season. As far as possible waste rock dump areas that have reached final profiling will maintain slope angles less than 1:5. If such an exercise is maintained for all WRDs, this will significantly reduce the rehabilitation costs of the WRDs at closure. Topsoil and vegetation will also be added to these areas during the Life of Mine (LoM) to further reduce the final rehabilitation costs.
Study Area	Roads	 The proposed access roads around the site will be ripped, except those needed to access the facilities for inspection after closure. Roads that can and will be used by other users post closure will, however, be left, provided this is agreed upon by all parties concerned.

Study Area	Ore Processing Plant	• It is assumed that some of these buildings and infrastructure of the administration block, workshop and maintenance area will remain to support post closure use. Once closure is complete, a decision to either demolish remaining facilities or hand them over to Government for conversion into social infrastructure (e.g. schools, clinic) will be made using a consultative process.
		All other infrastructure will be decommissioned as follows:
		 Any surface buildings and infrastructure which are no longer required will be demolished, unless specific directives to the contrary are received from the authorities. Such directives may result from communities' requests. This will need to be confirmed through a stakeholder engagement process undertaken as part of the Closure and Rehabilitation Management Plan goal refinement exercise.
		• Foundations will either be removed or will be covered with a layer of soil, or soil forming material, the depth to be determined following trials to be undertaken.
		 Non-re-useable materials including rubble and waste will be disposed of at suitable sites in accordance with the waste management and disposal plan that will be developed. It may be acceptable to dispose of certain bulky inert items in the mine void but this will need to be confirmed as the closure plan is refined.
		 Following the removal of the infrastructure a soil contamination assessment will be undertaken by an independent specialist and remediation and re-vegetation activities implemented where necessary.
		• Support infrastructure buried underground such as tanks and their pipes, other pipes and service tunnels will, depending on the proposed future use of the site, either be kept as is or be unearthed and removed from the site. If they are to be left in-situ, the integrity of all underground pipes and tanks will be assessed by an independent expert. If the integrity of sub-surface infrastructure is compromised, it will be removed.
		 Remaining openings and access ways of support infrastructure will be blanked.
		 A detailed plan indicating the location of any remaining infrastructure will form part of the Closure and Rehabilitation Management Plan.
		 Any roads which will no longer be required will be rehabilitated. The details of such rehabilitation will be outlined in the Closure and Rehabilitation Management Plan, but in general the following will be undertaken:
		 Bridges, culverts and ducts will be removed where they are no longer required.
		 The natural water flow will be restored and any disturbed section of the watercourse will be stabilised and revegetated.
		• The road surface, shoulders and embankments will be graded to a slope suitable to prevent erosion. Cuttings will be assessed and where necessary measures to improve safety and erosion stability will be implemented.
		• Electrical equipment and infrastructure such as transmission towers, electric cables and transformers which are no longer required will be demolished and removed from the site. The soils in the vicinity of transformers will be assessed for contamination and appropriate decontamination measures will be implemented, in accordance with Zambian regulatory requirements.
		 All disused mining plant and equipment such as winches, pumps and conveyors, concentrator equipment such as thickeners, and heavy machinery will be removed from the site. It is not anticipated that any of this

		 machinery or equipment will be contaminated. However, the mine will confirm this before any machinery or equipment is removed from the site. If any of the machinery or equipment is found to be contaminated it will be appropriately decontaminated before being removed. During the mitigation and rehabilitation works, particular attention will be paid to the places where equipment will be parked. The mine will assess these sites and if the soils are contaminated appropriate remedial measures will be taken in compliance with Mozambican regulatory requirements. The closure plan for the mine will include details for the closure of the landfill and will ensure that the closure of these specific facilities meets the requirements of Mozambican legislation and international best practice. Post-closure monitoring of these facilities may be required.
Study Area	General surface rehabilitation	 General surface rehabilitation should ensure the surface topography emulates the surrounding area, is free draining, has a "neat" appearance and is re-vegetated. Special attention will be given to shaping and removal of heaps of excess material, scrap and waste. The entire area is to be ripped, covered with at least 150 mm of topsoil (or thicker if available), and vegetated. The details of the revegetation will be documented in a comprehensive Closure and Rehabilitation Management Plan.
Study Area	Mine water contamination	 All the mitigation methods proposed during the operation phase are also applicable here; Backfilling the pits with reactive materials may be the best available option to manage sulphide oxidation in the post closure environment. The backfilled pits should be completely flooded with water to at least 15 m depth. The resulting pit lake will render the reactive materials chemically inert by diminishing the available oxygen.
		Impact category - Air Quality
Local	Demolition & removal of all infrastructures	 In order to mitigate the impacts of decommissioning activities on the atmospheric environment, the following measures may be applied: Demolition not to be performed during windy periods, as dust levels and the area affected by dust fallout will increase. The area of disturbance to be kept to a minimum. Drop heights when handling dump soil into trucks or on the ground to be minimised
Local	Rehabilitation (spreading of soil, re- vegetation & profiling/contouring)	 Reshaping, restructuring of the landscape and spreading of soil to be performed on less windy days. Re-vegete reshaped landscapes as soon as possible soil to minimise wind and water erosion Leaving the surface of the soil in a coarse condition reduces wind erosion and ultimately reduces the dust levels. Additional mitigation measures include applying dust suppressant (see previous comment), keeping the soil moist using sprays or water tanks – the number of time is dependent on the traffic and season, using wind breaks. Aim to conduct rehabilitation during the wetter seasons to allow vegetation cover to establish during times of higher rainfall.
Local	Storage, handling and treatment of	• Develop a Integrated Waste Management Plan and a Hazardous Chemical Management Plan that identifies anticipated waste streams and waste minimisation procedures, storage locations, waste-specific

 management and disposal requirements. Include a recycling strategy to be practiced by workers during the decommissioning phase. Provide secondary containment for fuel storage. Hazardous substances and chemicals will be stored and handled in accordance with the local regulations. Hazardous substances and chemicals will be stored in clearly labelled containers. Employees will be trained on the hazards and emergency procedures of handling and storing hazardous chemicals. Conduct periodic assessments to understand the processes that generate waste with the aim to reduce waste output.
 Post-closure phase Rehabilitation by vegetating will begin during the operational phase. The objective is to minimise the area subjected to wind and water erosion. The aforementioned will reduce the potential for fugitive dust generation and render the impacts negligible.
Impact category – Noise
 There are standard mitigation measures to ensure that vehicle noise is kept within acceptable limits: Vehicles will be kept in good repair; they will use standard exhaust and silencing equipment. Drivers will stick to designated speed limits. Roads will be kept in good condition. As far possible decommissioning activities will be kept to daylight hours. Fixed noise sources such as generators will, where feasible, be enclosed.
Develop a land use management plan for mining closure, incorporating conservation and agricultural abiastives

9. MONITORING, IMPLEMENTATION AND MANAGEMENT REVIEW

9.1 Introduction

Syrah Resources will establish procedures to monitor and measure the effectiveness of the ESMPs as well as compliance with any related legal and/or contractual obligations and regulatory requirements and applicable standards. Where the Authorities or other third party has responsibility for managing specific risks and impacts and associated mitigation measures, Syrah Resources will collaborate in establishing and monitoring the implementation and effectiveness of such mitigation measures. Where appropriate, Syrah Resources will consider involving representatives from Affected Communities to participate in monitoring activities.

A number of monitoring and review measures that are in accordance with the IFC Performance Standard 1 have been adopted and are described below.

9.2 Checking and Monitoring

Checking and monitoring will be implemented and is required to ensure that ESMP management activities are being implemented and desired outcomes are being achieved. If not, then corrective action will be identified and implemented. This component includes five key relevant activities:

- Defining objectives and targets;
- Monitoring selected E&S quality variables as defined in the objectives and targets;
- On-going inspections and continuous improvement of general state of the operations;
- Internal audits to assess the robustness of the ESMP and SOPs or to focus on a particular performance issue; and,
- External audits to provide independent verification of the efficacy of the ESMP and its associated reports and procedures.

9.2.1 Performance objectives and targets

Performance objectives and targets (measurable indicators) against which the performance of the project can be measured and monitored will be developed as part of ESMP and SOP report development, and agreed upon for activities in all phases of the project's life cycle. These objectives and targets will be clearly defined and incorporated, where appropriate, as contractual obligations that have to be fulfilled by third parties. In so doing, Syrah Resources will be better able to manage its Health, Safety and Environmental risks and obligations. Objectives and targets will be reviewed on a regular basis. In cases where objectives and targets are not met, new and revised method statements indicating proposed corrective measures will be developed and approved.

9.2.2 Monitoring Programmes

Syrah Resources and its contractors will establish procedures to monitor and measure the effectiveness of the management plans, as well as compliance with any related legal and/or contractual obligations and regulatory requirements. The variables that are to be monitored are to be defined in the respective ESMPs to be developed. Results obtained from the monitoring programme will be structured and presented for review on an on-going basis so that if objectives and targets are not met, corrective action can be taken.

It is required that all monitoring programmes are to be headed by appropriate personnel in the organisational structure. Where appropriate, Syrah Resources will consider involving representatives from affected communities to participate in the monitoring activities. Where skills do not exist, or where significant impacts are involved, Syrah Resources will retain external experts to verify its monitoring information. In instances where a third party has responsibility for managing specific risks and impacts and associated mitigation measures, Syrah Resources will collaborate in the establishment and monitoring of such activities.

9.2.3 On-going inspections and continuous improvement

On-going inspection and continuous improvement will form a key component of the ESMP as documents associated with the ESMP will be regularly reviewed and updated. Research on certain aspects will be undertaken to refine environmental management and to ensure that the levels of environmental protection outlined in this ESMPr are achieved.

Owing to the transient nature of the construction phase, the greatest source of information will be obtained through on-going visual inspection. At the same time some potential impacts are difficult to monitor quantitatively, such as soil erosion and waste management. An on-going, but pragmatic inspection regime will be developed that allows for potential E&S non-conformances to be identified proactively so that mitigation can be quickly and effectively implemented.

9.2.4 Internal and external audits

Audits of the environmental performance of the project will be undertaken on an annual basis by accredited institutions. The purpose of the audits will be to:

- assess compliance with the conditions of the Environmental Licence and Certification,
- determine if the objectives and targets outlined in the ESMPs and SOPs are being met.

The findings of external, internal and informal environmental reviews will be recorded and items requiring action will be identified. The implementation of these actions will be assessed in the following audit.

Where the monitoring data and the inspection reports highlight problems, an internal audit can be used to ascertain the source of the problem and to define action to prevent its recurrence. The three key areas for audit are operating efficiencies of facilities, project procedures and their implementation, and Contractor's E&S performance.

9.3 Incidents Reporting, Non-compliance and Corrective Action

9.3.1 Incident Documentation and Reporting

Syrah Resources and its contractors will develop procedures for managing E&S incidents, subject to approval by its senior management. A report will be completed for all incidents, and appropriate action taken where necessary to minimise any potential impacts. The relevant Mozambican authorities will be informed of any environmental incident, in accordance with legislative requirements.

A procedure for reporting E&S complaints from the affected community and employees will be developed prior to the onset of construction activities and will be applicable to all phases. Notification of an incident or emergency will include the following:

- Description of the incident;
- The location of the emergency or incident;
- The name and telephone number of the designated contact person;
- The time of the emergency or incident;
- The suspected cause of the emergency or incident;
- The environmental harm and/or environmental nuisance caused, or suspected to be caused, by the emergency or incident; and
- The action taken to prevent future occurrence of the incident and mitigate any harm and/or environmental nuisance caused by the emergency or incident.

The Incident reporting and documentation requirements will be based on best practice principles, and will take the following requirements into account:

• Documents associated with the ESMP will be regularly reviewed and updated by all environmental management parties;

- External environmental audits will be conducted quarterly during the construction phase and annually during the operation phase by accredited institutions that are vetted by the local authorities. Internal audit will be conducted regularly for the duration of the project's life cycle. The purpose of the audits will be to assess compliance with the conditions of the Environmental Licence, and objectives and targets outlined in the ESMP, and its various management tools;
- The findings of external, internal and informal environmental reviews will be recorded and items requiring action will be identified from the recommendations made and Action Plans developed;
- Syrah Resources is contractually obliged to fulfil any reasonable recommendations, and implementation of applicable ESMP.

9.3.2 Non-compliance

An ESMP or SOP is deemed not to have been complied with when:

- There is evidence of contravention of the recommendations in the document, its environmental specifications or the developed Method Statements or Procedures;
- If Company activities take place outside the legal boundaries of the concession area;
- Environmental damage ensues due to negligence;
- Personnel fail to comply with corrective or other instructions that have been issued as corrective measures; and
- Personnel fail to respond adequately to complaints from the public or Mozambican authorities.

9.3.3 Corrective Action

There are several mechanisms for implementing corrective action and they include verbal instructions, written instructions and contract notices.

Verbal instructions are likely to be the most frequently used form of corrective action and are given in response to minor transgressions that are evident during routine site inspections. Verbal instructions are also used to create further awareness amongst Contractors, as often the transgressions are a function of a lack of awareness.

Written instructions will be given following an audit. The written instructions will indicate the source or sources of the problems, and proposed solutions to those problems. The implementation of these solutions can also be assessed in a follow-up audit and further written instructions issued if required. All written instructions will be centrally logged to ensure that there is an auditable record of such instructions and how they were responded to.

A contract notice is a more extreme form of written notice because it reflects the transgression as a potential breach of contract. If there is not an adequate response to a contract notice, then the next step can be to have the contractor removed from the site and the contract cancelled. Contracts will be drafted with this in mind.

9.4 Management review

The process of management review is in keeping with the principle of continual improvement. As such, Syrah Resources will develop a management review procedure to ensure that the Company defines and maintains a documented process and agenda for Senior Managers to periodically review the continuing suitability, adequacy and effectiveness of the ESMP. The management review, which will be conducted annually, will include a review of internal and external audit reports as well as well as the cost estimates for implementation of the ESMP. The purpose of the review is to critically examine the effectiveness of the ESMP and its implementation and to decide on potential modifications as and when necessary.

9.5 Financial resources

The proponent will be responsible for ensuring that sufficient financial resources are made available for the effective implementation of the requirements of this ESMP. Where applicable, and particularly during the construction phase, Syrah Resources will need to ensure that all contractors are aware of their obligations in terms of this ESMP and that they have made appropriate financial provisions to ensure full compliance.

10. MONITORING PROGRAMME

10.1 Introduction

This Monitoring Programme outlines the E&S monitoring requirements for the Construction and Operational Phases of the Syrah Resources Graphite project. This programme has been based on the findings of the Environmental and Social Impact Assessment and the contents of the Environmental and Social Management Programme and will be periodically reviewed and updated. Please note that where standards are available for the host country, these will be compared to international standards and where there is a difference, the most stringent requirement for each monitoring parameter will be adopted.

10.1.1 Objectives

The objectives of the Environmental Monitoring Programme are:

- To confirm compliance with commitments to legislative and non-legislative E&S Standards, specifically the:
 - Decree No. 18/2004: The Regulation on the Standards of Environmental Quality and of Effluent Emission;
 - Ministerial Diploma of 18/2004: Regulation of the Quality of Water for Human Consumption;
 - IFC Performance Standards (2012);
 - o IFC General EHS Guidelines (2007);
 - Environment, Health and Safety Guidelines for Mining. (IFC, December 2007)
 - Guidelines for Drinking Water Quality (WHO, 2011)
- To provide early warning of potential impacts, determine the extent of predicted impacts and identify any unforeseen impacts associated with the project activities;
- To provide a baseline E&S data set;
- To provide feedback on the adequacy of environmental management practices and allow improved practices to be developed to continuously improve operations;
- To detect and measure environmental trends or changes and enable analysis of their cause; and
- To provide site management with information and data that can be used as a basis for decision making.

Baseline data will be used to compare pre-project conditions with future phases of the project. Where baseline conditions are not known or deficient, this programme describes additional baseline data requirements.

10.1.2 Monitoring Programme Structure

This programme consists of various monitoring plans, each of which covers a separate element. The structure of the programme and associated management plans is shown in Figure 10.1.



Figure 10-1: Summary of Structure of the Environmental Monitoring Programme

10.1.3 Monitoring Categories

Three monitoring categories shall be included and these are described below.

- 1. **Discharge (Emission) Monitoring:** This will involve monitoring of contaminants being discharged or emitted from construction and operational activities into the environment. Discharge or emission monitoring will be undertaken either at the discharge point or within the local catchment area. Discharge monitoring will provide direct information concerning the concentrations and loads of contaminants being discharged from the operation, and will also serve as a link between ambient monitoring results and the operation itself.
- 2. **Ambient Monitoring:** This involves the monitoring of background conditions and receiving environments that could be affected by project construction activities. While discharge monitoring should determine if environmentally significant releases have occurred, effects on the ultimate receptors within the receiving environment beyond the boundary of the facility can be determined only by ambient monitoring. Ambient monitoring will be undertaken for surface water (both upstream and downstream in project-affected rivers), groundwater, ambient dust, noise & vibration monitoring, workplace air quality, lighting and radiation (ionizing and non-ionizing).
- 3. *Investigation Monitoring:* This will be completed as required to determine the occurrence, nature and extent of possible impacts following an environmental incident, such as oil spillage, or to verify/refute third-party claims of environmental impacts. For example, investigation monitoring may be undertaken upstream of a routine monitoring point to identify a source of contamination.
- 4. **Occupational Health and Safety Monitoring:** The working environment will be monitored for occupational hazards relevant to the project. Occupational Health and Safety monitoring will be designed and implemented by accredited professionals as part of an occupational health and safety monitoring program with recognition for post-closure long term health concerns. As part of the monitoring programme, occupational accidents, diseases and dangerous occurrences and accidents will be documented for all facilities.

10.1.4 Monitoring Responsibilities

Implementation of the environmental component of the programme is primarily the responsibility of the Environmental Manager. However, the Occupational Health and Safety Manager will be responsible for monitoring employee health statistics. The Human Resources Manager will be responsible for monitoring employment statistics. The Health Coordinator will be responsible for monitoring public health issues.

Syrah Resources, through the EHS Manager, will ensure that bio-physical monitoring responsibilities are clearly defined within the Environmental Department. Where appropriate, Syrah Resources will consider involving representatives from affected communities to participate in the monitoring activities. Where skills do not exist, or where significant impacts are involved, Syrah Resources will retain external experts to verify its monitoring information. In instances where a third party has responsibility for managing specific risks and impacts and associated mitigation measures, Syrah Resources will collaborate in the establishment and monitoring of such activities.

10.1.5 Quality Assurance / Quality Control

Syrah Resources will implement a Quality Assurance / Quality Control (QA/QC) programme as part of the monitoring programme. The QA/QC programme will be described for each sampling component. The programme will include the following elements:

- 1) The regular maintenance and calibration of on-site monitoring equipment, as per the manufacturers' instructions;
- 2) The regular use of appropriately qualified and regulated external laboratories to verify onsite monitoring results;
- 3) The regular use of duplicate samples, split samples, field blanks, and laboratory blanks and a comparison of basic anion cation balances;
- 4) Chain-of-custody procedures for sample handling and transportation; and
- 5) Laboratory procedures manual for analytical methodologies.
- 6) All sample bottles shall be clearly labeled
- 7) Syrah will ensure that the results of all duplicates and blanks are checked against other samples for compliance. Where non-compliance is found, the laboratory will be notified and asked to re-run the test.
- 8) Standard sampling procedures for lab samples will be adhered to and the samples will be shipped to the lab within 48 hours as per procedure.

10.1.6 Review and Modification of the Monitoring Programme

Data from the monitoring programme will be continually reviewed trends will be identified. The monthly Environmental Report will subsequently become a basis for discussion on monitoring programme effectiveness, and the need (if any) for changes to sampling sites, sampling frequencies and analytical methods. The report will also include recommendations from the Ministry for the Coordination of Environmental Affairs (MICOA) regarding any necessary changes to the programme.

Modification of the programme will also be required:

- 1) When the configuration or operation of the Project changes significantly; and/or
- 2) Where environmental or social impacts vary from initial predictions; and/or
- 3) In response to new company commitments, legislative / financing requirements or stakeholder concerns.

10.1.7 Reporting

Monitoring results will be compiled by the Environmental Manager for submission to the General Manager on a monthly basis. Environmental monitoring results shall be incorporated into quarterly, biannual and annual reports.

10.2 Policy Guidelines and Regulatory Framework

The purpose of this section of the programme is to summarise the applicable Standards with which the project must comply and, in particular, to highlight the requirements within these Standards related to monitoring.

10.2.1 National Legislation

The following legislation is relevant to environmental monitoring within Mozambique:

- Decree No. 18/2004 as amended by the Decree No. 67/2010 of 31 December: The Regulation on the Standards of Environmental Quality and of Effluent Emission
- Ministerial Diploma of 18/2004: Regulation of the Quality of Water for Human Consumption

10.2.2 World Health Organisation Guidelines for Drinking Water Quality (2011)

The Ministerial Diploma of 18/2004 was adapted from the WHO drinking water guidelines. The primary purpose of the WHO guidelines for drinking-water quality is the protection of public health. The Guidelines provide the recommendations of the WHO for managing the risk from hazards that may compromise the safety of drinking-water. The guideline limit provided in the WHO guidelines will be considered in the context of managing the risk from other sources of exposure to these hazards, such as waste, air, food and consumer products.

10.2.3 International Finance Corporation Performance Standards on Environmental and Social Sustainability (2012)

In accordance with IFC Performance Standards and in particular PS 1 (Assessment and Management of Environmental and Social Risks and Impacts), Syrah Resources will establish procedures to monitor and measure the effectiveness of the management programme, as well as compliance with any related legal and/or contractual obligations and regulatory requirements. Where the government or other third party has responsibility for managing specific risks and impacts and associated mitigation measures, the client will collaborate in establishing and monitoring such mitigation measures. Where appropriate, clients will consider involving representatives from Affected Communities to participate in monitoring activities.

The IFC Environmental Health and Safety General Guidelines (IFC, 2007) includes specific guidelines regarding environmental performance. More specifically, guideline limits are provided for discharges from facilities to the environment. Further guidance on limits is provided in the IFC Sector Specific EHS Guidelines.

Those applicable to the Syrah Resources operations are:

• Environment, Health and Safety Guidelines for Mining. (IFC, December 2007).

The discharge limits recommended in these documents have been considered into the monitoring programme. Performance Standard 3 (IFC, 2012) specifies that "When host country regulations differ from the levels and measures presented in the EHS Guidelines, clients will be required to achieve whichever is more stringent".

10.3 Water Quality Monitoring

The water quality and hydrological studies have identified rivers, streams and wetlands as environments that need to be conserved and where impacts need to be minimised. Issues affecting ambient water quality mainly relate to surface run-off from areas subject to mining activities and effluent discharge and an increase in turbidity near cleared areas. Water quantity, both ground and surface water, will be affected by increased water use associated with the mining operations.

The Aquatic and Geohydrology specialist reports identified a number of mitigation measures, based on informed predictions, aimed at reducing potential impacts. In order to track impacts and the effectiveness of proposed mitigation measures, a pre-construction hydrology baseline must be established over a period of one year and key indicators must continue to be monitored throughout the life of the project. This baseline and subsequent monitoring must cover both water availability (quantity) and quality for both surface and groundwater sources.

In terms of the IFC requirements, effluent discharge guidelines are applicable to process effluents as well as site runoff that are to be discharged to surface waters for general use. Furthermore, site-specific discharge levels may be established under certain conditions. There are separate guidelines for discharge of sanitary effluent (sewage) provided in the General EHS Guidelines (IFC, 2007). This section details the components of the Surface and Ground Water Quality Monitoring (including effluent discharge, runoff and sanitary effluent) for the establishment of the baseline monitoring data and for the continual monitoring of surface and ground water quality during the operational phase using the baseline data as a reference.

10.3.1 Objectives of Ambient Surface and Ground Water Quality Monitoring

The objectives of surface water monitoring are as follows:

- 1) To establish a comprehensive pre-development surface water baseline, including reference sites, covering both quality and quantity of resources.
- 2) To identify any Project-related impacts on surface water quality by monitoring water quality upstream and downstream of the Project site.
- 3) To assess the effectiveness of mitigation measures aimed at minimizing impacts of the mine on surface water resources.

The objectives of the groundwater monitoring are as follows:

- 1) To establish the seasonal baseline ground water level and quality.
- 2) To track trends in groundwater quality and levels relative to the pre-mining baseline
- 3) To determine whether village water sources are adequately protected from mine-related impacts.
- 4) To indicate when corrective or prevention measures are required to maintain water levels and quality.
- 5) To monitor the effectiveness of mitigation measures.

10.3.2 Specific Monitoring requirements

A pre-construction surface and groundwater quality baseline must be established for the project area. As water from both of these sources is used by local communities, the baselines for surface and ground water will include all monitoring group parameters listed in Table 10-1. Until a statistically-valid baseline has been established, the results will be compared with potable water guidelines (see Table 10-5) in order to identify areas of concern.

Aquatic Bio-monitoring, based on changes to the composition of aquatic invertebrate communities, is regarded as a useful means to assess changes in the quality of water resources. The SASS5 approach (or similar) will be adopted by Syrah Resources to assist with the detection of ecologically-significant changes to surface water quality within the mining area (Table 10-1).

If project-related contamination or sedimentation is identified and poses a risk to downstream water resource use or aquatic ecology, Syrah Resources will undertake to mitigate the effects of the contamination without delay, compensate for any loss of water use, and prevent further deterioration. These measures may include changes to operational practices.

It should be noted that the TSF will be clay lined however, measure will be implemented for possible seepage of leachate. A moderate potential exists for AMD formation from the waste stockpile and TSF due to the sulphur content and acid generation potential. As a result of AMD, the potential exist for low pH water, bearing high concentrations of AI, Cd, Co, Cr, Cu, Fe, Mn, Ni, V, and Zn to seep into the aquifers beneath these facilities during the operational phase. In addition, possible elevated concentrations of radioactive constituents like U and Rb are also predicted to seep into receiving environment.

Variable	Units	Limits	References
		Total Dissolve Solids/Salts TDS (mg/l) = EC (mS/m) x 6.5 at 25 °C.	DWAF 1996
Colimity Flacturing		Recommended range for groundwater	UK DWI 2006
conductivity / salinity	mS/m or ppt	mS/m).	
		For potable water TDS should be ≤600	WHO 2011
		mg/l.	
pH @ 25°C	1 – 14 pH units	Surface water (freshwater) pH 6 to 9 Groundwater pH 4.7 to 9.6	ANZECC 2000 DWI 2006
Temperature	°C	<3º differential	IFC 2007
Dissolved Oxygen (DO)	Mg/L or % O ₂	Surface water (freshwater) 5.5 to 6 mg/l	CCME 1999
	<u> </u>		
Turbidity	NTU	1 NTU	WHO 2011
	TCU or Hazen		
Colour	Co scale	<15 TCU	MICOA 2004
AMD (Sulphate and Heavy r	netals: As, Al, Co,		ANZECC 2000
Cr, Zn, Cd, Cu, Fe, Ni, V, Mn); and		See Table 10-2 and 10-5 (for sulphate)	MICOA 2004
Radioactivity (U, Se, Sr and Rb)			WHO 2011
Aquatic life including invertebrate sampling and	SASS5 Score and (Invertebrate)	I Shannon Weiner Diversity Index	DWAF 1996
analysis	Fish catch per uni	t effort numbers and fish species diversity.	

Table 10-1: Pro	posed Parameters	for regular <i>in</i>	n situ Ground and	d Surface Wate	r Monitoring
	posed i arameters	101 10gulai <i>111</i>	<i>i situ</i> Orounu and	u ourrace wate	

Mozambique does not currently have water quality guidelines for receiving waters, i.e. target ambient water quality guidelines, such as those published by the Department of Water Affairs in South Africa. Mozambican legislation does, however, require that "parameters defining water quality for the public domain shall be standardised based on their category, taking into consideration the ultimate objective of their usage. The Australian and New Zealand Guidelines for fresh and marine water quality (ANZECC 2000) should be adopted by Syrah Resources (Table 10-2) until a statistically valid surface water quality baseline has been established. Here two indicative values are recommended for use; Long-term trigger value (LTV) and Short-term trigger value (STV). The LTV is the maximum concentration (mg/L) of a contaminant in the irrigation water which can be tolerated assuming 100 years of irrigation. The STV is the maximum concentration (mg/L) of contaminant in the irrigation water which can be tolerated for a shorter period of time (20 years) assuming the same maximum annual irrigation loading to soil as LTV.

10.3.3 Point Source Discharge

Any process effluent (including pit decant water or drainage from WRD or TSF) and storm water runoff from the site will comply with the limits specified in Table 10-3) In cases where it is likely that storm water may have been contaminated by chemicals directly associated with the mining project operations, the monitoring parameters will be extended to include such chemicals and this monitoring parameters detailed in Table 10-3 should be updated accordingly.

Where the quality of sanitary effluent can be monitored directly, it must conform to the most stringent discharge limits for sanitary effluent as specified in national legislation (Decree No. 18/2004 as amended by the Decree No. 67/2010) and the IFC EHS Safety General Guidelines (2007) (Table 10-4).

Parameter	Unit	ANZECC		
		STV	LTV	
Aluminium	mg/l	5	20	
Arsenic	mg/l	0.1	2	
Beryllium	mg/l	0.1	0.5	
Boron	mg/l	0.5	0.5 to 15	
Cadmium	mg/l	0.01	0.05	
Chromium VI	mg/l	0.1	1	
Cobalt	mg/l	0.05	0.1	
Copper	mg/l	0.2	5	
Fluoride	mg/l	1	2	
Iron	mg/l	0.2	10	
Lead	mg/l	2	5	
Lithium	mg/l	2.5	2.5	
Manganese	mg/l	0.2	10	
Mercury	mg/l	0.002	0.002	
Molybdenum	mg/l	0.01	0.05	
Nickel	mg/l	0.2	2	
Nitrogen	mg/l	5	25	
Phosphorus	mg/l	0.05	0.8	
Selenium	mg/l	0.02	0.05	
Uranium	mg/l	0.01	0.1	
Vanadium	mg/l	0.1	0.5	
рН		6	9	
Zinc	mg/l	2	5	

Table 10-2: Proposed Parameters for Surface Water Monitoring

ANZECC; Australian and New Zealand Guidelines for fresh and marine water quality

LTV; Long-term trigger value

STV; Short-term trigger value

Table 10-3: Discharge water quality guidelines applicable to the Syrah Balama Graphite Project

Pollutant/Measure	Units	MICOA	IFC
Aluminium	mg/l	1.5	-
Ammonia	mg/l	0.4	-
Arsenic	mg/l	0.05	0.1
Berelium	mg/l	1.5	-
BOD	mg/l	<5	50
Boron	mg/l	5	-
Cadmium	mg/l	0.005	0.05
Chromium (VI)	mg/l	0.05	0.1
COD	mg/l	-	150
Copper	mg/l	0.05	0.3
Cyanide	mg/l	0.005	1
Cyanide Free	mg/l	-	0.1
Cyanide WAD	mg/l	-	0.5
dissolved oxygen	mg/l	<=6	-
floating material	mg/l	absent	-
Fluorides	mg/l	1.4	-
Iron (total)	mg/l	0.3	2
Lead	mg/l	0.01	0.2
Manganese	mg/l	0.1	-
Mercury	mg/l	0.0001	0.002
Nickel	mg/l	0.1	0.5
Nitrate	mg/l	10	-
Nitrite	mg/l	1	-
Oil and Greese	mg/l	absent	10
рН	S.U.	6.5-8.5	6.5 to 9
Phenols	mg/l	0.001	0.5
Residual chlorine	mg/l	0.01	-
Selenium	mg/l	0.01	-
Silver	mg/l	0.005	-
Substances that react with methylene blue	mg/l	0.5	-
Sulphite like hydrogen disulphide	mg/l	0.002	-
Temperature	°C	-	<3°*
Tin	mg/l	2	-
Total Suspended Solids	mg/l	-	50
Uranium	mg/l	0.5	-
Zinc	mg/l	0.01	0.5

* Temperature at point of entry **Note**: The blue highlighted cells indicate the most stringent requirements that will be adopted

Table 10-4: Sanitary Effluent Discharge Standards

Pollutant/Measure	Units	MICOA	IFC Gen. EHS
Colour	Present / Absent	1:20 dilution ^β	-
Smell	Present / Absent	1:20 dilution ^β	-
Total Suspended Solids	mg/l	60	50
pH	S.U.	6-9	6-9
COD	mg/l	150	125
BOD	mg/l	-	30
Oil and Grease	mg/l	-	10
Total Nitrogen	mg/l	15	10
Total Phosphorus	mg/l	10	2
Total Coliform bacteria	MPN/100ml		400 <i>a</i>
Temperature increase	O°C	35° ^z	-

Note: The blue highlighted cells indicate the most stringent requirements that will be adopted

MPN = Most Probable Number

a: Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation

z: Increase at the receiving medium

β: No perceived colour/smell at 1:20 dilution

10.3.4 Potable Water Quality

All potable water on site will meet the most stringent of the Mozambique standard according to the Regulation on the Quality of Water for Human Consumption (Ministerial Diploma of 18/2004) and the WHO (2011) drinking water standards (Table 10-5).

Table 10-5: Drinking water quality guidelines applicable to the Syrah Balama Graphite Project

Pollutant/Measure	Units	MICOA	WHO
Arsenic	mg/l	0.01	0.01
Barium	mg/l	0.7	0.7
Boron	mg/l	-	0.5
Bromin	mg/l	0.3	-
Chromium	mg/l	0.05	0.05
Calcium	mg/l	50	-
Fluoride	mg/l	1.5	1.5
Manganese	mg/l	0.1	0.4
Magnesium	mg/l	50	-
Molybdenum	mg/l	0.07	0.07
Selenium	mg/l	0.1	0.01
Uranium	mg/l	-	0.015
Sodium	mg/l	200	-
Nitrate (NO ₃) as N	mg/l	50	-
Nitrite (NO ₂)	mg/l	3	-
Ammonium (NH ₄)	mg/l	1.5	-
Phosphorous (P)	mg/l	0.1	-
Sulphate	mg/l	250	-
Total Suspended Solids	mg/l	1000	-
Soluble Organic Carbon	mg/l	2.5	-

Pollutant/Measure	Units	MICOA	WHO
Cadium	mg/l	0.003	0.003
Cyanide	mg/l	0.07	0.07
Mercury	mg/l	0.001	0.006
Alluminum	mg/l	0.2	-
Iron	mg/l	1.5	-
Zinc	mg/l	3	
Chloride	mg/l	250	5
Chlorine	mg/l	0.5	-
Chlorite	µg/l	-	700
Antimony	μg/l	20	20
Copper	mg/l	1	2
Lead	μg/l	10	10
Nickel	μg/l	20	70
Coliform organisms (Total Coliform and E. Coli)	MPN/100ml	0	-
Turbidity	NTU	5	-
Hardness	mg CaCO₃/I	500	-
Conductivity	mS/cm	20	-
рН		6.5 to 8.5	-
Dissolved salts	mg/l	1000	-

Note: The blue highlighted cells indicate the most stringent requirements that will be adopted

10.3.5 Groundwater Monitoring

Groundwater is a slow-moving medium and drastic changes in the groundwater composition are not normally encountered within days. Due to the proximity of water supply boreholes and streams to the proposed mine, monitoring will be conducted quarterly. Samples will be collected by an independent groundwater consultant, using best practice guidelines and will be analysed by an accredited laboratory.

Groundwater level monitoring points, including village wells, will be identified and included in the water quantity monitoring regime. Level monitoring data will be collected using an electrical contact tape or pressure transducer, to detect any changes or trends in groundwater flow direction. Up to two years post closure samples will be collected and based on the results the monitoring timeframe can be adjusted accordingly and monitoring will continue until a sustainable situation is reached.

10.3.6 Sampling Locations

The location of all surface and ground water quality sampling points, including fish and aquatic invertebrate, is provided in Table 10-6 and Figures 10-2 and 10-3. Control sampling points upstream of the project site are included in the monitoring programme. Sites for monitoring of point source discharge points including storm water run-off and sanitary effluent have not yet been identified but will be identified by Syrah Resources as part of its planning activities. This monitoring plan will then be updated accordingly.

It is important to note that despite the baseline data collection being conducted over the period of one year, the data obtained will nevertheless provide only a 'snap shot' of the water quality situation in the project area. Other variables, such as climate change, droughts and floods will also affect longer term variability in water quality parameters. In order to enable some interpretation of these longer term drivers, an offsite "control" monitoring site will be included in the monitoring plan. This area will not be

affected by project activities and therefore changes measured here over time will provide some insight into longer term trends in water quality unrelated to project activities.

Site	Site Name	e (River)	Co-ord	linates	Sampling focus		
Number		(Latitude	Longitude	j ·		
			Surface W	ater			
S01	Chipembe Dam (Montepuez Riv	n ver)	-13.2023	38.6221	Fish, Invertebrates, Water quality		
S02	Chipembe Dan	n (Spillway)	-13.2023	-13.2023 38.6229 Water quality only			
S03	Mehucua River	(upstream)	-13.3183	38.7095	Fish, Invertebrates, Water quality		
S04	Mehucua River (downstream)		-13.2023	38.8482	Fish only		
S05	Mualipue River		-13.3377	38.6309	Fish only		
S06	Namiticu River	(confluence)	-13.3445	38.6769	Fish, Invertebrates, Water quality		
S07	Namiticu River		-13.4080	38.5869	Fish, Invertebrates, Water quality		
S08	Naconha River		-13.4331	38.6114	Fish, Invertebrates, Water quality		
		Proposed ç	ground water m	onitoring borel	noles		
	X	Y					
BGW1a &	b 464022	8529428	South eastern	corner of TSF			
BGW2a &	b 463411	8529189	South western	corner of TSF			
BGW3a &	b 462889	8529856	West of TSF				
BGW4a &	b 462455	8530844	North western	corner of TSF			
BGW5a &	b 463116	8531177	North eastern o	corner of TSF			
BGW6a &	b 463682	8530309	East of TSF				
BGW7a &	b 462431	8527315	North central o	f waste stock pil	e		
BGW8a &	b 462393	8526730	South west bet	ween waste sto	ck pile and pit		
BGW9	462512	8525366	Plume migration closure	on in the fracture	d aquifer toward Maulia Town after		
BGW10	464451	8526382	Cone of dewat aquifer at the r	ering in the weat lose L-shaped z	thered and fractured one of influence		
BGW11	461924	8523897	Groundwater aquifer towards	quality and cor s Namitucu Rive	e of dewatering in the fractured r		
BGW12	459418	8524831	Groundwater quality and cone of dewatering in the fractured aquifer across Mualipue River in Malipue Town				
BGW13	458930	8527358	Groundwater quality and cone of dewatering in the fractured aquifer across Mualipue River in north west of Malipue Town				
BGW14	460799	8527826	Groundwater quality and cone of dewatering in the weathered and fractured aquifer north of Balama west pits towards Ntete Town				
BGW15	465322	8529354	Groundwater towards Nguid	quality and cor e Town	e of dewatering in the fractured		
BBH1	462268	8526326	Groundwater q	uality and dewa	tering cone at Balama West pit		
BBH2	461651	8525777	Groundwater o West pit	quality and dew	atering cone at south of Balama		

Table 10-	6: Surface and	ground wat	ter sampling	points
			1	

Environmental and Social Management Plan and Monitoring Programme – September, 2014

BBH3	460636	8525609	Change in groundwater quality and water levels from baseline at Mualipue Town
BBH6	463380	8524767	Change in groundwater quality and water levels from baseline at Maulia Town



Figure 10-2: Map showing the location of surface water monitoring including, fish and invertebrate sampling points (See Table 10-6 for names and coordinates of sampling points)



Figure 10-3: Map showing the location of ground water monitoring points (See Table 10-6 for names and coordinates of sampling points)

10.3.7 Monitoring Frequency

The frequency of monitoring for surface and groundwater, including the bio-monitoring of invertebrates, is summarized in Table 10-7.

Aspects	Requirement	Frequency		
Potable water quality	 Listed parameters in Table 10-5 All parameters are to be analyzed to determine the baseline. Based on the presence or absence of contaminants and project activities contaminants can be justified for removal and will require no further monitoring. 	 Twice a month initially for one year (baseline) and then once every quarter. Monitor full suite of parameters once in a three year cycle. 		
	Listed parameters in Tables 10-1 and 10-2	Twice a month during the construction and operational phases		
	Listed parameters in Table 10-1	Twice a month for the first year (baseline) and then once every quarter.		
Surface water quality	Listed parameters in Tables 10-2	Twice a month during the construction and operational phases		
	Listed parameters in Table 10-5	Twice a month during the construction and operational phases.		
Croundwater quality	Listed parameters in Table 10-1	Twice a month initially for the first year (baseline) and then once every quarter.		
Groundwater quality	Listed parameters in Table 10-5	Twice a month during the construction and operational phases.		
Water level	Groundwater level monitoring points including village wells	Every two weeks in Year 1 for baseline flow determination and once quarterly during construction and operational phases.		
Sanitary effluent	Listed parameters in Table 10-4	Twice a month during the construction and operational phases for internal monitoring and once every quarter by a certified laboratory.		
Invertebrate sampling SASS5 Score and Shannon and analysis Weiner Diversity Index		Once a year for the life of the project		

Table 10-7: Water, Sediment and Invertebrate Monitoring Frequency

10.3.8 Quality Control Measures

Surface and Ground Water:

The following quality control measures will be applied:

- 1) Water sampling will always be done upstream of any water disturbance and positioned with the mouth facing upstream of water flow.
- 2) No overflow of water from the sample bottles will be allowed since some bottles are treated. No rinsing will be done when collecting water samples.
- 3) The right sample bottles will be used for each category of parameters namely chemical, physical and bacteriological. Shipment of samples will be done within 48 hours to the laboratory for analysis.
- 4) All the samples will be transported in cooler boxes to avoid significant change in temperature.
- 5) Samples will always be accompanied with shipping documents indicating the code for the sample as labeled on the bottle.

10.3.9 Contingency

If metal concentrations at village water sources approach or exceed drinking water quality criteria and are higher than typical background concentrations, Syrah Resources will undertake investigations to determine whether project activities are the cause. If so, the company will undertake all steps practicable to ensure that compliance with drinking water guidelines or background concentrations is maintained. If required, alternative water supplies will be provided.

If water levels are reduced due to project related activities, similar corrective measures as for water quality will be implemented. In this case, measures to ensure that communities have continued access to water will be put in place.

If exceedance of drinking water guidelines or background concentrations at village water sources provided by Syrah Resources is not attributable to project activities, Syrah Resources will endeavour to determine the cause of the exceedance and assist the community with the management of water quality issues for example by informing the community of contamination pathways and measures that may be implemented to prevent contamination or by informing relevant government institutions.

10.4 Meteorology

It will be necessary to collect meteorological data to facilitate the analysis of water, erosion and ambient air quality monitoring data.

10.4.1 Objectives

The objectives of the meteorological monitoring are to compile a record of on-site climatic data to assist in the environmental management of the Project, in particular, the design and sizing of water management structures, to improve the accuracy of hydrological models and to aid in the interpretation of ambient air quality monitoring data.

10.4.2 Parameters, Frequency and Sampling location

An on-site Automated Weather Station will be commissioned at the mine premises that measures hourly values for the following parameters: wind speed and direction, ambient temperature, relative humidity, barometric pressure, solar radiation, and precipitation. This will allow for data to be collected continuously and will be downloaded and stored securely at regular intervals (at least monthly). Such a meteorological station would require calibration annually.

10.4.3 Quality Control Measures

The quality control of data obtained from the automated weather station will be managed according to the Guidelines on Quality Control Procedures for Data from Automated Weather Stations (2004).

10.5 Air Quality Monitoring

Air Quality Performance indicators are usually selected to reflect both the source of the emission directly and the impact on the receiving environment. Ensuring that no visible evidence of windblown dust exists represents an example of a source-based indicator, whereas maintaining off-site dustfall levels to below 600 mg/m²/day represents an impact- or receptor-based performance indicator. Source-based performance indicators have been included in most international regulations.

- Dust fallout in the immediate vicinity of the haul road perimeter to be less than 1200 mg/m²/day and less than 600 mg/m²/day at the sensitive receptor areas.
- From all activities associated with the proposed activities, dust fallout rates will not exceed 600 mg/m²/day outside the project area for on-site activities or at the sensitive receptor areas for on-site and off-site activities.

Depositional dust that may be generated from active construction and operational areas (e.g. access roads and construction sites) will be monitored within the project area, at nearby villages and at suitable control sites and compared against the American Society for Testing and Materials (ASTM) D1739:1970 (Table 10-8). Duplicate samples and blank samples will be sent for analysis. The monitoring frequency will be monthly using fall out dust buckets.

Table 10-8: Acceptable dust fall rates as measured (using ASTM D1739:1970 or equivalent) at and beyond the boundary of premises where dust originates

Areas	Site ID	Dust fall rate (mg/m²/day, 30- days average)	Frequency and Permitted Frequency of exceeding dust fall rate
Residential Area	Camp, Phirira, Nduide, Ntete, Maputo and Plant	D < 600	Monthly Two within a year, not sequential months
Non-Residential Area	Plant	600 < D < 1200	Monthly Two within a year, not sequential months

NOTE: Please note that the village of Maputo (4km from site) should not be confused with the city of Maputo, the capital of Mozambique (2700km from site)

There was no real-time measurement or passive monitoring of gaseous pollutant levels in the proposed Balama mining area. Background levels of gaseous pollutants, such as SO_2 , Ozone, NO_X , NO_2 , Benzene, and CO are always critical to determine if the environment is already under stress. The ambient air quality parameters that are to be measured and their applicable guidelines are shown in Table 10-9.

Ambient PM_{10} and dust fall monitoring will be conducted on a continuous basis as part of mine's management plan. Dust fallout and ambient PM_{10} monitoring can serve to meet various objectives, such as:

- Compliance monitoring;
- Validate dispersion model results;
- Use as input for health risk assessment;
- Assist in source apportionment;
- Temporal trend analysis;
- Spatial trend analysis;
- Source quantification; and,
- Tracking progress made by control measures.

Table 10-9: Applicable Air Quality Guidelines

Pollutant/Measure	Averaging Period	Units	MICOA	WHO			
	Ambient Air						
	1 Year	µg/m³	-	30			
Particulate matter (PM ₁₀)	24-hours	µg/m³	-	75			
Destinuinte metter (DM)	1 Year	µg/m³	-	15			
Particulate matter (PM _{2.5})	24-hours	µg/m³	200	37.5			
	1 Year	µg/m³	100	40			
Nitrogen dioxides (NO ₂)	24-hours	µg/m³	200				
	1-hour	µg/m³	400	200			
	1 Year	µg/m³	80	-			
Sulphur dioxide (SQ.)	24-hours	µg/m³	365	50			
	1-hour	µg/m³	800				
	10minutes	µg/m³	-	500			
	1 Year	µg/m³	70	-			
	24-hours	µg/m³	50	-			
Ozone (O_3)	8-hours	µg/m³	-	160			
	1-hour	µg/m³	160	-			
	Air Emission						
Sulphur dioxide (SO ₂)	24-hours	mg/Nm ³	365	2000			
Lead (Pb)	1 Year	mg/Nm ³	0.5 – 1.5	-			
Nitrogen Dioxides (NO ₂)	1-hour	mg/Nm ³	400	600			
Ozone (O ₃)	24-hours	mg/Nm ³	160	-			
Particulate Matter	24-hours	mg/Nm ³	200	100			
Sulphur Dioxide (SO2)	24-hours	mg/Nm ³	365	2000			
Carbon Monoxide (CO)	1-hour	mg/Nm ³	4000	-			

10.5.1 Dust Monitoring

Management of the proposed Balama graphite mine will maintain the existing dust monitoring programme during the project life in order to collate continuous dust deposition data and have a repository of records covering the construction, operation and closure phase of the proposed operation. Availability of such records will assist management in managing dust impact, resulting in the reduction of respiratory diseases that are as a result of air pollution, reduced risk of damage to property, improved visibility, fewer disturbances to existing flora and fauna habitats, and a reduction in air pollution.

Prior to the commencement of mining activities, dust deposition data are being generated at six various locations, covering upwind and downwind locations around the Balama mine concession area. The air quality impact assessment has highlighted the main sources of dust, and the dust monitors have been correctly positioned – as predominant winds during the dry season comes from

the south and south southeast and northeast during the dry season. Residents in the northern section and south western section downwind side of the main sources of dust (TSF and ore removal) will be more vulnerable to air pollution.

As the amount of soil exposed is directly proportional to the amount of dust generated and the amount of dust transported, construction during the windy periods of August, September and October may be limited. If construction has to be done during this period, only a small area will be disturbed at a time. As haul roads are a major source of dust, reducing speed of trucks to 50km/h in haul roads will reduce dust immensely.

In order to determine the windy periods, a wind anemometer will be installed on site. Wind speed will be recorded daily and when speeds it exceeds 5.4 m/s (this is the threshold for transporting particles) extra dust control measures will be carried out. During dust generating periods, sprinkling of the area until it is moist is ideal for haul roads and traffic routes (Smolen et al., 1988). It must be noted however that excessive sprinkling to manage dust may result in runoff from the site.

Mulching of recently disturbed areas can reduce the amount of wind erosion by 80% (Smolen et al., 1988). Other methods of reducing in dust erosion include using wind break which can be natural or constructed. On disturbed areas which are not expected to handle traffic vegetative cover can be planted.

10.5.2 PM₁₀ Monitoring Programme

The project will establish a fine particulate monitoring programme, which will include one particulate instrument to monitor PM_{10} and $PM_{2.5}$ from the open pits and the material handling area. At least, two instruments will be purchased and located in the mine area and at a sensitive receptor downwind. Air dispersion modelling will always use site specific data as this data is extremely useful when analysing ambient concentrations of pollutants. I

10.5.3 Gaseous Monitoring Programme

Monitoring gas-phase pollutants is essential to understand background levels of pollutants prior to the commencement of polluting activities, exposure patterns and to establish a link between polluting source(s) and health. Often, measurement of the ambient concentrations found outdoor usually requires large, expensive instruments. Hence, ambient monitoring at selected sites around the proposed Balama mining area will employ passive diffusion tubes, to determine concentrations of criteria pollutants in the environment.

10.5.4 Sampling Locations

The locations of all air quality sampling points at the sensitive receptors are provided in Table 10-10 and their relative location in the project area is shown in Figures 10-4 below.

	Location	Site ID	Latitude	Longitude
≥	Ntete	A1	-13.2783	38.6348
ualii	Malipuli	A2	-13.3376	38.6334
Ď	Mualia	A3	-13.3418	38.6702
Ā	Nquide	A4	-13.2862	38.6895
	Existing	A5	-13.3011	38.6498

Table 10-10: Air Quality Sampling Points at Sensitive Receptors



Figure 10-4: Air Quality Monitoring Locations (See Table 10-10 for names and coordinates of sampling points)

10.6 Noise and Vibrations Monitoring

Noise will be monitored monthly at the villages closest to the mining activities these include Ntete, Nquide, Maputo and Piriri. Noice monitoring results will be compared with ambient international thresholds while occupational noise exposure within the mining facility will be compared to the guideline limits shown in Table 10-11.

Table 10-	11· Δmbient and	Occupational Noise	l evel Guidelines	(IFC 2007)
				$(11 \odot 2007)$

ent ee	Applicability	Day time (07:00 – 22:00)	Night time (22:00 – 07:00)	
oidr		One hour LA _{eq} (dBA)		
AmA	Beyond boundary of the facility	55	45	
I	Applicability	Equivalent Level	Maximum	
ona	Applicability	8 hour LA _{eq} , 8h (dBA)	LA _{max} , fast	
upatic Voise	Operational areas	85	110	
Occi	Control rooms and offices	50	-	

Ground-borne vibration that may be generated from active construction areas and mining related activities will be monitored within the project area, at nearby villages and at suitable control sites. Monitoring results will be compared to international accepted safe PPV thresholds based on infrastructural types. The monitoring frequency shall be monthly and/or event based.

A monitoring plan will be implemented to determine potential sources of noise, any increases and decreases in noise levels, and determine the level of mitigation required. Components to be included in the proposed monitoring plan are discussed in Table 10-12 below.

Table 10-12: Ambient and Occupational Noise Monitoring

Method	Monitoring locations	Frequency	Target	Reporting
Monitoring in accordance with the IFC EHS guidelines; Noise measurement will be taken for a 24 hour period at each location	The noise measurements will be taken at the measurement locations N1 – N4) as per the baseline study	To be conducted on a quarterly basis throughout the life of mine; Once it is established that the mitigation measures have decreased the specific noise levels from the mining activities, the noise monitoring will be carried out on a bi-annual basis thereafter.	Noise levels from the proposed mining activities should not result in a maximum increase in the existing background/ambient levels of 3dBA at the surrounding villages.	A report will be compiled quarterly/ bi- annual, depending on the intervals of the monitoring programme then submitted to management to ascertain compliance with the required standards

10.6.1 Sampling Locations

The locations of noise sampling points at the sensitive receptor are provided in Table 10-13 and their relative location in the project area is shown in Figures 10-5 below.

	Location	Site ID	Latitude	Longitude
Ð	Ntete	N1	-13.2812	38.6378
loise	Nquide	N2	-13.28.48	38.6897
Z	Maputo	N3	-13.3464	38.6656
	Piriri	N4	-13.3379	38.6367



Figure 10-5: Noise Monitoring Locations

(See Table 10-13 for names and coordinates of sampling points)

Coastal & Environmental Services

10.7 Biodiversity and Ecological Monitoring

Biodiversity monitoring involves the observation of long-term ecological processes in order to identify changes or trends in response to particular activities. In order to achieve this, appropriate indicators for monitoring and management intervention need to be developed.

10.7.1 Objective

The objectives of the biodiversity monitoring plan are to ensure that:

- To identify any changes to the fauna, flora and habitat surrounding the Project area and assess whether such changes are a result of project activities. For example, land clearing activities.
- Where feasible on-going research on fauna and flora in the area, which would improve the biological knowledge base, will be encouraged and facilitated;
- Monitoring is conducted annually and adaptive management is implemented.
- Areas of high sensitivity are monitored and audited at regular intervals as prescribed in the monitoring plan;
- Natural Resource utilisation by communities is monitored in terms of frequency and species harvested for particular purposes.
- To assess the efficacy of environmental actions undertaken to mitigate impacts of project actions.

10.7.2 Sampling Methodology and Assessment Criteria

Indicators need to be cost-effective, measurable and reveal meaningful trends. They should point directly to the state of biodiversity of the project area and take into account natural variation due to climate, weather etc. Importantly, the indicators will be consistent and selected to address the specific challenges/threats of a particular project.

The indicators selected for the biodiversity monitoring will incorporate four different levels, namely:

- 1. Regional/landscape
- 2. Community/ecosystem
- 3. Species/population

These are further elaborated in Table 10-14 below.

Level	Category	Indicators	Description
Regional/ landscape	Habitat area	Change in total area of particular habitat	Riparian Forest and Thicket in project area will need to be monitored: include changes due to rehabilitation efforts and mapped separately.
	Conservation	Change in area allocated to	
	status	conservation within project area	
Community/ Ecosystem level	Habitat distribution	Change in vegetation along watercourses	
	Vegetation structure	Change in crown cover	Riparian Forest and Thicket
	Keystone or indicator species	Change in number and/or distribution of indicator species	E.g. faunal groups eg insects or herps.
	Invasive species	Change in presence, location, area, numbers of invasive plant or animal species	The presence of alien species is an indication of disturbance. The project area has a number of alien species which need to be monitored.

Table 10-14: Selected Indicator / Variables to be measured

Level	Category	Indicators	Description
Species/	Abundance	Changes in abundance of key	Amphibians, Reptiles, Rodents,
Population level		animal species	Larger mammals (antelope).

Sampling will incorporate the collection of qualitative and quantitative data which is described in further detail below (Table 10-15).

Ideally, a Biodiversity Management Plan should be developed, with a comprehensive survey including all seasons over 2 years. This will provide an understanding of the full potential of species diversity within the study site (areas not utilised by the project) that could not be obtained from one sampling period as was done in the Ecological Baseline Assessment. The data gathered should include total biodiversity and abundance measurements. This will allow for the development and perfecting of the Biodiversity Monitoring Plan within the first few years.

Once a two year baseline has been established and selected indicator species have been identified and tested (found to be reliable indicators), sampling will move towards monitoring surveys of the indicator species.

Table 10-15: Indicators at each level (World Bank, 1998)

Class	Indicator	Data Set	Method	Comments
Regional/Landsca	ape Level			
Habitat Area	Change in total area of a particular habitat type Change in area of largest block of a particular habitat type Change in average size of a particular habitat type	Remote sensing data (vegetation maps may already exist for baseline assessment)	Manual methods using GIS mapping	Shows whether habitat is being gained or lost over the monitoring area Ideally monitoring area should extend outside the immediate project area. Comparison between the project/no-project areas would be useful
Conservation Status	Change in the number or total extent of the area allocated to conservation in the project area	Spatial Plans		Shows changes in conservation status (and therefore likelihood of protection) of land/habitat
Community/Ecos	ystem Level			
Vegetation Structure	Change in crown cover percent.	Canopy cover in % at upper canopy level (Whether tree, shrub, grass etc)	Standard canopy cover methods, possibly done seasonally, or at least annually in the same season	Significant habitat disturbance is generally indicated by changes in canopy cover and dominant species. However, records need to be long term to take into account short-term fluctuations due to factors such as weather patterns. Not likely to provide early warning of changes which are not revealed by other, possibly, easier methods
Habitat Distribution	Change in location of habitat boundaries Change in vegetation along watercourses	Location of boundary in defined quadrats or transects Area of riparian vegetation type, boundary of riparian	Long-term (possibly every 2-5 years) survey of sites, and/or fixed point photography Remote sensing or	Can show expansion or retreat of crucial habitats. Changes may take many years to establish and generally background effects need to be removed. Changes in riparian vegetation can have significant effects on aquatic biodiversity
		vegetation etc	transect/quadrat survey	through direct (change in water temp. and light availability) and indirect (increased run-off, siltation etc) impacts.

Keystone or Indicator Species	Change in number and/or distribution of keystone or indicator species	Transect or wide area survey results	Survey of transects or sites. The frequency depends on the species being measured.	Can suggest changes in ecological processes, particularly to provide early warning of possible changes. Examples include species important in seed distribution (certain birds, rats etc), bat species favouring different vegetation structure.
	Change in limiting factors for key species e.g. nest holes for parrots, fruit bat roosting trees	Count numbers look for or presence/absence of factors. Depends on factor involved.	l ransects, quadrats, general observations	Can provide early warning of impacts on species before changes in numbers become obvious.
Invasive Species	Change in presence, location, area, numbers of invasive plant or animal species.	Survey, transect or quadrat results, patrol reports, reports from community members.	Transects, quadrats or interviews	The significance of invasive species for the biodiversity values which are of concern needs to be known. In many cases plant invasions are and indicator of plant disturbance.
Indicator Events	Changes in the frequency of events such as landslips.	Patrol reports, aerial surveys, remote sensing	Incorporate into patrol reporting. Carry out specific surveys for identified events.	Events should be of a type which is related to biodiversity health at the community/ecosystem level.
Species/Population	on Level			
Abundance	Change in abundance of key species	Encounter rate (e.g. sight, sound, sign) along transects. Number of individuals at concentration points such as colonies or roosts.	Monitor transects at regular intervals. Regular counts at concentration points.	Indicates possible changes in population size and/or shift in range (interpretation should be subject to knowledge of demography and comparison with other indicators). Needs to be standardized (e.g. by distance/time/habitat type). More rigorous methods must be used occasionally to calibrate encounter rate against total population.
Range occupied	Changes in range of designated species (either total range or range within monitoring area)	Combination of sighting data and transect sign data.	Transects and sightings done at regular, consistent intervals.	Indicates expansion or reduction of species range. Could be associated with population changes, loss of habitat or disruption of migratory pathways.
Hunting/harvest changes	Change in total amount of plant or animal	Amount of resource harvested in a defined area	Record keeping by the	Trends in amount harvested should give early warning of over-harvesting, especially when
	species harvested in a defined site e.g. Project Area	as recorded by the local community	community or sub-group	combined with the indicator.
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Socio-Economic I	ndicators			
Human Population Dynamics	Change in total human population inside and around (within 20km) of the project area Change in demographic factors (age structure, settlement patterns, education levels, etc) of relevant human population in or around the project area	National or local statistical data or survey returns Data from baseline and repeated socio-economic surveys	Formal census data obtained from relevant agency Surveys, possibly involving sampling. Monitor every 2- 5 years	Rapid growth likely to indicate negative impacts on biodiversity. Indicates possible changes in level and nature of pressure on biodiversity values. Relationships are neither constant nor well understood. For example, increased education may correlate with reduced interest in a subsistence lifestyle; or increasing time available for recreation may lead to recreational hunting. May be more useful for assisting in interpretation of other indicators than as an indicator of biodiversity health itself. Careful analysis is required.
Socio-Economic situation	Change in proportion of income derived from biodiversity resources Change in proportion of income derived from alternative livelihood activities	Survey returns	Participatory techniques (RRA, PRA etc) and other socio- economic survey techniques, possibly every two or three years.	While reliable income data is notoriously difficult to gather, data on proportional importance of different sources, without requiring specific figures, is easier to collect. Requires training of survey personnel, and the relatively low frequency of survey may mean that it is more effective to use outside, specialist teams.
Resource Utilization	Change in resource consumption for household verse marketing Change in rate of consumption of biodiversity resources by different groups (e.g. local communities vs. outside interests)	Survey returns, management records, market surveys	Participatory techniques (RRA, PRA etc) and other socio- economic survey techniques, possibly every two or three years.	Relatively standard survey techniques exist for this. May show which groups are increasing or reducing their resource use, suggesting whether project initiatives have been successful Provides a check that reduction in resource

	Change in number of percent of people harvesting biodiversity resources. Change in levels of exploitation toward or away from sustainable use			use by the target group is not part of an overall reduction unrelated to project initiatives. May have a direct bearing on biodiversity health. Lower numbers, combined with other socio-economic data, may give a clear indication of likely future trends in involvement in biodiversity-impacting activities.
Alternative livelihood Uptake	Change in the number or percent of people engaging in alternative livelihood activities	Survey returns, management records, market surveys	Participatory techniques (RRA, PRA etc) and other socio- economic survey techniques, possibly every two or three years.	Participation data may be realtively easy to gather because of the need to register for assistance, loans, supplies etc. May have a direct bearing on biodiversity health if this group has also given up biodiversity-impacting livelihood activities, though this should not be taken for granted.

10.8 Waste Disposal Facilities and Practices

Various types of waste will be generated during the construction and operational phase. Major waste streams will be domestic waste, hazardous waste and construction waste. Management practices and disposal facilities will require monitoring to ensure compliance with best waste management practices.

10.8.1 Objectives

The objectives of monitoring waste disposal facilities are:

- To minimize the impact of wastes on human and environmental health.
- To ensure compliance with the Mozambique waste management legislation.
- To comply with the EIA waste management commitments.

10.8.2 Parameters and Frequency

Parameters will include the physical state of waste storage facilities, volumes of waste generated, waste separation, presence of disease vectors, compliance with licence conditions and state of housekeeping.

Monitoring of waste management facilities will be conducted monthly.

10.8.3 Sampling Locations

Waste management will be monitored across the site as a whole.

10.8.4 Quality Control Measures

The waste management team will undergo basic training in waste management and records of their training will be maintained. Waste disposal log-books will be maintained and monthly averages used to identify areas where waste could not have been collected accordingly. Periodic waste discussions focused on lessons learnt will be held with the waste management team to identify areas of improvement. Periodic inspections and observations will be done to monitor waste management practices and behavior and all the waste management records will be maintained in record books for inspections. Best management practices will also be attained through adherence to waste management permit conditions and general recommendations in the Regulations.

10.8.5 Contingency

Syrah Resources will ensure that non-compliances are attended to and where a storage facility cannot conform to the best practices perhaps due to location or other reasons, use of such facilities for waste management will be suspended until corrective measures are put in place.

10.9 Occupational Health and Safety Monitoring

Occupational health and safety monitoring programmes will verify the effectiveness of prevention and control strategies. The selected KPIs are to be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies. The occupational health and safety monitoring programme will be designed and implemented by accredited professionals and will include plans for mitigating post-closure long term health concerns. Facilities will also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents.

As a minimum, the occupational health and safety monitoring programme will include:

- **Safety Inspection, Testing and Calibration:** This will include regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used. The inspection will verify that issued PPE continues to provide adequate protection and is being worn as required. All instruments installed or used for monitoring and recording of working environment parameters will be regularly tested and calibrated, and the respective records maintained.
- Surveillance of the Working Environment: Employers will document compliance using an appropriate combination of portable and stationary sampling and monitoring instruments. Monitoring and analyses will be conducted according to internationally recognized methods and standards. Monitoring methodology, locations, frequencies, and parameters will be established individually for each project following a review of the hazards. Generally, monitoring will be performed during commissioning of facilities or equipment and at the end of the defect and liability period, and otherwise repeated according to the monitoring plan.
- **Surveillance of Workers Health:** When extraordinary protective measures are required (for example, against biological agents and/or hazardous compounds), workers will be provided appropriate and relevant health surveillance prior to first exposure, and at regular intervals thereafter. The surveillance will, if deemed necessary, be continued after termination of the employment.
- **Training and Induction:** Training and induction activities for employees and visitors will be adequately monitored and documented (curriculum, duration, and participants). Emergency exercises, including fire drills, will be documented adequately. Service providers and contractors will be contractually required to submit to the employer adequate training and induction documentation before start of their assignment.

10.9.1 Accident and Disease Monitoring

The employer will establish procedures and systems for reporting and recording occupational accidents and dangerous occurrences, and incidents. These systems will enable workers to report immediately to their immediate supervisor any situation they believe presents a serious danger to life or health. The systems and the employer will further enable and encourage workers to report to management all:

- Occupational injuries and near misses
- Suspected cases of occupational disease
- Dangerous occurrences and incidents

All reported occupational accidents, occupational diseases, dangerous occurrences, and incidents together with near misses will be investigated with the assistance of a person knowledgeable/competent in occupational safety. The investigation will:

- Establish what happened
- Determine the cause of what happened
- Identify measures necessary to prevent a recurrence

10.9.2 Radiation Monitoring

Radiation exposure can lead to potential discomfort, injury or serious illness to workers and the larger community. As such, a radiation baseline will be established to identify hotspots and regular monitoring will be conducted. Table 10-16 provides ionizing radiation exposure guidelines for workers and the public.

		Limits			
Exposure	Units	Mine workers* (min 19yr of age)	Apprentices & Students (16 - 18yr of age)	Visitors / Public	
Five consecutive year average – effective dose	mSv/year	20		1	
Single year exposure – effective dose	mSv/year	50	6	1	
Equivalent dose to the lens of the eye	mSv/year	150	50	15	
Equivalent dose to the extremities (hands, feet) or the skin	mSv/year	500	150	50	

Table 10-16: Effective dose limits for occupational and public ionizing radiation exposures

Source: International Atomic Energy Agency, 1999

* The occupational dose limit for women who are not pregnant shall be the same as that of men. Once pregnancy has been declared, the equivalent dose limit to the surface of the woman's abdomen shall be 2mSv for the remainder of the pregnancy.

As a minimum, prevention, control and monitoring strategies will include:

- Places of work involving occupational and/or natural exposure to ionizing radiation will be established and operated in accordance with recognized international safety standards and guidelines as described in Table 10-16.
- Exposure to non-ionizing radiation (including static magnetic fields; sub-radio frequency magnetic fields; static electric fields; radio frequency and microwave radiation; light and near-infrared radiation; and ultraviolet radiation) will be controlled to internationally recommended limits.
- In the case of both ionizing and non-ionizing radiation, the preferred method for controlling exposure is shielding and limiting the radiation source. Personal protective equipment is supplemental only or for emergency use. Personal protective equipment for near-infrared, visible and ultraviolet range radiation can include appropriate sun block creams, with or without appropriate screening clothing.
- If radiation levels for workers are deemed to be higher than background, based on the results of on-going monitoring, then detection and monitoring measures must include the use of equipment such as portable radiation monitors, area radiation monitors and personal dosimeters. This equipment will be serviced regularly and operated by trained personnel. Monitors for internal radiation contamination may also be adopted as measures for internal contamination done on body excretions such as urine, or can be made directly on the body using a whole body counter or thyroid monitor, depending on what is being tested for.

10.10 Socio-Economic Monitoring

Syrah Resources is responsible for implementing all resettlement and compensation strategies developed and defined in the RAP. Syrah Resources will therefore assume responsibility for providing the funding for monitoring of affected persons and project affected people. Such monitoring is required to ensure that resettlement is properly implemented, is in line with the RAP, that grievances are being attended to, and that any necessary changes to the overall process are being done in good time and sensibly. To be compliant with best practice monitoring will need to take place at two levels.

Internal Monitoring will be conducted by a suitably qualified person within the management of Syrah Resources. The form that this monitoring takes is flexible and can be tailored to the personnel and capacity of the management team. Monitoring must have at least three data sources. These would be:

- The Grievance
- Register results and minutes of the local level engagement programme as per the OP Stakeholder Engagement
- Qualitative monitoring database developed as the baseline for the Social Impact Assessment for the project.

External Monitoring will be conducted through a contracted independent body so as to provide external third party verification of social monitoring data gathered by the internal monitoring team.

Monitoring reports are a valuable tool in identifying problems in the implementation of the resettlement project and should be used as such. The monitoring team will revisit the monitoring plans after each monitoring exercise to evaluate findings and take necessary steps to rectify issues that have been highlighted by the monitoring reports. A manual for the usage of the protocols will be developed by the independent monitor.

The external Monitoring Team will visit the project area upon completion of the first phase of resettlement and then two years later. The subsequent frequency can be determined after the first two visits. External monitoring will pay particular attention to the following aspects:

- Ensure that any replacement housing for those who have had to move is of an adequate replacement standard.
- Ensure that households who have lost crops and other forms of livelihood production have received fair compensation and that compensation rates are reviewed regularly.
- Examine the livelihood restitution strategies as determined by the OP Resettlement and measure their progress. Indicators will be developed as part to the OP -Resettlement.

The following indicators will form part of the socio-economic internal and external monitoring framework:

10.10.1 Agriculture

- 1. Food security (including aspects of nutritional/health status by age and gender)
- 2. Commercial agricultural and farming income-generation
- 3. Household incomes (not only money, but surrogate indicators such as suite of assets owned (e.g. radios, bicycles, television, etc)).
- 4. Housing, quality of roof, walls, floor.
- 5. Expenditure patterns
- 6. Indebtedness/savings
- 7. Access/use of services (social and physical infrastructure)
- 8. Project Affected People's views on progress toward restoration/enhancement especially those to be physically relocated
- 9. Waged full/part-time jobs by household (Syrah Resources and non- Syrah Resources created jobs) by development phase (construction/operations)
- 10. Small-scale 'business' startups
- 11. Numbers of shops/trading activities in villages/project area
- 12. Changes in gender livelihood-focused activities and incomes

- 13. Status of Vulnerable PAPs
- 14. Grievances and resolution outcomes
- 15. Livelihood diversity and relative contributions (numbers/incomes from charcoal production, fishing, bee-keeping/honey production, fishing, etc)
- 16. Improvement in production/income for women/youth.

10.10.2 Education

Suggested indicators for monitoring:

- 1. Where applicable, primary and basic enrolment levels by gender.
- 2. School buildings and equipment, including chairs
- 3. Secondary enrolment levels by gender.
- 4. Pupil/teacher ratio.
 - a. Adult education enrolment level by gender
- 5. Distance to primary school.

10.10.3 Health

Suggested indicators for monitoring:

- 1. Availability of and distance to safe drinking water and sanitation.
- 2. Incidence of main diseases/gender/age.
- 3. Death rates of main diseases/gender/age.
- 4. Maternity rates
- 5. Mortality rate of infant/mothers during delivery
- 6. Trained health staff/catchment population.
- 7. Distance to health centre.
- 8. Child nutrition: height for age (stunting), weight for age (wasting).
- 9. If possible, incidence of HIV/AIDS and of other STDs by gender and age.
- 10. All communicable and vector-related diseases

10.10.4 Wider 'social' indicators (not in order of importance)

- 1. Local hiring as per policy
- 2. Grievance and resolution outcomes
- 3. Market prices (bartering items) for key food items
- 4. Relevant information tracking from external parties
- 5. Costs of social/welfare provisions/services (schools and 'equipment' [pencils, notebooks, uniforms]; clinics and medicines, local transport)
- 6. Inflation (food basket)
- 7. Influx/in-migration
- 8. Security/community incidents
- 9. Number of local companies involved in supplying goods and services/value of goods and services provided (Syrah Resources' local purchasing)
- 10. Return of youths to villages
- 11. Village demographic changes (by age/sex)
- 12. Birth rates
- 13. Nationalization progress (expatriates to nationals)
- 14. Intra-household conflicts
- 15. Intra-community (villages) conflicts (elders/youths; political factionalism)

10.10.5 Transport safety monitoring

Transportation monitoring is required within and outside the project property to ensure that spacing, speed limits and other traffic regulations, protection of pedestrians and accident are adhered to. Proposed technologies could include using a satellite tracking/monitoring system.

Syrah Resources Ltd

PARTE IV: RELATÓRIO DO PROCESSO DA PARTICIPAÇÃO <u>P</u>ÚBLICA

PROPOSTA MINA DE GRAFITE DE BALAMA NA PROVÍNCIA DE CABO DELGADO MOÇAMBIQUE

ELABORADO POR	ELABORADO PARA
	Twigg Exploration & Mining Limitada Uma subsidiária da Syrah Resources Limitada
P.O. Box 934 67 African Street Grahamstown, 6140 South Africa	356 Collins Street Melbourne 3000 Australia

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VERSÃO FINAL

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Relatório do Processo de Participação Pública

INDICE

1.	. INTRODUÇÃO	6
2.	. OBJECTIVOS DA CONSULTA PÚBLICA	8
3.	. PROCESSO DE PARTICIPAÇÃO PÚBLICA	10
	3.1 Identificação das Partes Interessadas e Afectadas	10
	3.2 Disseminação de Informação e Envolvimento aas PI&A's	11
	3.3 Realização de Reuniões de Consulta Pública	14
4.	. RESUMO DA CONSULTA PÚBLICA REALIZADA	16
	4.1 Fase De EPDA - Reuniões de Consulta Pública	19
	4.2 Fase De EIA - Reuniões de Consulta Pública	21
5.	. REGISTO DAS QUESTÕES DISCUTIDAS NAS REUNIÕES DE CONSULTA PÚ	JBLICA25

LISTA DE ACRÓNIMOS

AIA	Avaliação do Impacto Ambiental
СР	Consulta Pública
CES	Coastal and Environmental Services
DNAIA	Direcção Nacional de Avaliação do Impacto Ambiental
DPCA	Direcção Provincial para a Coordenação da Acção Ambiental
DPOPH	Direcção Provincial das Obras Públicas e Habitação
DIPREME	Direcção Provincial dos Recursos Minerais e Energia
EIA	Estudo de Impacto Ambiental
EPDA	Estudo de Pré-Viabilidade Ambiental e de Definição do Âmbito
PGAS	Plano de Gestão Ambiental e Social
PI&A's	Partes Interessadas e Afectadas
MQR	Matriz de Questões e Respostas
MICOA	Ministério para a Coordenação da Acção Ambiental
ONG	Organização Não Governamental
PGA	Plano de Gestão Ambiental
PP	Participação Pública
RPPP	Relatório do Processo de Participação Pública
RNT	Resumo Não Técnico
TdR	Termos de Referência

LISTA DE ANEXOS

- ANEXO A Listas de referência de partes interessadas e afectadas do projecto
- ANEXO B Anúncios públicados nos jornais e na rádio
- ANEXO C Modelos de cartas-convite para as reuniões de consulta pública em ambas as fases
- ANEXO D Registos dos participantes das reuniões de consulta pública
- ANEXO E Matrizes de questões e respostas

1. INTRODUÇÃO

A Twigg Mining & Exploration Lda., subsidiária da A Syrah Resources Lda é proponente do Projecto de Grafite de Balama (daqui em diante, designada por "o projecto") pretende explorar um projecto de mineração de grafite no distrito de Balama na Província de Cabo Delgado em Moçambique. O presente relatório descreve o Processo da Participação Pública (PPP) nas fases de EPDA e EIA bem como as consultas relacionadas com o Plano de Acçao para o Reassentamento do projecto realizada como parte do estudo da Avaliação do Impacto Ambiental, Social e na Saúde (ESHIA) realizado para o projecto da Mina de Grafite de Balama.

O local da mina está rodeado por quatro comunidades, nomeadamente Nquide, Ntete, Maputo (também conhecida por Mualia) e Pirira. Juntamente com a Vila de Balama, estas são referidas como as Comunidades Directamente Afectadas pelo Projecto da mina, embora mais comunidades possam se beneficiar do projecto em termos de emprego e desenvolvimento social. A área do projecto é caracterizada na sua maioria, por propriedades rurais agrícolas cultivadas (doravante chamadas de "machambas", como são comumente referidas em Moçambique), com diversas culturas agrícolas e árvores de fruto. Para além de árvores com valor económicas algumas destas machambas possuem estruturas secundárias sobre elas tais como celeiros e alpendres para repouso. Nenhum agricultor vive nas suas machambas uma vez que todos eles vivem nas aldeias. Assim, não haverá reassentamento físico das famílias.

O projecto proposto foi classificado como uma actividade de Categoria A pelo Ministério para a Coordenação da Acção Ambiental (MICOA), exigindo um processo de Avaliação de Impacto Ambiental (AIA) abrangente. A Coastal and Environmental Services, Lda. (CES), foi contratada para realizar o processo de AIA deste Projecto em Março de 2013, em nome do proponente do projecto.

A necessidade de realização de um Processo de Participação Pública (PP) em projectos de Categoria A constitui um requisito legal ao abrigo do Regulamento sobre o Processo de Avaliação de Impacto Ambiental, de Moçambique (Decreto 45/2004 de 29 de Setembro). Além disso, a Consulta Pública (CP) é parte integrante do processo de AIA para projectos classificados como Categoria A conforme estipulado nos regulamentos sobre operações de mineração que apresentam as orientações sobre qualquer AIA necessária para actividades de mineração. No que respeita operações de mineração, o processo de AIA é definido pela Lei de Mineração nº. 14/2002, de 26 de Junho, pelo Decreto-Lei de Mineração - Decreto nº. 28/2003

6

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de 17 de Junho e Legislação Ambiental para Actividades de Mineração -Decreto nº. 26/2004 de 20 de Agosto que, em conjunto, são as regulamentações ambientais para operações de mineração. O processo de PP deste projecto foi realizado em conformidade com as disposições dos referidos decretos e regulamentos e ainda com a Directiva Geral para o processo de Participação Pública no Processo de Avaliação do Impacto Ambiental (Diploma Ministerial 130/2006 de 19 de Julho). O EIA para este projecto é tambem realizado nos termos da Lei Ambiental (Lei n.º 20/97 de 1 de Outubro). Esta Lei aplica-se a qualquer actividade que possa ter um impacto directo ou indirecto sobre o meio ambiente. Além disso, o Projecto será alinhado com as Normas de Desempenho Social e Ambiental e Directrizes da Sociedade Financeira Internacional (IFC).

O Regulamento sobre o Processo de Reassentamento Resultante de Actividades Económicas foi recentemente aprovado pelo Decreto n.º 31/2012, de 8 de Agosto. O mesmo estabelece as regras e os princípios básicos sobre o processo de reassentamento com a finalidade de providenciar oportunidades para melhorar a qualidade de vida dos agregados familiares afectados. O Projecto elaborou um Plano de Acção para Reassentamento (PAR), que descreve a abordagem, princípios e procedimentos que irão cobrir todas as situações de deslocação economica que não puderem ser evitadas. O PAR está estruturado de com o Artigo 21º do Decreto n.º 31/2012, e é apresentado como um Anexo do relatorio de EIA.

O presente documento descreve as actividades do processo de PP realizadas como parte do processo de AIA para este Projecto. O relatório fornece ainda detalhes das reuniões públicas realizadas a nível local (Distrito de Balama) e provincial (Pemba) durante as várias fases do processo de AIA. Além disso, fornece também detalhes das reuniões de grupos de foco realizadas em Balama durante a fase de avaliação de impacto e reasentamento. Estes encontros foram facilitados pela Equipe de Estudo de Impacto Ambiental, com vista a criar um fórum para proporcionar informação sobre o Projecto e os resultados dos estudos especializados chave e envio de preocupações e comentários sobre os progressos do EIA.

7

2. OBJECTIVOS DA CONSULTA PÚBLICA

O objectivo principal da Consulta Pública é auscultar a sensibilidade das Partes Interessadas e Afectadas (PI&A's) sobre os assuntos chave que afectam ou poderão afectar o projecto em causa em cada fase do processo de AIA e garantir que as suas questões sejam registadas e consideradas pela equipa técnica de AIA, provendo-lhes a oportunidade de comentarem os resultados dos estudos. Permite ainda o estabelecimento de um canal de comunicação entre o público e o Consultor, bem como entre o público e o Proponente, a ser usado ao longo do processo de AIA, de forma abrangente, aberta e transparente. As consultas às comunidades tiveram como objectivo envolvê-las e providenciar, o mais cedo possível, informação sobre o projecto e sobre o processo de consulta bem como recolher as preocupações de forma que as mesmas pudessem ser abordadas no estudo de impacto ambiental

O envolvimento das PI&A's é um direito consagrado na legislação nacional, nomeadamente no Regulamento sobre o Processo de Avaliação de Impacto Ambiental (Decreto nº 45/2004) e na Directiva Geral para a Participação Pública no Processo de Avaliação do Impacto Ambiental (Diploma Ministerial 130/2006). A Directiva Geral para o Processo de Participação Pública no Processo de Avaliação do Impacto Ambiental (Diploma Ministerial 130/2006). A Directiva Geral para o Processo de Participação Pública no Processo de Avaliação do Impacto Ambiental (Diploma Ministerial 130/2006) de 19 de Julho) foi desenvolvida para padronizar os processos de participação pública. O Diploma Ministerial estabelece um processo de participação pública de cinco etapas que devem ser seguidas:

- 1. Identificação das partes interessadas;
- 2. Disseminação de informação;
- 3. Diálogo com as partes interessadas;
- 4. Assimilação de pontos de vista e preocupações; e
- 5. Retorno para os interessados

A CP foi realizada em cada uma das fases do processo de AIA:

- EPDA (Estudo de Pré-viabilidade e Definição do Âmbito); e
- EIA (Fases de Avaliação de Impactos)

A CP na fase de EPDA foi conduzida tendo em vista o cumprimento dos seguintes objectivos específicos:

- Fornecer informações gerais sobre os Proponentes e o Projecto proposto às PI&A's, potenciais impactos ambientais e as respectivas medidas de mitigação;
- Apresentar o rascunho do relatório de EPDA e os Termos de Referência (TdR) para o EIA;

- Divulgar o processo de AIA e o cronograma de actividades;
- Recolher questões e preocupações sobre o projecto por parte das PI&A's;
- Estabelecer/divulgar os canais de comunicação entre Consultor/Proponentes e o público;
- Criar uma oportunidade para as PI&A's comentarem e apresentarem propostas de questões chave que devem ser consideradas durante o EIA; e
- Harmonizar o EPDA e TdR de acordo com as sugestões relevantes feitas pelas PI&A's.

Na fase de EIA a CP realizada teve os seguintes objectivos:

- Fornecer informação actualizada sobre o projecto;
- Apresentar os resultados dos estudos especializados e o rascunho do Relatório de EIA: os impactos potenciais ambientais e socioeconómicos identificados e avaliados, e mitigação, gestão e monitoria das medidas propostas; e
- Dar às PI&A's a oportunidade de comentarem os resultados do EIA, nomeadamente a avaliação de impactos e identificação de medidas de mitigação, contribuindo para melhorar o seu conteúdo e consequentemente a sustentabilidade ambiental do projecto.

Durante a fase do EIA realizaram-se reuniões de grupos de foco com partes interessadas chave, com os seguintes objectivos:

- Fornecer informação sobre o desenvolvimento dos estudos técnicos e do projecto de forma a manter os principais sectores do governo central e provincial, incluindo todas as pares interessadas e afectadas, informados sobre o desenvolvimento dos estudos técnicos (Estudo de Impacto Ambiental e estudos de reassentamento) que estavam sendo e/ou que iriam ser efectuados.
- Nessas reuniões, consultores da Equipe de EIA e Proponentes estiveram presentes para prestar esse breve relatório e responder às questões que lhes foram colocadas.

3. PROCESSO DE PARTICIPAÇÃO PÚBLICA

A presente secção descreve a metodologia utilizada para a preparação das actividades de PP realizadas nas fases de EPDA e EIA, incluindo as reuniões de consulta pública legisladas, bem como outras reuniões realizadas com grupos de foco e reuniões comunitárias.

Cópias de todos os documentos relevantes tais como a lista de referência das PI&A's, modelos das cartas-convite, os anúncios públicados, as actas e as Matrizes de Questões e Respostas (MQRs), as listas de registo dos participantes e os comentários escritos recebidos das PI&A's podem ser encontrados nos Anexos A - F deste relatório.

Como Metodologia, foram tidos em conta cinco passos durante o processo de participação pública de forma a alcançar os objectivos estabelecidos na Secção 2 acima, conforme se segue:

- Identificação das Partes Interessadas e Afectadas
- Disseminação de Informação e Envolvimento das PI&A's
- Realização de Reuniões de Consulta Pública
- Recolha e Registo de Contribuições das PI&A's
- Elaboração do Relatório do Processo de PP

Estes passos são mais detalhados abaixo.

3.1 Identificação das Partes Interessadas e Afectadas

Uma lista preliminar de PI&A's foi desenvolvida nas fases iniciais do projecto com base em projectos similares ou anteriores realizados na área. A chave para um processo de participação pública eficaz é o envolvimento das partes interessadas de todos os níveis, particularmente aqueles susceptíveis de serem afectados a nível local, isto é, Distrito de Balama e comunidades locais dentro da área afectada.

A lista preliminar de PI&A's foi actualizada como um documento vivo durante todo o processo de AIA. Como por exemplo, os anúncios de jornal e rádio serviram para informar o público sobre o projecto (e vários rascunhos de relatórios disponíveis para comentário do público). Foram igualmente adicionados à base de dados, PI&As identificados pelos Proponentes do

Projecto. A lista exaustiva das PI&A's deste projecto faz parte de um dos anexos deste relatório (Anexo A).

Tabela 1. Partes Interessadas e Afectadas identificadas

NÍVEL	Partes Interessadas e Afectadas
PROVINCIAL	ONG's locais e internacionais activas na área do ambiente ONG's com intervenção no local de execução do projecto Instituições de ensino e pesquisa Órgãos de comunicação social Sociedade civil
DISTRITAL	Governo Distrital Conselho Local do Posto Administrativo de Balama Proprietários de concessões na área do projecto Sociedade civil
COMUNITÁRIO	Aldeias abrangidas pelo projecto: Nquide, Ntete, Ntete e Pirira

3.2 Disseminação de Informação e Envolvimento aas PI&A's

DIVULGAÇÃO DOS DOCUMENTOS

Os documentos divulgados para as consultas públicas foram os rascunhos dos relatórios do EPDA e do EIA, e os respectivos Resumos Não Técnicos (RNT's). Todos os documentos foram distribuídos quinze dias antes da realização das reuniões de consulta pública, juntamente com as cartas-convite (de acordo com o Regulamento). Os documentos para consulta foram disponibilizados nos locais indicados na tabela 2 abaixo.

Para além de fornecerem informação sobre os Proponentes, o projecto proposto, objectivos da Consulta Pública, o processo de AIA, os principais potenciais impactos ambientais do projecto identificados e as medidas para a sua mitigação, gestão ambiental e social do projecto, a Equipa do EIA pretendeu com esses documentos criar um mecanismo de recolha de questões, comentários e sugestões relacionadas com o processo de AIA, motivando as PI&A's a participarem no processo.

Consulta do Relatório de EPDA e EIA

Tabela 2 . Locais para a consulta do relatório pelo publico

PEMBA	INSTITUIÇÃO DIPREME – Direcção Provincial dos Recursos Minerais e Energia DPCA – Direcção Provincial para Coordenação da Acção Ambiental Escritórios da Twigg Exploration and Mining Lda: Rua 1º de Maio Nº 1153, Rés-do-Chão Direito, Cidade de Pemba.
BALAMA	Administração do Distrito de Balama. Acampamento da Twigg Exploration and Mining Lda, Distrito de Balama, Localidade de Ntete.
Maputo	Direcção Provincial para Coordenação da Acção Ambiental, av Acordos de Lusaka nº 2115 Direcção Nacional de Minas, Praça 25 de Junho no 380, R/C e 1º A Escritorio da CES, rua Frente da Libertação d Moçambique no 342

As versões electrónicas em Português e Inglês do relatório de EPDA e rascunho do EIA estiveram igualmente disponíveis para consulta pelas partes interessadas na Internet, no portal da CES:

- Em Português: http://www.cesnet.co.za/syrahmoz.html
- Em Inglês: http://www.cesnet.co.za/syrah.html

MODALIDADES DE DIVULGAÇÃO

As oportunidades de envolvimento das PI&A's, a divulgação dos documentos informativos, o convite para acompanharem todo o processo de AIA e o convite para participarem nas reuniões públicas foram divulgados através dos seguintes meios:

Anúncios no Jornal e Rádio

Nas fases de EPDA e EIA foram públicados anúncios nos Jornais e Rádio de maior abrangência nacional e provincial, nomeadamente, Jornais Notícias e Rádio Moçambique, na emissora provincial de Cabo Delgado, nas datas indicadas na tabela abaixo.

Tabela 3 Anúncios públicados

Fase	Meio de comunicação		Data
Pre avaliaçao	Difusão oral atraves dos comunitarios	lideres	
EPDĂ	Jornais Notícias Rádio Moçambique Delgado)	(Cabo	5 -8-2013
EIA	Jornais Notícias Rádio Mpharama Delgado)	(Cabo	08/01/15

Os anúncios públicados no jornal e rádio tinham como objectivo divulgar informação sobre o processo de AIA, convidar as pessoas a participar das reuniões públicas como partes interessadas do projecto, informar as PI&A's sobre as datas das reuniões, horas e locais, divulgar informação sobre os locais de consulta dos documentos antes das reuniões. O primeiro anúncio é normalmente públicado 15 dias antes da reunião de consulta pública ser convocada (de acordo com o regulamento).

Na fase de EIA, a divulgação da realização das reuniões foi feita através da públicação em núncio no Jornal Notícias, no dia 08 de Janeiro de 2015 e divulgação na Internet (portal: http://www.cesnet.co.za). Adicionalmente, uma equipa de Oficiais de Ligação com as Comunidades do Projecto, efectuou campanhas de informação e sensibilização das comunidades, de forma a estender a informação a um maior número possível de pessoas. Os comprovativos de públicação dos anúncios são apresentados no Anexo B deste relatório.

Na fase de pre avaliação o método utilizado para informar as comunidades sobre as reuniões de grupos de foco foi através de lideres comunitários. Antes de cada reunião, uma reunião de grupo foi realizada com os chefes do local e lideres comunitários para lhes informar sobre o processo ESHIA e finalizar as datas para as reuniões comunitárias publicas. Nas reuniões de grupo focao, foram concordadas as datas e horas para as reuniões comunitárias.

Cartas-convite Dirigidas

Distribuição de Cartas-convite personalizadas a todas as PI&A's registadas na base de dados do projecto, por correio. As confirmações de participação foram feitas através de contactos telefónicos (ver modelos no Anexo C).

Para a reunião a nível distrital e provincial foram enviadas cartas-convite endereçada as diferentes PI&A`s. Para a reunião a nível distrital, para alem das carta-convite endereçada os restantes participantes (membros do Governo do Distrito residentes na sede e os membros do Conselho Local do Posto Administrativo de Balama) foram convocados através da própria Administração. De modo a assegurar uma ampla divulgação deste Projecto, A Administradora foi convidada a alargar os convites de modo a incluir entidades relevantes de acordo com o seu próprio critério, bem como outras partes interessadas.

3.3 Realização de Reuniões de Consulta Pública

O processo de PP abrange todas as fases do processo de AIA. Cria um fórum de discussão e de negociação entre as partes envolvidas no processo de desenvolvimento, possibilita a discussão e análise imparcial dos impactos que uma actividade pode causar, onde se equacionam em conjunto as questões de índole ambiental, económica e social, auxiliando a se alcançar o desenvolvimento sustentável na AIA.

O envolvimento das partes interessadas, incluindo a comunicação com a comunidade local, é uma parte crítica do processo de AIA, pelo que foram realizadas reuniões em etapas chave do processo para assegurar que as preocupações e os comentários das partes interessadas fossem abordados na AIA. Foram realizadas reuniões com as partes interessadas durante a fase de EPDA e EIA, bem como reuniões de grupos focais no início da fase de avaliação de impacto e reuniões comunitárias no final dessa fase.

Durante o estudo do ESHIA para alem das reuniões nas fases de EPDA e EIA, foram conduzidas reuniões preliminares em Consultas a Nível Comunitário onde o consultor interagiu directamente a nível das comunidades abrangidas pelo projecto e potencialmente afectadas. Esta interacção incluiu encontros com as comunidades, entrevistas e discussões em grupos focais adaptados às condições locais. A participação comunitária revestiu-se de muita importância na identificação das principais preocupações relativas ao projecto, dos potenciais impactos do projecto, particularmente no que diz respeito à perturbação do seu modo de vida, estratégias de

14

sobrevivência, ligações vicinais e perda ou limitação do acesso aos locais sagrados. Permitiu também a participação das comunidades na identificação de medidas de mitigação, respeitar as percepções e opiniões dos membros das comunidades locais, e avaliar a percepção das comunidades em relação ao projecto, suas preferências e necessidades em termos de benefícios sociais e compensações.

Mais detalhes sobre as reuniões de consulta pública são providenciados na Secção 4.

4. RESUMO DA CONSULTA PÚBLICA REALIZADA

A tabela abaixo indica todas as reuniões de consulta pública realizadas a nível provincial, distrital e comunitário, durante as fases de EPDA e EIA do projecto.

As reuniões de grupos de foco em Nquide e Pirira foram realizadas no dia 4 de março de 2013. As reuniões foram assistidas pelos secretários e os chefes das aldeias, juntamente com aproximadamente 150 e 60 membros das comunidades de Nquide e Pirira. Respectivamenncontrote. Os grupos de foco em Maputo e Ntete doram realizados a 5 de maoço com cerca de 150 pessoas presentes em cada

FASE	TIPO DE REUNIÃO	NIVEL	DATA	LOCAL
Pre	Grupo de foco	comunitario	04/03/2013	Nquide
ovoliação			04/03/2013	Niele
avallação			05/03/2012	Pirira
EPDA	Reunião com Conselho Consultivo Distrital	Distrital	21/08/2013	Distrito de Balama
	Reunião pública aberta	Provincial	22/08/2013	Pemba
	Reunião com Grupo Focal	Comunitário	2-13/04/2013	
	Reunião pública aberta	Comunitário	19- 20/08/2013	Aldeia de Nquide, Ntete Pirira e Maputo
EIA	Reunião com Conselho Consultivo Distrital	Distrital	26/01/15	Distrito de Balama
	Reunião pública aberta	Provincial	29/01/15	Pemba
	Reunião com Grupo Focal	Comunitário		
	Reunião pública aberta	Comunitário	26-28/01/15	Aldeia de Nquide, Ntete Pirira e Maputo

Tabela 4 Reuniões de consulta pública realizadas

As reuniões de consulta pública foram facilitadas pela CES. A equipa de consulta pública era constituída tres representantes da CES nomeadamente Elisa Vicente, Anton Hougth e Carina Saranga, por dois representantes do Proponente (Twigg) nomeadamente, Dinis Napido e Cabral Mutiquinhene. e quatro representantes do governo nomeadamente dois da DPCA e os restantes do DPREM. No início de cada reunião foi feito o registo dos participantes (as listas

podem ser encontradas no Anexo D.

Tanto na fase de EPDA como de EIA, as reuniões a nível provincial e distrital foram conduzidas em Português enquanto que nas reuniões a nível distrital nas comunidades, houve tradução para a língua local (Macua), de modo a que os participantes pudessem compreender a informação que estava a ser transmitida, participar activamente e serem capazes de transmitir essa informação aos restantes membros das comunidades.

Para cada uma das reuniões foram preparadas apresentações em PowerPoint, tanto pela Equipa do EIA como pelos Proponentes. As apresentações foram preparadas tendo em conta os participantes de cada reunião e a informação que deveria necessariamente ser disseminada. Por exemplo, para as reuniões a nível distrital, as apresentações foram feitas de forma simplificada e clara, usando linguagem não técnica e, onde possível, ilustrações para facilitar a compreensão da audiência. A nível comunitário, a apresentação foi feita apenas através do uso de posters.

De forma geral, em cada uma das reuniões, foi apresentada a empresa e a descrição do projecto. Depois, a Equipa do EIA apresentou os resultados do EIA (isto é, os resumos dos relatórios rascunhos do EPDA e do EIA), incluindo o processo participação pública (descrito na secção 2).

Fase	Informação apresentada pela Equipa de EIA:		
EPDA	 Reuniões de apresentação do Rascunho do Relatório de EPDA Visão Geral do Projecto Potenciais impactos biofísicos e socioeconómicos esperados nas fases de construção e operação do projecto; Estudos especializados a realizar na fase do EIA; Conclusões do EPDA 		
EIA	Reuniões de informação com Grupos de Foco • Ponto de situação do Relatório de EIA • Informação sobre o projecto • Estudos especializados em curso • Actividades realizadas no âmbito do processo de AIA em 2013 • Processo de Reassentamento Reuniões de apresentação do Rascunho do Relatório de EIA		

 Tabela 5 Apresentações feitas nas fases de EPDA e EIA

Visão geral do processo de Desenvolvimento do projecto
Esboço das instalações
Princípios fundamentais do projecto
 Área de estudo
Avaliação dos impactos ambientais e socioeconómicos
 Sumário dos principais impactos ambientais em alto mar, próximo
da costa e em terra e a sua mitigação
 Sumário dos impactos socioeconómicos e mitigação

Reuniões de preparação foram realizadas antes de cada ronda de reuniões com a presença da Equipe do EIA e dos Proponentes. Previamente ao encontro foi igualmente realizado um trabalho preparatório com os tradutores locais de forma a familiarizá-los com a mensagem e termos técnicos que foram utilizados durante as reuniões.

Após as apresentações, seguiram-se as sessões de questões e respostas para dar oportunidade a todos os participantes de colocarem as suas perguntas ou preocupações à Equipa de EIA ou aos Proponentes e/ou partilhar informação. Foram feitas actas resumidas das reuniões e todas as questões levantadas, bem como as respectivas respostas, fornecidas tanto pela Equipa do EIA como pelos Proponentes, foram registadas em tabelas denominadas de Matriz de Questões e Respostas (MQR). Todas as matrizes estão incluídas no Anexo E deste relatório.

Antes da finalização das reuniões, o facilitador da reunião indicou as páginas da internet onde se podia ter acesso aos relatórios. Foram igualmente fornecidas as datas e detalhes de contacto para o envio de comentários aos relatórios. Todos os comentários escritos recebidos antes ou após as reuniões de consulta pública por parte das PI&A's estão incluídos no Anexo E. Detalhes e fotografias de cada uma das reuniões realizadas durante as fases de EPDA e EIA são apresentados abaixo.

4.1 Fase De EPDA - Reuniões de Consulta Pública

Reunião com Conselho Consultivo Distrital de Balama					
Data	Hora	Local	Nr. de Participantes		
19/08/13	8:00h	Administração	19		
		do Distrito			

Grupo de Participantes:

Governo Distrital

Membros do Conselho Consultivo Local do Posto Administrativo de Balama Grupos ambientais locais e ONG's ambientais e de desenvolvimento



Figura 1. Imagem ilustrativa da reunião em Balama Sede

Reunião Com Comunidades De Nquide E Ntete					
Data	Hora	Local	Nr. de Participantes		
19/08/13	11:00h	Sede da aldeia de Ntete	68		
19/08/13	14:00h	Sede da aldeia de Nquide	94		

Grupo de Participantes: Membros das comunidades



Figura 2. Imagem ilustrativa da reunião em Nquide e Ntete

Reunião com comunidades de Pirira e Maputo

Data	Hora	Local	Nr. de Participantes
20/08/13	9:00h	Comunidade de Pirira	35
20/08/13	14:00h	Comunidade de Maputo	112

Grupo de Participantes:

Membros das comunidades



Figura 3. Imagem ilustrativa da reunião em Nquide e Ntete

Reunião Pública Aberta em Pemba

Data	Hora	Local	Nr. de Participantes
			•
20/08/13	9:00h	Sala de Reuniões da Direcção Provincial das Obras Pública e Habitação	80

Grupo de Participantes:

Delegações das instituições governamentais Associações e Grupos ambientais locais ONG's ambientais e de desenvolvimento locais Instituições de ensino e pesquisa Sociedade civil



Figura 4. Imagem ilustrativa da reunião em Pemba

4.2 Fase De EIA - Reuniões de Consulta Pública

Reunião com Conselho Consultivo Distrital de Balama				
Data	Hora	Local	Nr. de Participantes	
26/01/15	9:00h	Administração de Balama	22	

Grupo de Participantes:

Governo Distrital

Membros do Conselho Consultivo Local do Posto Administrativo de Balama Grupos ambientais locais e ONG's ambientais e de desenvolvimento



Figura 5. Imagem ilustrativa da reunião em Balama Sede

Reunião com a comunidade de Ntete					
Data	Hora	Local	Nr. de Participantes		
26/01/15	13:00h	Sede da aldeia	96		

Grupo de Participantes:

Representantes das comunidades e população local (ver fotografias abaixo) Representantes das instituições governamentais ONG's ambientais e de desenvolvimento locais



Figura 6. Imagem ilustrativa da reunião em Ntete

Reunião com as comunidades de Nquide e Pirira					
Data	Hora	Local	Nr. de Participantes		
27/01/15	09:00h	Sede da aldeia de Nquide	50		
27/01/15	13:00h	Sede da aldeia de Pirira	88		

Grupo de Participantes:

Representantes das comunidades e população local (ver fotografias abaixo) Representantes das instituições governamentais

ONG's ambientais e de desenvolvimento locais



Figura 7. Imagem ilustrativa da reunião em Nquide e Pirira

Reunião	Pública	Aberta -	Aldeia	de	Maputo

Data Hara Logal Nr. de Participante	
Data NI. de Participante	es
28/01/15 09:00h Sede da aldeia 130	

Grupo de Participantes:

Representantes das comunidades e população local (ver fotografias abaixo) Representantes das instituições governamentais ONG's ambientais e de desenvolvimento locais





Figura 8. Imagem ilustrativa da reunião em Maputo

Reunião Pública Aberta, Pemba						
Data	Hora	Local		Nr. de		
				Participantes		
29/01/15	10:00h	Sala	de	14		
		Reuniões	da			
		Universidade	;			
		Católica	de			
		Moçambique				

Grupo de Participantes:

Delegações das instituições governamentais Associações e Grupos ambientais locais ONG's ambientais e de desenvolvimento locais Instituições de ensino e pesquisa Sociedade civil



Figura 9. Imagem ilustrativa da reunião em Pemba

Acividades realizadas no ambito do Plano de Ação para o Reassentamento

Tabela abaixo lista todas as atividades de participação pública no âmbito do Plano de Ação para o Reassentamento elaboradas até ao final de agosto de 2014.

Aldeia	Data	Nº de Participantes	Objectivos
1ª e 2ª Vis	sita no ambito	do Plano de Ação para	o Reassentamento (Julho a Agosto 2013)
Ntete	08/07/2013	23	Apresentação da equipa do PAR e
Nquide	09/07/2013	25	Tecnico (TWG) elegendo dois representantes
Maputo	09/07/2013	41	de cada aldeia
Pirira	10/07/2013	102	
Nquide		44	- explicar o processo de avaliação de
Maputo		30	aldeia e explicar o funcionamento deste

Pirira	06/08/2013	102	grupo;	
Ntete		52	 explicar aos camponeses os seus direitos de acordo com Constituição de Moçambique e as diretrizes do reassentamento; estabelecer um mecanismo de queixas. 	
3ª Visita no ambit	o do Plano de	Ação para o Reassent	amento (Novembro e Dezembro de 2013)	
Todos as	28/11/2013	41	- Inicio de mais uma fase de avaliação de	
quarto aldeias			machambas	
afectadas				
4ª Visita ao Local do Plano de Ação para o Reassentamento: Divulgação do Relatório RAP (Mai				
2014)				
Ntete	14/05/2014	14	divulgar o relatório BAD	
Nquide	15/05/2014	45	- Avaliar mais machambas ; e	
Balama sede	15/05/2014	28	- Discutir pacotes de compensação com os membros do TWG e agricultores afetados	
Pirira	16/05/2014	25		
Maputo	16/05/2014	38		

5. REGISTO DAS QUESTÕES DISCUTIDAS NAS REUNIÕES DE CONSULTA PÚBLICA

MATRIZES DE QUESTÕES E RESPOSTAS (MQR'S)

Cada uma das questões, sugestões, críticas, preocupações, comentários e pedidos de esclarecimento/informações apresentados pelos participantes nas reuniões de consulta pública, e as respectivas respostas fornecidas pela Equipa de EIA e pelos Proponentes, foram integrados em MQR's.

A MQR para cada reunião pode ser encontrada no Anexo E. As Matrizes não apresentam uma transcrição das Questões e Respostas levantadas, mas sim um resumo das questões colocadas e as respectivas respostas fornecidas.

Ao nível mais alto, as questões chave levantadas pelas PI&A's referem-se a:

- Oportunidade de emprego formação para as comunidades locais.
- Reassentamento e compensação
- Aquisição de terras (processo seguido e comunicação).
- Benefícios económicos e desenvolvimento comunitário.
- Descrição do projecto e impactos ambientais

COMENTÁRIOS RECEBIDOS

Durante as reuniões de consulta pública, em foram recebidos comentários escritos apenas na na fase de EPDA.Todas as questões consideradas pertinentes e relevantes para o EPDA e EIA foram endereçadas e os relatórios foram actualizados.

O período para comentários pelo público ou o período alocado para a recepção de questões e comentários foi de 30 dias. Este período iniciou com a divulgação dos anúncios (com os locais para a consulta dos relatórios) e com a distribuição das cartas-convite e após as reuniões.

ANEXOS DO RELATÓRIO DE PARTICIPAÇÃO PÚBLICA FASE DE EPDA E EIA

ANEXO A LISTAS DE REFERÊNCIA DE PARTES INTERESSADAS E AFECTADAS DO PROJECTO

TABELA 7: LISTA DE PI&A'S

Instituição	Endereço	Telefone	Fax				
Autoridades Governamentais Provinciais de Cabo Delgado							
Governo da Província de Cabo Delgado	Av. 16 de Julho, Edif. Governo						
Direcção Provincial para a Coordenação da Ac ção Ambiental	Rua Comércio, 54	272-20353					
Direcção Provincial dos Recursos Minerais e Energia - DPREME							
Direcção Provincial do Turismo - DPTUR	Rua Geronimo Romero	272-21860	272-21860				
Direcção Provincial da Agricultura - DPA	Av. Joaquim Chipande						
Direcção Provincial do Trabalho	Av. Eduardo Mondlane, 281						
Direcção Provincial dos Transportes e Comunicações	Rua do Comércio						
Direcção Provincial de Saúde	Av. 16 de Julho, Edif. Governo						
Direcção Provincial de Pescas	Rua Alberto Chipande	272-20666	272-21555;				
Direcção Provincial de Educação e Cultura	Av. 16 de Junho, Bairro Cimento						
Direcção Provincial da Indústria e Comércio	Av. Eduardo Mondlane, 239	272-20328	272-20328				
Direcção Provincial das Obras Públicas e Habitação	Av. 25 de Setembro						
Conselho municipal da Cidade de Pemba							
Instituto de Desenvolvimento de Pesca de Pequena Escala - IDPPE	Av. Marginal, 7682						
Instituto Nacional de Investigação Pesqueira - IIP	Complexo da DPA						
Instituto Nacional de Estatistica							
Administração Nacional de Estradas - ANE (Delegação de CD)	Av. Gen. Alberto Chipande, 1654	272-21152, 272-21194	272-21194				
GOVERNO DISTRITAL BALAMA							
Autoridades Governamentais Distritais							
Governo Distrital de Balama	Balama-Sede						
Serviços Distritais de Actividades Económicas de Balama	Balama-Sede						
Serviços Distritais de Planeamento e Infra- estrutura de Balama	Balama-Sede						
Comunidades Afectadas, Individuais & Grupos Vulneráveis (Comunidades de camponeses, Mulheres, Jovens)							
Comunidade de Ntete							
Comunidade de Pirira							
Comunidade de Nquide							
ONG´s e Instituições Académicas e de Pesquisa							
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AMA - Associação do Meio Ambiente	Rua do Porto, 1234	272-21415					
CTV - Centro Terra Viva	Rua Capitão Curado, 1757						
Universidade Católica de Moçambique	Av. 25 de Setembro	272-21969					
WWF	Rua do Comércio, 202	272-21332					
FOCADE - Fórum das ONG's de Cabo Delgado	Rua Comércio, 46, r/c	272-20348	272-20348				
Associação Progresso	Rua Cemitério, 109, 1º	272-20934					
Helvetas	Rua CI III, nº 2051 (Rua da Marginal)	272-21624 / 21415					
Fórum Terra de Cabo Delgado							
Organização da Sociedade Civil	Rua do Comércio (IDPPE)						
União Provincial dos Camponeses							
Universidade Lúrio	Pemba						
Ме	Media						
Rádio Moçambique	Rua Josina Machel	272-21213	272-21213				
Jornal Notícias	Av. 25 de Setembro	272-20535					
Radio Mapharama de Balama	Balama sede						

ANEXO B ANÚNCIOS PÚBLICADOS NOS JORNAIS E NA RÁDIO

Syrah Resources Ltd

FASE DE EPDA



Maputo:

- Direcção Nacional de Avaliação de Impacto Ambiental: Av Acordos de Lusaka Nº 2115.
- Direcção Nacional de Minas, Praça 25 de Junho.
- Escritório da Coastal and Environmental Services: Rua da Frente de Libertação de Moçambique Nº 324.

Cabo Delgado:

- Direcção Provincial para a Coordenação da Acção Ambiental de Cabo Delgado.
- Direcção Provincial de Recursos Minerais e Energia de Cabo Delgado.
- Escritórios da Twigg Exploration and Mining Lda:Rua 1º de Maio Nº 1153, Rés-do-Chão Direito,
- Cidade de Pemba.
- Administração do Distrito de Balama.
- Acampamento da Twigg Exploration and Mining Lda, Distrito deBalama, Localidade de Ntete.

Para informações adicionais, por favor contactar a Coastal and Environmental Sevices Mozambique Lda,Tel: (+258) 21 243500 • Fax: (+258) 21 243550 • Email: e.vicente@cesnet.co.za.

8560

FASE DE EIA

	CO	NVITE PAP	A REUNIÃO DE CONS	ULTA PÚBLICA			
FSTI	ESTUDO DE IMPACTO AMPIENITAL PARA O PROJECTO DA MINA DE GRAFITE DE RALAMA						
A Turies F	understion and Mi	ninglda	ubsidiária da Syrah P	asourcas Limitad pretande implemen			
o seu Proj Coastal & registada Social (AIA	ecto da Mina de C Environmental Se no MICOA (Reg. 2 S) do projecto nes	Grafite de rvices Mo 0/2012), fi ta fase par	Balama, no Distrito de zambique Lda (CES), oi indicada para realiz ra fins de licenciament	e Balama, Província de Cabo Delgado uma empresa de consultoria ambien zar a Avaliação do Impacto Ambienta co ambiental.			
Como par	te do Processo de	Participaçã	ão Pública, são convid	adas as partes interessadas e afectad			
a participa	ar das reuniões pú	iblicas abe	rtas de apresentação	do (Estudo de Impacto Ambiental)			
que terão	lugar na Província	de Cabo D	elgado, de acordo cor	n o seguinte programa:			
Data	Dia do Somana	Hora	Incelização	Local da Reunião			
27/01/15	Segunda-Feira	09:00h	Distrito de Balama	Administração de Balama			
27/01/15	Segunda-Feira	13:00h	Distrito de Balama	Comunidade de Ntete			
28/01/15	Terca-Feira	09.00h	Distrito de Balama	Comunidade de Nouide			
20/01/10	Torga Faire	17:00h	Distrito de Balama	Comunidada da Dirira			
28/01/15	I orca-Foira			L'Ununuaue de Fillia			
28/01/15	Ouarta-Feira	09:00h	Distrito de Balama	Comunidade de Maputo			
28/01/15 29/01/15	Quarta-Feira	09:00h	Distrito de Balama Cidade de Pemba	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universid			
28/01/15 29/01/15 30/01/15 O objectiv ao público	Quarta-Feira Quarta-Feira Quinta-Feira o destas reuniões o para levantar qu	é o de apr	Distrito de Balama Cidade de Pemba esentar os detalhes do perguntas relacionada	Comunidade de Filha Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais:	o destas reuniões para levantar qu	é o de apr iestões e p io disponív	Distrito de Balama Cidade de Pemba esentar os detalhes de perguntas relacionada reis para consulta no p	Comunidade de Pana Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo:	o destas reuniões para levantar qu	é o de apr iestões e p io disponív	Distrito de Balama Cidade de Pemba esentar os detalhes d perguntas relacionada reis para consulta no p	Comunidade de Pina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M	o destas reuniões o para levantar qu especialidade esta recção Nacional de recção Nacional de critório da Coast	é o de apr lestões e p lo disponív e Avaliação e Minás, Pr tal and E	Distrito de Balama Cidade de Pemba esentar os detalhes di perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M	o destas reuniões o para levantar qu especialidade esta recção Nacional de recção Nacional de critório da Coast oçambique N° 324	é o de apr lestões e p lo disponív e Avaliação e Minas, Pr tal and E	Distrito de Balama Cidade de Pemba esentar os detalhes di perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M Cabo Delg	vecção Nacional de crecção Nacional de crecção Nacional de critório da Coast oçambique Nº 324	é o de apr lestões e p lo disponív e Avaliação e Minàs, Pr tal and E	Distrito de Balama Cidade de Pemba esentar os detalhes do perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M Cabo Delg	o destas reuniões o destas reuniões o para levantar qu especialidade estâ recção Nacional de recção Nacional de critório da Coast oçambique N° 324	é o de apr iestões e p io disponív e Avaliação e Minás, Pr tal and E	Distrito de Balama Cidade de Pemba esentar os detalhes do perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service	Comunidade de Prima Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M Cabo Delg • Di	o destas reuniões o destas reuniões o para levantar qu especialidade esta recção Nacional de recção Nacional de critório da Coast oçambique Nº 324 rado:		Distrito de Balama Cidade de Pemba esentar os detalhes do perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Es M Cabo Delg • Di • Di	o destas reuniões o destas reuniões o para levantar qu especialidade esta recção Nacional de critório da Coast oçambique N° 324 rado: recção Provincial p	é o de apriestões e priestões e Avaliação e Avaliação e Minàs, Priestal and E	Distrito de Balama Cidade de Pemba esentar os detalhes di perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service rdenação da Acção Am s Minerais e Energia d	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e bortal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação abiental de Cabo Delgado. le Cabo Delgado.			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M Cabo Delg • Di • Di • Di	o destas reuniões o destas reuniões o para levantar qu especialidade esta recção Nacional de critório da Coast oçambique N° 324 rado: recção Provincial p recção Provincial p	é o de apr lestões e p lo disponív e Avaliação e Minas, Pr tal and E para a Cooi de Recurso g Explorati	Distrito de Balama Cidade de Pemba esentar os detalhes di perguntas relacionada reis para consulta no p o de Impacto Ambienta raça 25 de Junho. nvironmental Service rdenação da Acção Am s Minerais e Energia d on and Mining Lda:	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e bortal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação nbiental de Cabo Delgado. le Cabo Delgado. Rua 1º de Maio Nº 1153, Rés-do-Cl			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Es M Cabo Delg • Di • Di • Di • Di	Quarta-Feira Quarta-Feira Quinta-Feira o destas reuniões o para levantar qu especialidade estã recção Nacional de critório da Coast oçambique N° 324 rado: recção Provincial p recção Provincial p recção Provincial p recção Provincial p	é o de apr iestões e p io disponív e Avaliação e Minas, Pr tal and E para a Cooi de Recurso g Explorati emba.	Distrito de Balama Cidade de Pemba esentar os detalhes de perguntas relacionada reis para consulta no p o de Impacto Ambienta aça 25 de Junho. nvironmental Service rdenação da Acção Am s Minerais e Energia d on and Mining Lda:	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e bortal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka Nº 2115. es: Rua da Frente de Libertação nbiental de Cabo Delgado. le Cabo Delgado. Rua 1º de Maio Nº 1153, Rés-do-Cl			
28/01/15 29/01/15 30/01/15 O objectiv ao público etudos de locais: Maputo: • Di • Di • Di • Es M Cabo Delg • Di • Di • Di • Di • Di • Di • Di	Quarta-Feira Quarta-Feira Quinta-Feira o destas reuniões o para levantar qu especialidade estă recção Nacional de critório da Coast oçambique N° 324 rado: recção Provincial p recção Provincial p recção Provincial p recção Provincial p reitó, Cidade de Pu	é o de apr iestões e p io disponív e Avaliação e Minas, Pr tal and E oara a Coord e Recurso g Explorati emba. strito de B	Distrito de Balama Cidade de Pemba esentar os detalhes do perguntas relacionada reis para consulta no p o de Impacto Ambienta aça 25 de Junho. nvironmental Service rdenação da Acção Am s Minerais e Energia d on and Mining Lda: alama.	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e portal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka N° 2115. es: Rua da Frente de Libertação nbiental de Cabo Delgado. le Cabo Delgado. Rua 1° de Maio N° 1153, Rés-do-Cl			
28/01/15 29/01/15 30/01/15 O objectiv ao públicc etudos de locais: Maputo: • Di • Di • Di • Es M Cabo Delg • Di • Di • Di • Di • Es Di • Di • Di	o destas reuniões o destas reuniões o para levantar qu especialidade estă recção Nacional de critório da Coast oçambique N° 324 rado: recção Provincial p recção Provincial p recção Provincial p reitó, Cidade de Pu dministração do Di campamento da T tete.	é o de apr lestões e p lo disponív é Avaliação e Avaliação e Minas, Pr tal and E oara a Coord de Recurso g Explorati emba. strito de B	Distrito de Balama Cidade de Pemba esentar os detalhes de perguntas relacionada reis para consulta no p o de Impacto Ambienta aça 25 de Junho. nvironmental Service rdenação da Acção Am s Minerais e Energia d on and Mining Lda: alama. oration and Mining I	Comunidade de Prina Comunidade de Maputo Sala de Reuniões da Universida Católica de Moçambique o projecto e oferecer uma oportunida as ao projecto. O rascunho do EIA e bortal <u>www.cesnet.co.za</u> e nos seguir al: Av Acordos de Lusaka N° 2115. es: Rua da Frente de Libertação nbiental de Cabo Delgado. le Cabo Delgado. Rua 1° de Maio N° 1153, Rés-do-Cl Lda, Distrito de Balama, Localidade			

ANEXO C MODELOS DE CARTAS-CONVITE PARA AS REUNIÕES DE CONSULTA PÚBLICA EM AMBAS AS FASES

FASE DE EPDA E EIA

COASTAL & ENVIRONMENTAL SERVICES MOZAMBIQUE LIMITADA

Gestão Ambiental e Avaliação de Impacto

RECOGTY CASEDITERRA VIVA CABODELCA Rua da Frente de Libertação de Moçambique N Maputo, Moçambique Telefone: (+258) 21 243500 Telemóvel: (+258) 82 3079739 Email: c.saranga@cesnet.co.za 07 de Janeiro de 2015 Nª.Ref. 29 /2015/MOZ

Para: (

Assunto: <u>Convite para reunião de Consulta Pública</u> Estudo de Impacto Ambiental do Projecto da Mina de Grafite de Balama

Exmos Senhores

A Twigg Exploration and Minning Lda, subsidiaria da Syrah Resources Limited, pretende implementar o seu projecto da Mina de Grafite de Balama, no Distrito de Balama, Provincia de Cabo Delgado. A Coastal & Environmental Services Mozambique Lda (CES), uma empresa de consultoria ambiental registada no MICOA (Reg. 20/2012), foi contratada para realizar a Avaliação do Impacto Ambiental e Social (AIAS) do projecto, para fins de licenciamento ambiental. Como parte do Processo de Participação Pública, são convidadas as partes interessadas e afectadas a participar das reuniões públicas abertas de apresentação dos resultados do Estudo de Impacto Ambiental do Projecto da Mina de Grafite de Balama com vista a oferecer uma oportunidade ao público para levantar questões relacionadas ao projecto. As reuniões terão lugar nas comunidades afectadas pelo projecto e também na Cidade de Pemba, de acordo com o seguinte programa:

Dat	a	Dia de Semana	Hora	Localização	Local da Reunião
27/01/	/15	Segunda-Feira	09:00h	Distrito de Balama	Administração de Balama
27/01/	15	Segunda-Feira	13:00h	Distrito de Balama	Comunidade de Ntete
28/01/	15	Terça-Feira	09:00h	Distrito de Balama	Comunidade de Nouide
28/01/	15	Terça-Feira	13:00h	Distrito de Balama	Comunidade de Pirira
29/01/	15	Quarta-Feira	09:00h	Distrito de Balama	Comunidade de Maputo
30/01/	15	Quinta-Feira	10:00h	Cidade de Pemba	Sala de Reuniões da Universidade Católica de Moçambique

A instituição de V.Excia foi identificada como uma das instituições importantes neste processo, e, neste contexto, endereçamos-vos este convite para participar da reunião pública.

Coastal & Environmental Services Mozambique Limitada, NUIT No. 400354642 Acionistas: Coastal & Environmental Services South Africa; Dr AM Avis (PhD Rhodes) Para maior familiarização com os conteúdos da reunião, o rascunho completo do documento poderá ser consultado no Portal <u>www.cesnet.co.za</u> e nos seguintes locais/instituições:

Maputo:

- Direcção Nacional de Avaliação de Impacto Ambiental: Av Acordos de Lusaka Nº 2115;
- Direcção Nacional de Minas, Praça 25 de Junho;
- Coastal and Environmental Sevices Mozambique Lda.: Rua da Frente de Libertação de Moçambique Nº 324;

Cabo Delgado:

- Direcção Provincial para a Coordenação da Acção Ambiental de Cabo Delgado;
- Direcção Provincial de Recursos Minerais e Energia de Cabo Delgado;
- Escritórios da Twigg Exploration and Mining Lda. Rua 1º de Maio No 1153, Rés-do-Chão Direito, Cidade de Pemba;
- Acampamento da Twigg Exploration and Mining Lda, Distrito de Balama, Localidade de Ntete;
- Administração do Distrito de Balama;

Para mais informação por favor contacte:



A vossa presença será digna do nosso maior apreço e apresentamos desde já os nossos antecipados agradecimentos Com os Melhores Cumprimentos

CLASSO CL acurac

dra. Carina Saranga (Consultora Social)



ANEXO D REGISTOS DOS PARTICIPANTES DAS REUNIÕES DE CONSULTA PÚBLICA

FASE DE EPDA

Registo de participantes- Administração de Balama





TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Balama - Sede Data 19.08.13

No.	Nome Completo	Instituição	Função	Contacto
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2	ISSA RACHIDE VAMUTHO	SECRETAIZIA DIST	Stermanente	\$2.52.ZZ12.3
3	Continho ledis Manghangs	Director SDPI	Director SDD1	828175410
4	GERVISIO VANCE HAMAGINESA EQUERD	COMANDONE DISTRITAL	COHAN BANTE DISTRITAL	828281250
2	Laura Antonio	SDAE	Enginheira Agrous	861770854
6	Regina timesto	SDETT	Directoral - SDEFT	861779546
F	Salama Deto hachido	Secretaria Districta	Secretaria Panticulo	82610 9869
8	Mayon de Fatima N. Wair	503MAS- Balans	Gestora et Deolos	828006792
9	L'elso do Rosario S. Nhue maio	SDAE -	Técnico Recursos Ninge	is 822831840/84102420
10	Jadas Andre	D.P.L.EME	TEC. Porol. Reguess him	6. 82 (100 G183
11	4160 EL FIZHNCISCO MUCHIZE	D.P.12 HINERA'S	TER. MINGRANS	826875390
12	And WI JEAN	UPCA	Tec. Prof. AlmA	824477167
13	spatite Antonio	DPCA	Tec. Ambiental	828137922
14	Caned Milifinition	TEM, L	ADMIN	8488565555
15	Elisa Vilent	CES	Consultora Ambienta	823079739
16	STIPHAN OSIGSY. J. GIADDUH ZODUNTOO	SECRETARIA DISTRIAL	CHEFE DA RALFP	861779883





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Balana - Se de Data 19.08.13

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19.	Lupisa Josuch	C.E.S.	Consultant	explores fry
-				
-				
-				

Registo de participantes- Mualia/ Maputo





TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Malia - Maputo Data 20.08.13

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	Non Falima Shmal			
	Marage Samuli			
	Eusebio Binamo			
	Ali Selemane			868708615
	Sabade Siate			865482-253
	DEdizo Alberto			866202159
	Anastancia Habito			000
	puisa sanali			
	Terezinha Assance			
	Riana Armindo			
	Masina Angoondo		1	
	Bina Salina			
_	Alnaci Dinis			
_	PAIS CAPIL,			863887054
	CANAS Altame			





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE_ Mualia

____ Data 20,08,2013

No.	Nome Completo	Instituição	Função	Contacto
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	Crimelindo Serbuneti			
	Recharo Latife			
	Amila Usingilia			
	EBracinno Yassin			
	Fermando Locorias			
	RAPUNA SACAL			
	Hansel Omas			
	hourenes hind			
	CHABank USSene			
	Alon + Gourale			
	Margle Antonio			
	Tome saucede			
	Sumaila Saulia Elias			
	Zarage IDS q			
	Mateus ALBENTO			





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE_ Mualia

____ Data 20,08,2013

No.	Nome Completo	Instituição	Função	Contacto
	Lalite Clipmo			
	Crimelindo Babunete			
	Recharo Latife			
	Amida Usingilia			
	EBracinna Youssin			
	Fermando Locarias			
	PAPUNA SACAL			
	Hannel Omas			
	hourenes hind			
	CHABank USSene			
	Alla & Garalle			
	Anople Antonio			
	Tome samede			
	Sumaila Saulia Elias			
	Louge IDS a			
	Mateus Achente	-		





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Amation - Maputo Data 20.06-17

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	MOVAMEDE ALFANE			
	· Sigali A gostinho			
	MARA JOANA			
	MARA Jehal			
	Romadand Plan	150		
	PEdro Alberto			
	DAMITO ELGENIO			
	Durido Marage Samuli			
	Tomais Butomani			
	CANIMARIO ;			
	Parcoal Toml			
	Fre derico Aguino			
	(VISTARIAN SALAI)		land -	
	Vitorino Saide / 16			
	A Sina Raissa			



5



TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Mualia Mahuto Data 20,08,013

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	Altera Simil			
	Dom's claina ABiBO			
	ARLINDO VALDE			
	LAGENO Siza		· · · · · · · · · · · · · · · · · · ·	
	Aurido Marage			869475237
	Antonio Waite			
	Gunito Ali			
	Sigali A gostinho			
	Moria Tucha			
	Damadane Damatio			
_	SABADO Nuyarmeter Alfane			
	Alaka Jaumehati			
	Saliching Omar			
	Fatima Aquimo			
	Roda António	· · · · · · · · · · · · · · · · · · ·		

Coastal & Environmental Services

No.





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Mualia Maputo Data 20,08,13

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	Captilon Namper (a			
	Fougenic Dussine			862202 764
	Almeida Pius			862056395
	Pisuali MAland			
	suis purit			
	RUMHZEMai			
	DZIME PANG			
	Minis 59 Armando			
	Satala ASSANi			
	MaRif da papi	lo		
-	Momade Ali			
	Sigibo Mario			861458135

Registo de participantes- Nquide





TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

comunidade/cidade Vquicle

Data 19.08.13

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	Benito Acquio			866288695
	Cuolitina plans			
	Fracio permonelo			
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_	DAUCO OUD			86272287
_	ZINHA Adelino			
	flenzigerss gabled			
	MAHAMUDU SESEPH			
-	Armande Afai			
	Amando Jandagul			





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Vquide Data 18.08.13

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	SALIND XHAMALE			
	FRANCISCO MANCIEL			
	Frederie Corado			
	Ali On Us oncio	-		
	Marin Francisco Xovile			
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	Januario Auresse			868250276
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	Lourenço Gimo			869597200
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4

TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Vqui de Data 19.08.13

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	Arlino Openitio			
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	Henni guis Rame			
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	Magrinho Sauge			
	ACMENTA SXILE			





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE NQUIDE Data 19.08.13

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6	Ang Maria John	DPCA	TEC. Prof. Adm. Pul	824477160
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10	Ussene Bikana	Marida	/	906905530
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1	Joan Micula	1 cuide	Soconnista	86156612049
	JORDAD ASSIMO	1		869571094
	Abilio Jos Grancisco			
	MUSSA Machida			
	Paitanie Savide		860036998	860036928





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

comunidade/cidade Nquicde Data 19.08.13

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	REAMOND ARMANDO			968-146033
	Gospos Amado			6691,18209
	Sapi Yedno			867449749
	DANITO SELLINI			865374914
	MODESTO Juis			
	Hussa Gongahrs			
	Eugenic Victor			
	charia			865374974
	Menyani Verbentim			· / · /





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REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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Data 19.08.13

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	Simo Amimo			
	Paulino Honacio			
	Berndo getarda			
	Ledro Manuel			
	Rafael Riture			
	Alerento Saulinai			8677.01000
	Luis Nakita			S60(127202
	S. Saloda Mussa			000482529
	Pedro Bacar			
	Fleciano			8621566711
_	Domier Adope			962192222
_	huis Assance			2694 JELIOG
-	Francisco Manuel			166055981
	Alferro Ceris			- Our of or
	Ehresto Antonio			8665 IDALA

Registo de participantes- Ntete





TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Niete

_ Data 19 08.13

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02	Ang Narig Tohn	DOCA	TECHICOL Ambiente	828137937
03	HIGHER FORMERSON HUMAN	A D D II JED NIC	DEC. PSOF TEM. The	824477160
04	The second participation of the second	D. F. K. MINERAS	HURERAIS	826875391
05	Colud M T-0 : 0	D. P. KEMIE	TECTOF. Pecuros Minor	82400 6983
06	and imagination	TEME	ADM	848822222
1	Union Haigh	CES	Jocial Scientist	0775147611
57 1	ungest Dostren	LES	forsalter f	04668223/26-
00	barrieg nedol to	Greado		876901603
05	Carina Jaranga	CES	Social Spicht	824124038
10	Elisa Inguane Vicent	CES	Convillación Ambient	X72-20229
11	Divis NAPIDO	TEML	Diparton	Q100100
	MOMPHE MOHIANE		Brize Ciun	025190 440
-	Inesio Santos Pirar			
	Bachide Fidel HCe			
	JESene ALi Mussa			01.11.1
	Les cuna Zacarias			001448167





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Ntete

Data 19.08.13

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Ser	HO JOAO			9602 11.25
	Jood Amane			d d
DEX	K ISSA			96102000
Chab	are Marriel Councle			10/0000
Ma	no faiestino			86617162
San	ito Sacarias			
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AGO	SINNAO PAULO			869895771
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Sau	de Jaita			
Kan	radance enstat			
siana	Amada			8652467
Javie	Manuel			
V Qa	neperce Ungole			



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TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA ADE IV fe fe

COMUNIDADE/CIDADE_

Data 19.08.13

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Nolite	BASSILIC PACEME			-
ASO	Appri Cilikono	-		
- Ori	topas Paulo			
<u>tor</u>	rondo Nozario			
TRIVE	IENE GONIAR			
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PROJECTO DE GRAFITE DE BALAMA

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15m	nail Abdul	N teti		
C	Musse Rajato	Ntete		
Au	levereide AMAATE	Actes the		
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	HWIEG AJORIO	NTELE		
Cho	Vitering Causse	NDIE		
-JAI	MOGL ANIONIO	NTOTE		
Dar	ningos Jole	·		
- Fe	nnando geraldo			
AN	TOHIO MULTUCA		SLAALACIA	\$(288522)
Mac	muel band		hiden	8
Aar,	TOXIO SUPC	ATER		16127584
JAD	it RAIMUNDO	XITETE		863-1472
				-0199970

REUNIÃO DE PARTICIPAÇÃO PÚBLICA





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA ADE Nfefe

COMUNIDADE/CIDADE

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	Nazanio Ali Laite			
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-	1 liguel Obrahano			860036234
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Registo de participantes- Pemba





TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

comunidade/cidade Pemba

Data 21.08.2013

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5	Dirain Vapal	TEAL	Directr	825520440
6	Call philiphinham	TEM	ADDIN	848856555
7	AMERICO JUSTAOLINA	D. P. STUDE	CHEFE 2PLAN. COOP	826726270
8	Abdul Anze	Escre de Ace	Estudante	825405697
9	Afatilio Sevenhane	UCM	Estudante	824245436
10	Nito T. Muaramuassa	Escola & Eteca	Esteedante	827035055
11	Maten Ehadrique	Éfice	8 tudonte	824452830
12	Sivetio bazaro	DRIC	Tric. DPIC	823557450
13	Jacito Margen	EE e Cidadiano	Docente	820561910
14	HENRIQUES BUSTANI	22P	Reless 2 Prov	826127870
15	Xauric Subastia	SDEYT	Ternico Pedas.	826401660
1,6	Jagir Shibang	ILP	Te'enico O	8270 88 313





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Penibace

Data 21.08.2013

No.	Nome Completo	Instituição	Função	Contacto
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18	Swagen Tape	TIP	Freeniss	B57234658
19	Payla Igata Muadi	Thigg	Agata-Adim	826995950
20	14mana 1 surse	prin	0	953628394
21	Ang Maria John	BPCA	Tec. Prof. Ad. pub	82447760
22	Sucas Joibios Walla	EECD	Profession	861773252
23	Sommonda Bomifacio Camera	BECD	Pro fessor	861773253
24	Tovedito Ernesto	EECA	Phopenson	861773276
25	Ancha César	EECD	Estudante	86 1767527
26	Ines Manuel Lesalio	EECD	Estudante	849075545
27	Munira de Sandra g. M. Rita			
28	Bendiph Matias Mugals	UCM	08 quedante	825175299
29	Analo Leur	ite	Gester.	828481490
30	Stepa-ce, low	Nunisa Co-infr	Dhow Garol	523228327
31	julieta yalaquim	Efica u.c.m.	2 studante	820786804
32	Helena Mariano	Ética U.C.M.	Estudante	866055936





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE____

Peube Data 21.08.2015

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37	Fritza Abigail C. Amelia	UCM	Estudente	222975448
38	Misalda Alija Reliano Sebastino	UCM	Estydante	826703286
39	Charge Leventas	NICM	apterdante	820235487
40	Maliri de Ali	UZN	Studanto	827933564
41	7 ito Machiona	INICIATIVA LOGAL Pango Ales	Oficial de Mogsanay	824907281
42	IMANO MOSINA	KARSBO	REPRESENTATIO	820265820
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44	Tustino Tacinto Acelino	UCM	Estudants	86-1767860
45	Mariano Hamudo Same	UCH	13 albuts	824352330
46	MIGNEL FRANCISCO MIKARDA	12. MINERAIS	TEC. MINERAIS	826875390
47	Sonja Siege	UCM	Docente	861445752
48	TOFI Payle A TACINT	TLS- 85211'CS	Cresto2	846487575





PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

Pemba

COMUNIDADE/CIDADE____

___ Data 21.08.13

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52	ISAKEL TEMEINS	INICIATIVA LOZAL	CODILADIVAJONA	014102858
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PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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PROJECTO DE GRAFITE DE BALAMA

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TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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06	Call malifing mene	TEM,L	Allmini	JEIGESETY
07	PINIS NAPIDO	TEML	Director	8250303
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PROJECTO DE GRAFITE DE BALAMA

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PROJECTO DE GRAFITE DE BALAMA

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PROJECTO DE GRAFITE DE BALAMA

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	4ATO FLACHIDE			
	LACSIMO Size			
	Juna Palisse			
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TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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	Miguel ledes filippe	EPC-lefaputo	Diretos	861477364
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FASE DE EIA

Registo de participantes- Administração de Balama

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Balang

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE_Balama Data 26.01.2015

	Nome Completo	Instituição	Function	
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Registo de participantes- comunidade de Ntete





CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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COMUNIDADE/CIDADE_____

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14	ALGINE SMALLA	SECRETA, OM	NCO AC/2	882174231

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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22	fabrao formado	Campanés	cantang	
23	Raymundo Armando	Mecanica	Mecanica	
24	Almeda Amane Remba	Protreiro	Propreizo	
25	Manuel Crnesto	campanés	campanes	
26	Lopes Mussa	Campanés	,	
Xt	HV0519 Callallahina	/		
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CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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3	Bendita Addfo			
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7	emisene Beman	Ntete	Camillanas	
	- Bomofacio Vorgilio		TOTAL	
	him Antonio Maninea	METE	Panhonen	
_	Austoqui VICENT:	NTETE	Comproved	
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-	GIRIA ANIÓNIO	NTETE	Com Donoy	
(CALISTO Pedro		and a cost	
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Registo de participantes- comunidade de Nquide





TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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	POLOUIM SAIDE	BALAMA	Neuise	862522872
	Lourenco gimo	Balama	Neuide	
	TROSS Raibse	0.7.8	Nemple	869423541
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	Salimo Vrála	Campomes	Neuide	
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	printando Fallion 20	Campuny	Nerride	865894104

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	Rosalima Sale		4	
	Ernestina Agostinha			
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	Sani Suate	and the second s		
	Juma Nimasse	633		
N S	YRAH SOURCES Nguide 27.01	. 2015		
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	Joven Amade		
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	Ignera Victor		
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Registo de participantes- comunidade de Pirira

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		CAPITOL RESOURES	5	
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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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	VOMAR BERTINIO		V	** */
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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

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	Antomio Magureca			
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Fatma Abudo		
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SYRAH
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TWIGG EXPLORATION & MINING LIMITADA, SUBSIDIÁRIA DA SYRAH RESOURCES LIMITED

PROJECTO DE GRAFITE DE BALAMA REUNIÃO DE PARTICIPAÇÃO PÚBLICA 2

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Registo de participantes- comunidade de Maputo _Mualia





TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

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TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE_Maputo/Mualia Data 28.01.15

No.	Nome Completo	Instituição	Função	Contacto
29	Ternando Somani	mapato	GPANE	
80	AGUSTO MICOCO	MAPLITO	CONTOES	
31	Darquinho yoro	Maputo	Company	<
32	LALIC Rahibo	MADUTO	Canhomez	
33	Juanilo Precasila	MAPYTO	Canponder	
34	Vidor Assame	papin	Alfabetizeda	
35	Ferro baquine	Maputo	camponés	867567783
36	Adelino Sadique	Maputo	chebe da aldeia	
37	ALSENTO BUANAIDE	MARUTO	CAMPONES	
38	ampile Dedro. Silin	na Maputo	CAMINENES	\$753 150 36
39	Di Etropo Vahossa	Mayorto	C. Lanslans S	
40	RAMPSSANE SAMUEL	MAPUTO	CAM PUNES	
4)	AKGENIND ALFANE	MAPUTO	CAMPUNES	
42	S'JIDO Narid	Maputo	Canpanes	





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No.	Nome Completo	Instituição	Função	Contacto
15	AFATI SIJANA	Makerto	Canpunão	
16	Rofte Grans	Mapato	cayinas	
17	Sauate Mario	Maperto	cantones	
18	Acacio Coles Thins	Malala	cantomes	
19	FELIX MURANE	MAPUTO	CANPOWES	
20	Manudo Manage	Maputo	componés	866173159
21	Zita Hinge	majuto	Cann?.	361456364
2.2	Gibriana Usserie Laissa	Mapreto	Camponsés	862694396
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2.21	SABADO LUIS JAIME	MA PLETO	CAM PONED	
25	ARLindo Marage	Maputo	Caripones	862685168
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comunidade/cidade_Majuta/Mualia_ Data 28.01.15

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5	Julio Stabote tracement	SD9I-Balana	T. in EDT	028081960
6 -	Licio Domingos Nazania	SD- D-Da	recuito. all'I	872905282
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	ABRIAND BUANATE	MARUTO	2 M Parto	501200115
1	ANIAO UANTE	MARUTA	OLUZOUT-	26
2	RACHIDE ALI NANTETC	NADIJE	ALIENC	86
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-	ALGI LA RICHARD	Maputo	Teemico Associu	826991399
17	TAMO BACAL	MAPUID	CAMPOXIES	8661JIJIG





TWIGG EXPLORATION AND MINING

CAPITOL RESOURES

PROJECTO DE GRAFITE DE BALAMA

REUNIÃO DE PARTICIPAÇÃO PÚBLICA

COMUNIDADE/CIDADE Maputo/Mualia Data 28.01.15

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57	GENTTO Augusto	munting	Cobany	8/ 14/2 8.5d
58	Carina Saranga	CES		
59	Jodan Andre	D.P.L.EME		8210006988
60	ISSLED TANKAN	C.t.V	C. frognas	823032140
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Nelson Anselmo	No.	Nome Completo	Impressão digital	Contacto
Durra Sabas		Sabina Mussa		
Teresinha Samail		Lazaro Agtur		
Siruma Cassimue		Amane Saulia		
Jalma Sclemane		Sugli Francisco		

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Atibo Celiano			Jose Antonio Cu		
SUD P.	1 Maria		Felix Matebu		

Jaime Pailas	*	
Sumail Salde		
Jaice Cirage		
Americaha Namele		
Luito Annando	•	
Julio Danis		

Registo de participantes-Pemba

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ANEXO E MATRIZES DE QUESTÕES E RESPOSTAS

FASE DE EPDA

Matriz de Perguntas e Respostas Reunião em Ntete Data: 19/08/13 Hora: 09h00 – 12h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
emprego		
Fernando Cassona	Estamos gratos pela apresentação. Sofremos por falta de emprego. Estamos registados desde o ano passado, mas não sabemos os resultados desses registos. Não importa se perdermos a mesquita, ficaremos felizes se conseguirmos emprego.	Compreendemos as preocupações apresentadas e reconhecemos que ter emprego é muito importante; a empresa abriu há dois anos e encontra se na fase de pesquisa para posteriormente estabelecer amina tão desejada. Contudo, não sera possível empregar todas as pessoas.
Manuel Razão	Nós moçambicanos estamos mal porque com a chegada da empresa temos limitações porque as áreas agrícolas são poucas e a terra está limitada no distrito de Balama. O que será dado aos nossos filhos? Eu sei que a empresa trará benefícios, mas nem todos terão emprego. O que acontecerá com aqueles que não são empregados?	Iremos trabalhar com o Ministério do Trabalho, para criar uma equipe composta por membros da Comunidade, o governo do Distrito e um grupo de trabalho e da empresa. O objetivo desta equipe será o de estudar a melhor forma de recrutar trabalhadores. Para aquelas pessoas que se dirigem ao acampamento da Twigg à espera de alguma oportunidade de emprego, queremos dizer que não estamos a recrutar de momento.
Bibiana Ernesto	Participamos em todas as reuniões, ouvimos dizer que as mulheres de Pirira e Maputo foram empregadas, nós também queremos emprego. Nós sabemos limpar.	Ém breve iremos recrutar trabalhadores temporarios por períodos curtos de 2 a 4 dias. É preciso ter calma e paciência. A prioridade de mao de emprego e para os locais e
Issufo Jaisse Narape	Fico muito satisfeito com este programa. É bom saber que a empresa vai vir e trazer empregos. Vão vir pessoas de fora mas nós ficaremos no nosso controlo. Há dificuldades porque há pessoas que estudaram mas estão sem emprego. Eles deveriam pelo menos aceitar algumas	moçambicanos. Somente quando necessario iremos empregar estrangeiros. A empresa ira cumprir com os requisitos da lei de trabalho moçambicana. Para alem de emprego preve se beneficios socials como

	dessas pessoas.	melhoria de vias de acesso, hospitais, escolas, entre oiutros.
		Esta em elaboração um plano de recrutamento de mao de
Mamade Muhale	Sou jovem e estou preocupado porque os	obra. Neste documento constam todos os requisitos a ser
	não são contratados. Há pessoas que	seguidos na altura de contratar pessoal. Mulheres tambem
	estão lá desde o ano passado, mas não são empregadas.	terão oportunidadesespecializada. Devo informar tambem
Lordino Sawalé	Esses trabalhos foram obtidos por	que havera formação para todo o pessoal a trabalhar no
	pessoas vindas de Maputo, queremos que a companhia traga pessoas daqui.	projecto. Dinís Napido – Twigg
António Muatuca –	Eu gostaria de agradecer pela boa	
Chefe da aldeía	contribuição para a Comunidade. As	Agradeço a presença de todos. sobre a questão do emprego,
	As pessoas querem trabalhar, mas	como o Sr. Dinís Napido disse, usaremos transparência
	sabemos que nem todos serão	para lidar com a questão do emprego. O nosso objectivo e
	pelo menos que as mulheres trabalhem na	evitar corupção no processo de recruramento. formação
	mina de grafite.	para todo o pessoal a trabalhar no projecto. Cabral
		Mutiquinhene – Twigg
Reassentamento e co	mpensação	
Basílio Pajume	A terra pertence ao estado. Quais são os mecanismos que serão usados para a compensação?	Em primeiro lugar temos que cumprir com a lei, mais concretamente com o regulamento sobre o processo de reassemento e outras directrizes internacionais. As questões relacionadas com reassentamento e compensação irão constar do Plano de Acção para Reassentamento. Elisa Vicente –CES
Agostinho Paulo	Sabemos que a mina ainda não abriu. Paramos agora de cultivar?	Como ja falamos anteriormente, a Twigg encontra se neste momento na fase de pesquisa pelo que apelamos a população a continuar com as sua actividades diária . as pessoas não devem parar de cultivar. Antes de iniciar o trabalho da mina, e preciso identificar os proprietarios das machambas, atribuir lhes terras novas para machambas e compensar. E um processo que leva o seu tempo. Cabral Mutiquinhene – Twigg
Nazário Aly	Há estacas colocadas em algumas machambas e vimos algumas pessoas a	As estacas foram colocadas para assistir os inspetores mas

Matriz de Perguntas e Respostas

Reunião em Nquide Data: 19/08/13 Hora: 14h00 – 16h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
Emprego		
Enrique Rame	Não tenho muito a dizer senão agradecer à companhia por trazer este projeto à região. A companhia emprega menos de três pessoas de Nquide. Será que podemos não trabalhar como guardas ou para colher lixo no acampamento? O projeto é bom mas precisamos de trabalho.	Entendemos que o problema principal são empregos. O projeto está a andar rapidamente e logo vamos passar a fase de construção e operação da mina. Estamos a trabalhar com o governo do distrito para resolver a questão da distribuição dos empregos. Há um plano de recrutamento de trabalhadores através de comitês comunitários. Estas comissões serão criadas aqui e em todas as
Catarina Jeremias	Não temos muito a dizer, só queremos ver	comunidades e serão assistidas por membros do governo – o
	os nossos maridos empregados. Eles vão trabalhar e trazer dinheiro para nós.	Ministério do Trabalho.
Katchatepa Nassir Mualuwe	Gostaria de apoiar o Enrique. Da montanha até aqui, a terra pertence ao Nquide, mas não estamos a ganhar nada com o projeto. Não temos empregos. Espero que as oportunidades de emprego podem ser para todos. Se arranjarmos emprego, vamos dançar toda a noite. Temos pessoas que sabem dirigir tractores, máquinas pesadas, temos pedreiros, carpinteiros, mas sofremos porque não há empregos.	Não temos trabalho para todos, mas existem alguns trabalhos que são necessários ocasionalmente. Ainda estamos a estudar como melhorar o processo de recrutamento com o apoio do governo. Cabral Mutiquinhene- Twigg
Martins Nicula	Precisamos de empregos para Nquide. Deixamos casas para procurar emprego no acampamento e passamos o dia inteiro sem saber de nada, se há emprego ou não. Às vezes a empresa diz que não há emprego, mas depois disso ficamos a saber que alguém foi empregado.	Em relação às pessoas que vão e ficam no portão do acampamento da Twigg para procurar trabalho, nos apelamos para que não façam isso pois existem procedimentos para recrutamento de mao de obra temporario ou permanete. Tems por vezes trabalho com duração de dois dias, mas o recrutamento e feito de acordo com as regras estabelecidas. Dinís Napido - Twigg

Pedro Manuel Mustafa	Pode ser empregado um estrangeiro residente em Moçambique? Uma pessoa que venha de Maputo durante a fase de recrutamento poderá ser empregada na mina?	Quanto a estrangeiros, o nosso governo dá prioridade ao recrutamento de mao de obra nacional. Em caso de necessidade de mao de obra especializada que não se encontre em Moçambique ai teremos que recrutar estrangeiros, mas sempre obedecendo os regulamentos da lei do trbalho para contratação de mao de obra estrangeira. Pessoas de Maputo, Niassa, Cabo Delgado são todos moçambicanos e não queremos discriminação entre moçambicanos. No entanto, será dada prioridade aos moradores locais. Dinís Napido – Twigg	
Mahamudo Jesefo	Está visto que uma equipa irá à aldeia para falar com os chefes. Gostaria de recomendar que os chefes não dessem os empregos só aos seus familiares.	Sobre corrupção no processo de recrutamento, a equipa não será formada só por líderes da Comunidade teremos representantes de departamentos governamentais como o Ministério do Trabalho, autoridades distritais e representantes da empresa. Temos que seguir a nossa organização e confiar nos nossos dirigentes. Dinís Napido – Twigg	
Augusto Cassimo	Quando a empresa chegar não vai querer empregar pessoas doentes (deficientes). Que tipos de doenças são permitidos? E sobre as pessoas com deficiências?	A politica da empresa e não desriminar o trabalhador. Esta previsto no plano de contração de mao de obra, formação para os trabalhadores. Assim, a pessoas com deficiencia pode concorrer a uma vaga para a qual tenha uma aptidao comprovada. Dinís Napido – Twigg	
Descrição do projecto			
Martins Nicula	Ouvi dizer que se a machamba for identificada, a pessoa será compensada pela perda de colheitas, mas a terra é da responsabilidade do governo. A empresa tinha prometido trazer um tanque de água 1000 L. Não aconteceu nada até hoje.	Na área onde se pretende explorar a grafite existem machambas e algumas estruturas de apoio como celeiros e alpendres para descanço. Todas essas machambas precisam ser indentificadas, conhecer os proprietarios, medir a área da machamba, registar todas as culturas presentes. Isso faz parte do processo de reassentamento economico. As pessoas que forem afectadas devem receber uma compensação pela perda de machambas, culturas agricolas e e bens. Dinís Napido – Twigg	
		Eu não sei quem disse que seria um tanque de 1000 L. Estamos a considerar um projeto muito grande onde a água vem de Chipembe, passa por Ntete até ao nosso acampamento, daí teremos água para beneficiar as comunidades. Dinís Napido – Twigg	
Secretário do bairro	Eu não tenho muito a dizer só quero agradecer a todos os presentes. O povo contribuiu muito. Nesta aldeia de Nquide	O problema da água poderá ser resolvido quando a mina estiver a funcionar, pois canalizaremos a água da barragem de Chipembe e parte dessa água pode ser usada pela aldeia. Todos os vossos	
não temos água. Gostaríamos de ter	receios e questões serão considerados no processo. Dinís Napido		
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água. Temos fontes e isso não está a	– Twigg		
funcionar, gostaríamos de ter ajuda para			
reparação. Temos um ribeiro que se for			
escavado pode vir a ser uma boa fonte de			
água. Estamos prontos para receber a			
mina.			

Reunião em Pirira Data: 20/08/13 Hora: 09h00 – 12h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
emprego		
Simão Roberto Amimo	Eu gostaria de ouvir os membros do governo, confirmando se as informações que recebemos são corretas. MICOA é a favor do governo ou das pessoas em geral? Sabemos que as promessas não serão cumpridas; Recebemos pessoas do governo, do Departamento de Eletricidade, cortaram nossos coqueiros e disseram-nos que seremos compensados, mas não fomos compensados. Queremos saber se o governo é pela população ou pela empresa. No princípio gostamos da forma como a empresa Twigg trabalhou, mas não agora. Naquela altura era fácil arranjar emprego no portão, mas agora é difícil. Há pessoas que dizem que conseguem arranjar uma vaga de emprego. Como é que as pessoas que não são da empresa podem prometer emprego? A empresa é a única responsável por empregar pessoas.	Como já dissemos, vamos criar uma estratégia de recrutamento para garantir que estes problemas não aconteçam e que todas as aldeias tenham seus membros a trabalhar para a empresa. Nesta fase em que nos encontramos não há empregos permanentes mas apenas empregos ocasionais por alguns dias. Não haverá nenhuma discriminação para empregos exceto onde o trabalho requer habilidades especiais. Em relação à idade, existem limites, por exemplo, a empresa não pode empregar menores de 18 anos. Então velhos e jovens abaixo da idade para trabalhar não serão empregados. Dinís Napido – Twigg Este processo esta a ser acompanhado pelo governo, neste caso pela Direcção Provincial para Coordenação da Acção Ambiental, de forma a garantir que o ambiente érespeitado incluindo pessoas e sues bens. Ana Maria Jone-DPCA
Maria Saibo	Precisamos de trabalho, mas quando vamos à mina não somos contratados	

Nome/Organização	Comentários/Pergunta	Respostas
	porque não sabemos falar Português e	
Reassentamento e co	mpensação	
Reassemanento e co	mpensuguo	
Salvador Rajabo Momola	Agradeço a apresentação detalhada, eu não sou contra o projeto, pois sabemos que onde há uma empresa teremos benefícios, mesmo não estando nós mesmos a trabalhar lá. Estamos preocupados com as nossas machambas, precisamos de machambas para nosso sustento. Eu gostaria de ver as pessoas que perdem suas machambas a ser recompensadas decentemente.	Todas as pessoas afectadas pelo projecto serão compensadas pela perda de bens. Iremos cumprir com a lei moçambicana que regula esses assuntos. Dinís Napido – Twigg
	Ainda bem que nem todos os terrenos serão afetados. Nós também reservamos áreas importantes e ficamos satisfeitos por saber que o projeto não usará essas áreas.	
Simão Roberto Amimo	Queremos saber quem vai pagar a compensação, será o distrito ou a empresa? Estamos em dúvida, foi dito que o distrito pagaria a compensação, mas hoje não vemos qualquer representante distrital. Sr. Anton disse que a compensação seria paga pelo Banco Mundial e Twigg.	A empresa vai pagar a compensação pela terra e não o governo. Por lei o governo éresponsavel pela atribução de novas terras aos afectados. O que Anton estava a dizer é que o processo de compensação pela perda de terras será feito segundo as normas internacionais ou do Banco Mundial e tambem ira seguir a legislação mcambicana. Elisa Vicente-CES I
Simão Roberto Amimo	Houve outra reunião a 6 de agosto e foi dito que isso não será pago porque a terra pertence ao estado.	As pessoas não serão compensadas pela terra mas serão compensadas pelas culturas, árvores e estruturas de apoio presentes nas machambas. O governo ira identificar juntamente com as comunidades novas áreas para abrir novas machamabas para atribuir as pessoas afectadas. A terra em Moçambique não se vende, porque a terra pertence ao estado. Elisa Vicente-CES I
Assamo Calmane	Estou preocupado porque os membros de governo provincial aqui presentes	A empresa chamou a Direção Provincial para a Coordenação da Acção ambiental e outras instituições do governo para monitorar as

Nome/Organização	Comentários/Pergunta	Respostas
	estiveram também em outro projeto que ainda não pagou a nossa compensação. Como podemos confiar nesses membros?	actividades de consulta pública deste projecto de modo a verificar se todos os procedimentos legais estão a ser obedecidos. Devemos confiar sim no governo pois este esta aqui justamente para defender os interesses do povo. Ana Maria Jone-DPCA
Molande Zumane Dumbwa	Sabemos que estas terras são emprestadas na comunidade, se alguém tem um terreno com árvores de caju e manga que não pagou, é melhor pagar e não comprometer a empresa.	Todctadas pela perda de bens e culturas agricolas serão devidamente compensadas. Caso existe alguma pessoa que foi prejudicada e não foi compensada tera a oportunidade de recmos conflamar uma vez iniciado o processo RAP. Dinís Napido – Twigg
Amane Nusso	Obrigado pela vossa presença, só estou preocupado com a bomba da água que está danificada.	Essa preocupação esta fora do assunto que nos trouxe hoje, contudo esta questão da falta de água na comunidade tambem nos preocupa. iremos entrar em coordenação com a administração de forma a encotrar uma solução para o fornecimento de água. Dinís Napido – Twigg

Reunião em Maputo/ Mualia Data: 20/08/13 Hora: 14h00 – 16h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
emprego		
Sumaila Nandioca	Esta montanha é ao lado de Mualia, mas só pessoas de Balama são empregadas. Para ter um emprego é necessário ter um BI, mas existem pessoas com BI que deixaram seus nomes mas ainda não têm	Gostaria de esclarecer que a empresa não enviou ninguém para recolher uma lista de nomes e/ou BIs para o emprego. Contudo, no iremos investigar para apurar a verdade sobre a questão. A questão

Nome/Organização	Comentários/Pergunta	Respostas
	emprego porque a empresa não veio para Mualia.	do emprego será tratada em coordenação entre o governo e a
		comunidade. Este projeto está a dar o primeiro passo, então só tem
Arlindo White Siare	Obrigado por apresentar o projeto em detalhes. Este é o primeiro projeto que acontece no distrito. Agradeço a presença da equipe e eu gostaria de recomendar que o governo seja informado de que a população de Mualia está feliz com o projeto. Existem pessoas cadastradas, mas não entendem o propósito do registo. Quais são as formalidades para obter empregos? Ele disse que esta montanha é perto de Mualia, mas apenas as pessoas de	 50 trabalhadores. Neste momento só estamos a fazer a pesquisa Quando entrarmos na fase de construção preve se empregar cerca de 300 pessoas. Quando chegarmos a esse estágio trabalharemos com as quatro comunidades porque eles são diretamente afetados pelo projeto. Vamos trabalhar com o Ministério do Trabalho e com as comunidades no processo de seleção dos trabalhadores. Aconselhamos a população a continuar com as suas actividades habituais, não deixem de ir a machamba e produzir comida. Quanto à questão do emprego, a empresa não discrimina as mulheres. Todos tem direitos iguais e na fase de recrutamento os
	Balama é têm empregos. Há pessoas de Mualia que deixaram nomes mas ainda não têm emprego porque a empresa não veio para Mualia	trabalhadores irão receber formça acerca da actividade a desenpenhar.
Luisa Aquino	Houve uma reunião e eu fiquei toda entusiasmada porque foi mencionado que as mulheres podem trabalhar. Na mina de grafite as mulheres não trabalham?	não largarem o trabalho que têm para virem para o portão. contratamos um grupo de pessoas para coletar uma amostra. O processo de demarcação de terras começou como parte do RAP.
Amade Quiname Nipira	A informação que temos é que o número de trabalhadores foi reduzido, mas há um grande número de trabalhadores de Balama na mina. No dia da reunião, encontrei quase 20 pessoas. O diretor disse que ele iria informar as pessoas quando houvesse alguma vaga. A mina deveria seguir o exemplo de equidade, e os empregos deveriam ser divididos igualmente entre as aldeias. Não sei se a pessoa deve ficar no portão para conseguir emprego. Se assim for eu enviarei os jovens da aldeia para o portão	Dinís Napido – Twigg

Nome/Organização	Comentários/Pergunta	Respostas
	do acampamento. Ouvi dizer que havia uma demarcação de terras. Isso acontecerá aqui também?	
Reassentamento e co	mpensação	
Aquino Aide Adelino Sadique	Não estou satisfeito porque as brigadas não dizem a verdade, você está mentindo. As pessoas que fazem as pesquisas nas fazendas dizem que a pessoa perderá machamba mas não dizem o valor a ser pago. Não queremos o projeto venha explorar as pessoas e achamos que o Administrador deveria estar na reunião. Nos campos só há milho e sorgo. Já colhemos e se não há nada na machamba, como a compensação será paga? Concordamos que a terra pertence ao estado, e é melhor obedecer à lei, não vale o risco. As pessoas deveriam poder estabelecer o preço das fazendas. As pessoas que fazem a pesquisa dizem que as pessoas lesadas não serão pagas quando se acha terra somente, e perguntam se queremos dinheiro.	Sobre reassentamento e compensação , devo dizer que os estudos estão a ser feitos com base no regulamento moçambicano sobre reassentamento. O princípio orientador central de um projecto de reassentamento é garantir que nenhuma população afectada, nenhum dono de machamba fique numa situação pior após o reassentamento. éimportante garantir que as pessoas afectadas não sejam apenas consultadas ao longo do projecto do PAR, mas que os seus direitos e responsabilidades sejam claramente comunicados a eles. Este éum processo que leva o seu tempo por isso apelamos a paciencia e caso exista alguma irregularidade voçes devem informar ao grupo de trabalho. Elisa vicente –CES
Geral		
Constantino	É verdade que há uma falta de informação.	Prometemos melhorar a comunicação com as populações e iremos criar em breve um plano estratégico de comunicação . Estamos
Secretário	Gostaria de agradecer a todos e informar que a montanha pertence a nós. As pessoas deveriam nos abordar para quaisquer questões.	gratos por esta declaração – temos que assegurar-nos de que todas as informações são passadas sem distúrbios. Dinís Napido – Twigg
Lider na comunidade	Como toi já foi dito pelo secretário, temos que viver em paz. As pessoas que vão à procura de emprego e não acham na	

Nome/Organização	Comentários/Pergunta	Respostas
	mina, plantam discórdia. É preciso	
	escutar com atenção	

Reunião na Administração de Balama Data: 19/08/13 Hora: 14h00 – 16h00 Local: sala de reuniões da Administração

Nome/Organização	Comentários/Pergunta	Respostas
emprego		
Alice Rodolfo Administradora do Distrito	Obrigado para a apresentação, o governo já sabe sobre o projeto. Queremos ter boa coordenação entre governo, empresa e comunidades. Eu gostaria de saber sobre a mão-de- obra estrangeira. Sabemos que a empresa contratou técnicos moçambicanos e estrangeiros e tivemos problemas com estrangeiros em outras empresas. No projeto de Ancuabe, o acampamento foi dividido entre moçambicanos e estrangeiros, moçambicanos não podiam cruzar o lado estrangeiro do campo.	 Um projeto nunca se desenvolve sozinho. Temos o administrador Cabral que é responsável pela gestão e temos três diretores, eu sou o diretor moçambicano, outros dois são estrangeiros. temos tido a experiência de outras empresas de mineração e queremos trabalhar com o governo em relação à mão-de-obra. Todos os aspectos legais de contratação de mao de obra nacional e estrangeira serão obedecidos. Quanto à discriminação, no campo, temos áreas para funcionários seniores e júniores. Não há nenhuma discriminação racial; tentamos minimizar o ingresso de trabalhadores estrangeiros. Os estrangeiros que temos agora no acampamento são os consultores. Dinís Napido – Twigg
	Sabemos que nas aldeias, a população é analfabeta e eu já tinha solicitado apoio à empresa para abrir uma escola de alfabetização pois Balama tem altos níveis de analfabetismo. Eu gostaria de saber se haverá um laboratório nacional para o processamento de grafite.	Como parte do desenvolvimento de aptidões no distrito de Balama, a empresa vai criar um programa de desenvolvimento de aptidões para assegurar uma melhoria nas competências dentro das comunidades. No nosso plano de responsabilidade social preve se a construção e ou melhoria de escolas de modo a contribuir no aumento do numero de pessoas com acesso a escola. Mesmo aquelas pessoas que são analfabetas terão direito a emprego pois ha actividades que podem ser desenvolvidas por

Nome/Organização	Comentários/Pergunta	Respostas
		trabalahdores não especializados. Para alem disso, antes de iniciar com o trabalho terão direito a formação
		Sobre o laboratório, temos o nosso laboratório, vamos construir o nosso laboratório de controlo de qualidade. Dinís Napido – Twigg
Issa Rachide (Secretário Permanente do Distrito de Balama)	O projeto é bem vindo, porque irá ajudar desenvolver o distrito e os membros do governo estão conscientes disto e faremos o nosso máximo para fornecer apoio. Gostaria de compreender melhor o mercado de grafite e urânio porque tinha ouvido dizer que possuímos urânio. Sabemos que a empresa irá treinar os nossos cidadãos baseados em estrangeiros, ás vezes esquecemos nos que o papel dos estrangeiros é para o ensino. Os estudos devem incorporar a questão de formação de moçambicanos.	A empresa pretende explorar grafite e possivelmente vanadio. Não iremos explorar uranio. A grafite é um mineral de cor cinzento-aço, de brilho metálico, macio e bom condutor da corrente elétrica. Uma das suas mais importantes aplicações é o fabrico de lápis. A grafite é um dos minerais mais macios que se conhece. Conforme a quantidade de argila com que é misturada no fabrico dos lápis, estes são mais ou menos duros. Pelo facto de ser boa condutora, a grafite é utilizada no fabrico de cadinhos refratários, de elétrodos e de outros materiais elétricos. O preço da grafite está ligado, entre outros fatores, às suas propriedades: condutividade, inércia química e baixa densidade. Além disso, a quantidade, tipo das impurezas e o teor de cinzas são fatores também determinantes nos preços dos produtos de grafite A Lei de Trabalho estabelece a percentagem de estrangeiros que podem ser utilizados por uma empresa. Os estrangeiros devem cá vir para partilharem o conhecimento deles. Isto será realizado através de acordos escritos e memorandos com o governo. Mesmo aquelas pessoas que são analfabetas terão direito a emprego pois ha actividades que podem ser desenvolvidas por trabalahdores não especializados. Para alem disso, antes de iniciar
Celso Nhumaio (Especialista em Recursos Minerais)	Sugiro que quando começar o treinamento, seja criada uma escola de geologia semelhantemente ao que foi feito pela Vale em Tete.	Levaremos em conta todas as propostas dadas. Vamos tentar achar um meio termo para melhor cobrir as necessidades do trabalho e formação. Dinís Napido – Twigg

<u>Reunião em Pemba</u> Data: 21/08/13 Hora: 9h00 – 11h00

Local: Sala de Reuniões da Direcção Provincial das Obras Pública e Habitação

Nome/Organização	Comentários/Pergunta	Respostas
Emprego		
Mbeua Cabudo	Qual é o trabalho que será feito pelas pessoas locais?	Existem diversos programas para serem desempenhado e formação para a juventude e as mulheres, mesmo antes da construção da
Omar Martins – Estudante	Incentivo o projeto a trabalhar com o governo. "O filho da casa lava o chão melhor do que o hospede". Balama necessita uma escola técnica.	 para a juventude e as mulheres, mesmo antes da construção da mina. É difícil empregar todos. A questão de desemprego será monitorado pelo governo para garantir que as pessoas do local conseguem emprego. Trabalharemos juntamente com o Departamento de Trabalho. Como parte do desenvolvimento de aptidões no distrito de Balama, a empresa vai criar um programa de desenvolvimento de aptidões para assegurar uma melhoria nas competências dentro das comunidades. No nosso plano de responsabilidade social preve se a construção e ou melhoria de escolas de modo a contribuir no aumento do numero de pessoas com acesso a escola. Mesmo aquelas pessoas que são analfabetas terão direito a emprego pois ha actividades que podem ser desenvolvidas por trabalahdores não especializados. Para alem disso, antes de iniciar com o trabalho terão direito a formação. Temos tido a experiência de outras empresas de mineração e queremos trabalhar com o governo em relação à mão-de-obra. Todos os aspectos legais de contratação de mao de obra nacional e estrangeira serão obedecidos.
		seniores e júniores. Não há nenhuma discriminação racial; tentamos minimizar o ingresso de trabalhadores estrangeiros. Os estrangeiros que temos agora no acampamento são os consultores. Dínis Napido
Reassentamento e co	mpensação:	– Twigg

Syrah Resources Ltd

Nome/Organização	Comentários/Pergunta	Respostas
Angela	Estamos a aprender com os megaprojetos e começamos a entender os riscos. Vimos que haverá um reassentamento e foi mencionado monitoramento mas nunca vemos o seguimento disso.	Gostaria de corrigir isso e informar que este projeto não terá nenhum reassentamento físico. Prevemos o reassentamento económico devido à perda de machambas. Os regulamentos nacionais e internacionais dizem que quando as pessoas são retiradas de suas mbas devem receber outras áreas de tamanho equivalente para continuarem a trabalhar em seus campos. Em nossos regulamentos, é da responsabilidade do governo fornecer novas áreas e o proponente do projeto deve criar condições para que as áreas sejam utilizadas. Elisa Vicente – CES
Descrição do project	os e avaliação de impactos	
Joel Paulo - Empresário	O ToR iria avisar sobre a questão da água, há muitos interesses agrícolas na área. É melhor estar ciente, porque ouvi dizer que a irrigação de Chipembe irá promover a agricultura na região.	O uso da barragemde Chipembe por diferentes obras será debatido com o governo. Essa é uma das alternativas de água para o projecto. Outras alternativas para o fornecimento de água podem ser consideradas tais como o uso das águas subterrâneas. Elisa Vicente – CES
Joel Paulo- Empresário	Ficamos preocupados ao vermos que em mega projetos só há companhias italianas ou sul-africanas. Eu gostaria que os serviços nacionais tivessem prioridade.	Há lugar para as companhias nacionais, porém temos que nos preparar para as necessidades de mercado. Dinís Napido – Twigg
Estudante	Como vai ser feita a proteção aos locais sagrados e aos cemitérios?	De acordo com nossa experiência em relação aos locais sagrados, o primeiro passo é identificar esses locais com a ajuda da população. Existem alguns monumentos que não podem ser removidos, e portanto, é preciso garantir que as populações continuem a ter acesso a esses lugares. Quando se trata de sepulturas, propomos a deslocalização das sepulturas se houver sepulturas afetadas pela mina. O processo deve ser feito respeitando os costumes locais. É necessário que as cerimônias tradicionais sejam realizadas e que sejam apoiadas e financiadas pelo proponente do projeto. Elisa Vicente – CES
Fakir Sevenha	Quero saber sobre o uso de caminhos-de-ferro, porque nas apresentações só se fala de estradas. Já que Cabo Delgado não tem caminhos-de- ferro, como é que a carga vai ser levada para o porto de Pemba?	Conversamos com o CFM-Norte para sabermos dos planos para o porto e caminhos-de-ferro em Pemba.Preve se a construção de uma linha férrea de Lichinga a Pemba passando por Balama. Mas para já será tudo transportado por estrada de Balama até Pemba ou Nacala. Dinís Napido – Twigg
Mbeua Cabudo	Bem-vindos ao projeto, acho que ao avaliarmos o impacto na saúde teremos mais oportunidades de nos envolvermos	Durante a avaliação de impactos na saúde vamos trabalhar lado a lado com o setor de saúde para sabermos quais são os principais problemas de saúde no distrito, que consequências na saúde advirão

Coastal & Environmental Services

Nome/Organização	Comentários/Pergunta	Respostas
	e saber como intervir. O projeto traz	com o projeto, e elaborar medidas de mitigação e controlo destes
	Gostaríamos de ver melhorias na saúde	problemas.
	de Ntete.	Estamos numa fase preliminar e ainda não dispomos de todos os
		dados sobre as áreas que serão afetadas pelo projeto. Nossos
		estudos especializados irão abordar este aspecto.
		Os regulamentos ambientais atestam a necessidade de estudos de impacto ambiental em poyas áreas de reassentamento para garantir
		a existência de condições aceitáveis, tais como água e solos férteis.
		Se não houver condições, recomendaremos medidas para a
		melhoria. Elisa Vicente –CES
Fakir Sevenha-	Obrigado pela apresentação, onde foi dito	Quanto à perda de biodiversidade, já temos estudos especializados
Estudante	que haverá alta perda da vegetação e	que cobrirão este aspecto. Baseados na nossa experiência vamos
	piodiversidade. Sendo uma fase	apresentar estudos onde recomendamos compensações na
	fossem apresentados a nós também	No final dos estudos, teremos um encontro como este para
		apresentar os resultados. Elisa Vicente –CES
Matias	Tivemos experiências ruins com a	Os diversos estudos especializados feitos como parte do projeto irão
	Anadarko. Há grafite nas florestas de	dar a mesma importância a estas áreas que dão às áreas proibidas
	Miombo. Foram descobertas espécies	que deverão ser protegidas. Elisa Vicente –CES
lonuário	endemicas, isto foi levado em conta?	Como monoionado enteriormento, etuelmento e preisto sindo está
Muaramassa	a vida da população pão irá mudar muito	em fase de exploração e estão a ser feitos diversos estudos. Logo
maaramassa	O que falta?	que todos esses estudos ficarem concluídos e a mina abrir, vai haver
		mais postos de trabalho e as pessoas vão ver a diferença.
Lúcia Lurdes	Como é que vão ser tratados os rejeitos?	Vamos ter vários tipos de resíduos, e cada um será tratado de forma
		diferente. O refugo final terá tratamento próprio devido à ocorrência
		de enxofre e outros elementos. Vamos também criar um sistema de
Alborto Ernosto	Que métodos o projeto irá usar om	reciciagem de enuentes. Elisa vicente –CES
Alberto Emesto	relação à proteção da atmosfera. Quais	Em matéria de O2 e CO2, a empresa usará equipamentos movidos a
	são as etapas para sensibilizar a opinião	<i>diesel</i> . Estão previstas compensações ecológicas. Os proietos
	pública, e o que é o plano do projeto?	devem ser evitar a poluição . Dinís Napido – Twigg
J. B. Sixpense -	Há alguma possibilidade de criar	Ja se pensou no assunto. Estamos a considerar todas as propostas.
Nunisa	empresas paralelas para usarem grafite?	Dinís Napido – Twigg
Angola	Os mais lesados são as populações	A meta desta reunião é apresentar os principais riscos o possívois
Allyeia	daqui é preciso salváguardar os seus	estudos que serão realizados para propor medidas para atenuar
	l uayui, e pieciso saiyayuaruar os seus	estudos que serao realizados para propor medidas para dienual

Nome/Organização	Comentários/Pergunta	Respostas
	interesses. Estou satisfeito com a forma como eles estão a trabalhar. Espero que vocês tenham dito às pessoas das aldeias que terão mais tempo para semear.	esses riscos. Vários estudos ecológicos, sociais, de saúde, etc., estão a fazer-se para identificar os impactos causados pela mina. Elisa Vicente – CES
J. B. Sixpense - Nunisa	Qual é a estratégia para a implementação da responsabilidade social? Esta função vai ser passada para o governo?	A nossa Responsabilidade Social não depende de outras companhias. As outras companhias são apenas associadas porque os programas não poderão ser isolados. Os planos a executar no ambito da responsabilidade social sempre estarão em coordenação com os interesses do governo e das comunidades. Dinís Napido – Twigg

FASE DE EPDA: comentários questões recebidas Por email

Nome/Organização	Comentários/Pergunta	Respostas
Descrição do project	o e avaliação de impactos	
Sean Nazerali (Consultor	Foi mencionado apenas de passagem a existência de áreas de conservação muito significativamente importantes nas proximidades (Parque Nacional das Quirimbas (PNQ), Reserva Nacional do Niassa e Reservas de Caça). É preciso avaliar o impacto sobre estes. Especialmente, Twigg deve avaliar o impacto do uso de água na bacia de Montepuez, incluindo no Parque Nacional das Quirimbas. NB e PNQ têm uma zona- tampão de 10km, o que traz tudo para muito mais perto da proposta m	Comentário anotado. O relatório especializado dará mais detalhes. As áreas protegidas são discutidas na seção 4.3.2 (pág.37) do EPDA. O PNQ fica aproximadamente a 85 km de distância no seu limite mais próximo (Figura 4-5 pág. 37). CES
Ìndependent)	O EPDA menciona que as normas de desempenho da IFC vão ser	Anotado. Muitos desses pontos estão implícitos no PS6 – não é preciso incorporar no ToRs. PS6 também não estipula o uso de

Nome/Organização	Comentários/Pergunta	Respostas
	respeitadas. O PS 6 prevê o uso de Compensações de Biodiversidade para impactos residuais, que embora mencionado na seção no PS6, não parece ser nos TORS para a EIA. 1. O EIA deve avaliar a quantidade e extensão de habitats críticos e naturais em conformidade com PS6. 2. A necessidade de avaliar o potencial de áreas de compensação, bem como seu atual estado da biodiversidade. 3. A compensação possível de apoiar o WWF está incorreta. Deveria ser antes apoiar o PNQ ou a Reserva do Niassa. 4. NB o DNFFB não é a entidade governamental certa para a criação de áreas de conservação.	Compensações de Biodiversidade, na verdade afirma sua criação como último recurso, após outros meios (atenuação, reabilitação etc) terem sido explorados. 1. Avaliação será feita no estudo de vegetação 2. Só será realizado se forem considerados compensações necessárias pelos especialistas 3. Anotado. Redação no parag. 87 atualizada para destacar QNP como potencial de compensação de biodiversidade 4. Anotado. Corrigida para Direção Nacional de Áreas Conservação (DNAC). CES
	Vários estudos da vegetação feitos em Cabo Delgado nos últimos anos estão à disposição contrariamente à informação na secção 4.2.1., particularmente nas áreas protegidas nas proximidades do local do projeto.	Obrigado por chamar a nossa atenção para isto. Estes estudos vão ser revistos e as informações relevantes serão incluídas no projeto ESHIA, avaliações de fauna e vegetação. CES
	Os impactos no porto e no corredor de transportes não parecem ter sido incluídos.	Estes serão tratados na Avaliação Visual do Trânsito e dos Transportes. CES
	Na questão do uso da terra e posse da terra, por que não considerar a possibilidade de reunir as aldeias como acionistas associadas do projeto, em troca de se sujeitarem ao reassentamento forçado e perda de acesso às suas terras tradicionais?	Os benefícios futuros da mina vêm através de distribuição de potenciais lucros e receitas. Há royalties de 3% nas vendas e 32% de imposto no lucro. Isto tudo será pago aos "donos" da terra, ou seja, o governo. O desafio é criar protocolos para garantir que alguns benefícios que estes fundos podem criar sejam sentidos localmente, sem falar da Responsabilidade Social à Comunidade canalizada pela mina. CES
	Os aspectos socioeconômicos devem incluir a identificação das oportunidades de emprego para a população local e as aptidões necessárias para tirar partido	A Avaliação do Impacto Sócio Económico vai tratar destas questões, e incluir estas sugestões válidas. CES

Nome/Organização	Comentários/Pergunta	Respostas
	destas oportunidades, bem como uma visão geral do atual nível formação e aptidões.	
	Deverá pensar-se num programa de formação desde o início para criar a base para que as pessoas locais possam ser treinadas para poderem ser empregadas. Deve também prestar-se atenção à preparação para oportunidades paralelas que a mina vai criar, ou seja, fornecimento de bens e serviços para a mina e para os seus trabalhadores.	
Sean Nazerali	P38 "a tribo não tem título jurídico sobre a terra" está incorreto. Sob a lei de terras, eles na realidade têm direitos jurídicos e legais para o uso da terra, baseado no uso tradicional. Não é preciso obter nenhum certificado formal para isso.	Propriedade e direitos de uso de terras são problemas distintos, em nossa opinião. É nosso entendimento que, embora as comunidades gozem de direitos de uso de terra sem ser preciso nenhuma documentação formal, a terra porém pertence ao governo. O quadro jurídico para os direitos à terra e sua aquisição é sustentado pela constituição do país e a lei de terras de 1997. Artigo 109 do capítulo V da Constituição, por exemplo, declara que a terra não pode ser vendida, e que a posse da terra eventualmente cai sobre o estado. Os direitos e apreciação dos mesmos serão mais investigados na avaliação de impacto sócio econômico e plano de ação de reassentamento (RAP). CES
Isabel Ferreira	Considerando que o projeto terá duas áreas de atividade a. Balama – extração. b. Pemba – entrega dos produtos E dado ao aumento no trânsito de camiões pesados e ao elevado número que circulará na cidade, criando uma enorme pressão para a infraestrutura existente (por exemplo, nas vias de acesso para o porto de Pemba, manutenção de estradas, congestionamento do tráfego, estacionamentos, etc.) e para a qualidade do ar, devido a emissão de CO2 para a atmosfera, serão os impactos sobre a	O impacto do tráfego no local da extração & processo, bem como a entrega do produto no porto de Pemba será abordada especificamente na Avaliação Visual do Trânsito e Transportes. As emissões geradas durante a construção e fases operacionais serão registadas num inventário de emissões e incluídas num modelo de dispersão, como parte da Avaliação da Qualidade do Ar. Queira consultar os Termos de Consulta para Estudos Especializados na página 88 & 90 do EPDA. CES

Nome/Organização	Comentários/Pergunta	Respostas
	cidade de Pemba considerados e estudados na AIE?	
	O plano de gestão deve considerar a captura de carbono, provavelmente apoiado pela atividade secundária da produção agrícola, incluindo o plantio de árvores maiores que têm um impacto maior e mais duradouro em comparação com os arbustos e as culturas?	Não será elaborado nenhum plano de gestão específico para a captura de carbono. Uma parte fundamental das recomendações vindas da ESHIA será planos para projetos agroindustriais de grande porte nas áreas agrícolas existentes (sem perda de carbono) como parte dos planos de desenvolvimento socioeconômico para a reabilitação do projeto e vegetação (captura de carbono), particularmente das Florestas de Miombo. Os projetos agroindustriais também podem desviar a atividade econômica de produção de carvão em pequena escala na área e reduzir as emissões de carbono assim produzidas. CES
	O EIA identificará a quantidade de emissões de CO2 para a atmosfera em comparação com valores internacionais, o grau de poluição gerada a partir de gases GEE?	As emissões geradas durante a construção e fases operacionais serão capturadas num inventário de emissões e incluídas num modelo de dispersão, como parte da Avaliação da Qualidade do Ar. CES
	O aumento de movimento de navios na Baía de Pemba gerado pelo projeto terá um impacto na vida marinha. A Baía de Pemba é um lugar de passagem de baleias e outras espécies de importância ecológica, bem como áreas coralíferas importantes. Que medidas serão tomadas para proteger esses ecossistemas?	Um estudo ecológico marinho da Baía de Pemba não foi incluído no escopo da ESHIA. CES

Syrah Resources Ltd

FASE DE EIA

Reunião em Balama Data: 26/01/15

Hora: 13h00 – 15h00

Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas	
descrição do projecto	descrição do projecto e avaliação de impactos		
Renato Wani	Em primeiro lugar lamentar o facto de o encontro ter começado tarde. Em relação aos procedimentos de consulta pública, quem deve oritar o encontro é o Administrador do Distrito ou o secretario permanente ou seu representante	Comentario anotado. Como pode verificar, na presente reunião estão representantes da administradora do distrito e do seu secretario permanente. Estes não puderam se fazer presntes neste encontro por motivos de agenda de trabalho. Lina Buque-CES	
	Recomendo que se de acesso as comunidades para poderem ler ou debater com antecedencia o relatorio de AIA de forma a que as mesmas possam participar de forma mais efectiva	Foram feitas actas de todas as reuniões feitas no ambito do reassentamento e foram entregues a administração no sentido de termos a assinatura da administradora. Esteve tambem a sugerir a assinatura e a fixação das atas, faremos chegar as comunidades. O nível de analfabetismo é alto. Não basta pendurar as atas mas tambem explicar. Carina Saranga-CES	
	Qual foi o mecanismo de divulgação do presente estudo? Quais as pessoas convidadas, são pessoas afectadas ou tambem as interessadas?	A divulgação da reunião de consulta pública para divulgação dos resultados do presente estudo obedeceu os criterios da lei. Foi anunciado na radio comunitaria de Balama, em lingua local, por ser um meio de maior alcance para as potencias partes afectadas e interesadas, especialmente as comunidades locais. Tabem anunciamos no jornal noticias e endereçamos cartas convite a todas PI&A's. Lina Buque-CES	
Rita de Jesus	Falaram sobre produção de mudas para recuperação da área pos mineração	Ja identificamos uma áreas onde sera o viveiro da empresa. As mudas serão feitas apartir de sementes ou plantas nativas da	
Angelo Francisco	Como sera concebido o viveiro	regiao. Estamos em contacto com outras empresas do ramo que irão nos apoiar no assunto. Serafino Mucova-Twigg	
	Na gestão de residuos não falaram sobre icineradores. Não havera previsa de construção de icineradores para gerir os residuos	Preve se construir um aterro sanitário para residuos não perigosos, e preve se no mesmo projecto a costruçao de um icinerador para o mesmo tipo de residuos de forma a gerir de eficazmente no controlo dos residuos gerados. Dinis Napido-CES	
Reassentamento e compensação			
Renato Wani	Na elaboração do presente estudo teve se	Quanto ao reassentamento, a licença é de 11 mil hectares. Há	

Renato Wani	em conta o plano Distrital de uso e aproveitamento de terras? Houve alguma atenção a componente de zoneamento de terras ou outros planos de desenvolvimento do distrito? Quem faz parte do comite do Plano de Açção para o reassentamento?	duas condições para operação, a primeira condição é o DUAT, outra condição é a licença ambiental que esta no processo agora. Foi constituido um comite de reassentamento a nivel provincial, distrital e da comunidade. Fazem parte da comissão representantes da comunidade (foram escolhidos pela comunidade para estabelecer um elo de ligação com a comunidade), governo, do proponente e do consultor. Em relação a zona de reassentamento que esta agora a ser preparada tivemos reuniões com os lideres comunitarios com o governo e pessoal da grafite. O lugar foi identificado não so pelo comite de reassentamento mas tambem pelos lideres comunitarios da área.
Inorio Nkuwa	O acordo com a empresa syrah foi de que Para alem da compensação em dinheiro iriamos receber terra para fazer machamba. Mas estamos a enfrentar problemas com os donos da terra onde foram reassentadas as novas machambas	A empresa parcelou as novas machambas de acordo com as dimensões da machamba anterior, limpou a área. O conflito da área de reassentamento deriva do facto de não ter havido uma comunicação exaustiva , a grafite comunicou o governo, a comissão e os lideres, pode ter havido um aexclusão de informação a nivel local. Vamos tentar resolver essa situação nos proximos dias.
Renato Wani	As populações hospedeiras foram consultadas sobre a vinda de pessoas reassentadas para praticar agricultura nas suas áreas	ja fizeram um avaliação e dizem que a terra é propria para gricultura. Célio Panquene –Twigg
Frederico Luis	Percebi pela explicação que os camponeses foram devidamente compensados pela Syrah. No meu entender a preocupação dos camponeses e que eles perderam as suas machambas para a empresa e agora não tem onde plantar pois os hospedeiros não permitem que cultivem as suas terras	Existem oportunistas a área que identificamos não tinha dono. Consultamos as comunidaes hospedeiras e todos os procedimentos foram cumpridos para atribuição da nova terra. Contudo estamos a discutir o assunto por forma a encontrar uma breve solução para o problema. Devo lembra que e função do governo atribuir novas áreas para reassentamento de machambas. Julio Mabote-Serviços Distritais de infraestutura de Balama
Dahudo Maquid	Recebi uma senha ha dois anos atras e de la para ca so vi os outros a serem compensados e reassentados. Gostava de	Foram identificadas as machambas dentro da área do projecto, por isso que cada proprietario recebeu uma senha de identificação da machamba.

	saber o que esta a acontecer	O reassentamento de machambas vai de acordo com o desenvolvimento da mina. Por exemplo, porque ha necessidade de construção de estradas numa determinada área, foram reassentantados e compensados ate ao momento 47 camponeses. Recomendo a equipe gestora dos assuntos sobre reassentamento e compensação da Syrah que intensifique a comunição com as comunidades de forma a informar sobre o andamento do processo e os passos que estão a ser realizados. Dinis Napido-CES Foi feito um levantamento das machambas, árvores de frutas dentro da área de interesse da mina, a empresa de consultoria registou celeiros, árvores de frutas, fotos, etc. Na altura de compensação serão usados os dados do levantamento. Caso um produtor não tenha senha não é um grave problema porque criamos mecanismos de reclamação, pode ser que na altura do lvantamento o campones não estava na machamba, a pessoa pode usar desses mecanismos e receber a sua compensação. Célio Panquene –Twigg
Patricio Ramadan	As distancias das novas áreas de reassentamento são distantes ou proximas das residencias dos camponeses	Com relação a questão da distancia, tivemos esse cuidado para que as pessoas consigam ir a machamba e voltar, sem que seja distante. O projecto tem impacto directo sobre 4 comunidades (Nquide Ntete, Mualia e Pirira) e a área de Ntete pode beneficiar Ntete e Nquide, e a área de reassentamento de Maputo pode beneficiar (Pirira e Maputo). A distancia media que estimamos era de 8 kilometros. Entretanto tambem estamos abertos a sugestões de como suprir essa distancia no ambito da responsabilidade social. Com a nova compensação que fizemos houve mudança do padrão de vida, alguns camponeses abriram moageira, negocios de projecção de filmes etc, deixaram de ser simples produtores agricolas e passaram a ser comerciantes podemos criar planos para ensina-los a gerir negocios. Célio Panguene -Twigg
Renato Wani	Recomendo que se produzam brochuras de 2 a 3 paginas com informação sobre o projeto e resultados do EIA e se entregue	Comentario anotado. Lina Buque-CES
	nas comunidades	
Lucia Alberto	O colega disse que em Balama so tem um	Sugestão anotada.

tecnico da área de infrestruturas e por isso	
e somente um que consta do comite de	
reassentamento embora a lei diga que	
devem ser dois tecnicos. Quando assim	
acontece sugiro que peça apoio a DPCA	
de Pemba ou procurar um tecnico mais	
proximo em Montepuez por xemplo de	
forma a obedecer com para	
reflorestamento a lei.	

Reunião com Comunidade de Ntete Data: 26/01/15 Hora: 13h00 – 15h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
descrição do projecto	o e avaliação de impactos	
Ali Somane Manuel Razão,	A dúvida que tenho é sobre os cemitérios, os cemitérios da minha familia, tem sinais que colocaram no cemitério e não fui informado. Como a grafite anda sempre com dinheiro fico a pensar que compraram os cemitérios. Ali certamente a pessoa que colocu os sinail não identificou todos cemitérios. Eu e a minha familia somos familiares daqui. Esta área onde andam a usar maquinas um meu tio foi apanhado por um leão e tornou-se um local sagrado para ele e agora esta distruido.	Quero primeiro agradecer ao Sr Ali, o nosso trabalho de identificação de cemiterios e locais sagradados era mesmo para respeitar as pessoas, líderes comunitarios ajudaram a identificação. O objectivo 'e a identificação, temos que respeitar o patrimonio cultural. Sr Manuel Razão, obrigado, as pessoas da comunidade que trabalharam conosco não sabiam que ali era um local de culto, ja que é um local sagrado vamos tentar fazer alguma coisa para reconstituir esse local, nem que seja necessario fazer algum tipo de cerimonia etc. Célio Panquene- Twigg

Ussene Mahala	Em primeiro lugar agradecer, sou a favor da empresa, hoje sabemos o que é grafite mesmo sem nunca termos visto. Antes de ontem veio pessoal da geografia e cadastro para fazer delimitação da área da grafite. Solicitarm por uma pessoa que podia trabalhar com a grafite para ver onde pode passar a grafite e trazer os resultados para a população, para sabermos onde vai comecar e onde vai terminar a área da grafite. Com a recomendação que estão a dar estamos agradecidos, já que dizem que teremos muitos carros e problemas de	
Reassentamento e co	mpensação	
Ovira Faustino	Aqui tem grafite, na barragem tem outro projecto, vamos parar aonde assim? Eu não estou contra a empresa, mas eu tenho 5 filhos, eu não trabalho na grafite mas ja levaram minha machamba. Queria saber se so vão reassentar machambas ou tambem as casas de Ntete.	 Obrigado pelas perguntas, todos nos seguimos o governo, e eles ainda não deram a possibilidade das empresas mineiras darem os 20% na comunidade. Todo o imposto que o governo cobra as empresas mineiras vão para o governo central. Os 20% que falaram serve para sectores florestais, faunisticos ,de hotelaria e turismo e não para mineração. Nos apesar de estarmos na fase de investmento financiamos material escolar para todas as criancas de Ntete, demos bolas, colocamos paineis solares nas escolas para os papás poderem estudar. Tambem ajudamos a maternidade de Ntete a ter água. Colocamos paineis solares para a maternidade ter luz para partos noturnos. Existe um entendimento entre a empresa e o governo que chamase responsabilidade social, a empresa deve com a população e governo local fazer actividades sociais e nos estamos paara assinar um memorando para a empresa tirar dois milhões de dolares (60 milhões de meticais) por ano para investir em Balama. Quanto ao reassentamento, a licença é de 11 mil hectare. Há duas condições para operação para isso, a primeira condição é o DUAT, outra condição é a licença ambiental que esta no processo agora. O poder todo esta convosco. O governo nunca vai aceitar sem o vosso

Renato Uani	Como a empresa vai fazer com relação ao	 consentimento. Por isso convidamos elementos do governo para testemunhar. Dinis Naapido- Twigg O conflito da área de reassentamento deriva do facto de não ter havido uma comunicação exaustiva , a grafite comunicou o governo, a comissão e os lideres, pode ter havido um aexclusão de informação a nivel local. Vamos tentar resolver essa situação nos proximos dias. Célio Panquene- Twigg O processo de DUAT, obrigou a fazer uma revisão para não afectar as comunidades, estamos a iliminar as comunidades (para que não
	tem, esta ser tido em conta este aspecto?	seja necessario reassentamento de famili) que é para a geografia e cadastro depois confortar com os outros interessas na comunidade. Dinis Naapido- Twigg
Impactos sociais		
Renato Uani	Gostaria de primeiro felicitar pela apresentação penso que foi acessivel e isso nota-se pela reação da comunidade, penso que foi usada uma linguagem acessivel a todos, ha algumas preocupações essas devem ser entendidas como contribuição para o melhoramento deste processo. Primeiro não vimos a participação da mulher neste encontro, a mulher é importante, ela tambem tem algo a dizer a nossa recomendação é que tambem se incentive a participação da mulher. A consultora falou da produção do relatorio deste encontro, gostaria de saber se sera produzido so o relatorio ou tambem a ata deste encontro, temos que perceber que o relatorio é util para empresa etc mas a ata é importante para nos porque todos nos podemos assinar. Porque aquilo que são as nossas duvidas e opiniões e preucunações devem vir refletidas pa ata	Como pode observar est ão presntes nesta reunião um numero significativo de mulheres as quais sempre apelamos antes de iniciar com a apresentaç ão que as mesmas prestem atenç ão e sintam se a vontade para trazer as suas preocupações pois são igualmente validas. A elaboração deste encontre segue em cumprimento do regulamento moçambicano que rege sobre avaliação de impactos ambientais mais concretamente sobre o processo de participação pública. Sera produzido um relatorio deste encontro onde constarão todas as preocupações levantadas e respectivas respostas. O mesmo relatorio vai ser submetido como anexo ao relatorio de AIA ao MICOA. Lina Buque-CES

porque dinheir amanh cobrar Emprego	e por exemplo alguns aspectos com iro tem que constar na ata para ha nos como comunidad podermos r as promessas.	
Amide Sadique As mul na grat nos nã La na g docum muito t ainda t	ulheres de Ntete não tem emprego afite. Afinal de contas pensam que ão sabemos trabalhar? grafite pediram-nos alguns nentos, para emprego mas ja passa tempo e não dizem nada, podemos ter esperancas?	Sobre emprego no geral a longo deste periodo que estamos em Balama, estamos a aprender e ja criamos algumas opções, de emprego que vão abranger as 4 comunidades e o distrito todo. Porque o governo aconselhou a ter o cuidado de não so olhar para as quatro comunidades. Isso no ambito da responsabilidade como empresa. Neste momento estamos a pensar em criar um comite de avaliação de todo o potencial de mao de obra local, não é um exercicio facil mas vamos tentar abrannger lideres locais para encontrarmos harmonia, nos não queremos escolher os lideres, mas as pessoas que farão parte do comite, virão das comunidades, para terem a missão de selecionar as pessoas, o que nos vamos fazer é levar as pessoas e comecar a treinar. E ao mesmo tempo havera consultas medicas para as pessoas saberem se estão aptos ou não para a tarefa. Porque nos queremos pessoas saudaveis trabalhar. Dinis Napido-Twigg

Reunião com Comunidade de Pirira

Data: 27/01/15 Hora: 13h00 – 15h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
descrição do projecto	o e avaliação de impactos	
Saibo Alí	Por exemplo, disseram que virão camiões de grande porte para trabalhar na mina de Grafite, o serviço de grafite, nos somos naturais daqui, nascemos e crescemos aqui, a cerca da estrada quem sabe é o governo e grafite, precisamos que as estradas não tragam poeiras. A seguir, ouvi dizer que lá no mato a empresa vai criar coelhos, antílopes ntre outros animais e vão nos proibir de chegar a determinadas áreas porque terá animais perigosos como cobras.	Quando falei sobre os animais não me entendeu bem, o que eu disse foi que é necessário proteger os animais evitando caçar. A muito tempo era possível caçar agora não reduziram e os que ficaram fugiram a procura de melhor lugar para viver, áreas menos impactadas. é preciso proteger as boas matas, evitar caçar e vender os animais . se derubamos as matas ficamos sem plantas medicinais, sem sombra, sem lenha, sem bambu etc. É nesse sentido que dizia que é necessário proteger esses animais. A empresa não vai criar antílopes. Lina Buque-CES
Saibo Ali	Na área da saúde os medicamentos não chegam para nós. Se de facto a Grafite esta aqui com o governo perguntem se porque é que este povo está acabar, são doenças. A grafite prometeu ajudar esta comunidade. Os furos de água que eles abriram foram três, mas não estão a funcionar e nada fazem nem vedação.	Quanto aos furos de água, a empresa sabe que todas comunidades tem problemas de água. Nos não somos especializados na área de furos de água, entao contratamo uma empresa para esse trabalho, depois de algum tempo os furos apresentaram problemas. Contratamos alguns especialistas para tentar repor os fros, mas descobriu-se que dois dos furos haviam colapsado. Neste momento estamos com o projecto de novos furos de água, (Mputo, Ntete, Nquide) desta vez Pirira não foi contemplado. Numa fase posterior vamos estender o programas para Pirira, vamos ter um pouco de paciencia, a MINA DE Grafite vai beneficiar todo Balama, e o governo do distrito nos chamou atenção nesse aspecto. A empresa ainda não está na fase de produção, ainda temos algumas limitacões de investimento. Célio Panquene-Twigg

Coastal & Environmental Services

Quero falar sobre a escola. No ano passado fizeram medições da escola mas depois não fizeram mais nada.Quendo há admissão ao emprego, as mulheres de Pirira não são procuradas, só uma mulher de Pirira esta a trabalhar na Grafite.	sobre a escola. Nos tivemos um programa de por luz em todas escolas da aldeias a volta da mina porque queriamos programas de alfabetização nas noites. Esse programa foi discutido com o governo atravez do da educação distrital e acordaram, foram informar as comunidades e estas aceitaram. Em Pirira aconteceu que a escola que temos é de capim e barro,entao, como empresa não podiamos beneficiar sem antes satisfazer o padrão das escolas prmarias em Mocambique, houve discução com o governo para ver se a população de pirira poderia fazer blocos, e nos ajudariamos a construir. Estamos a espera da planta padrão das escolas, incluindo casas de banho, entao estamos a espera que o governo nos dê isso. Procuramos saber quais são as outras comunidades de Balama com problemas de escola para podermos ajudar. Estamos a espera do governo para podermos comecar. Dinis Napido-Twigg
npensação	
Gostei de tudo que ouvi, mas o que aconteceu foi o seguinte, ha pessoas que foram abrangidas pelo reasentamento e foram indeminizadas, prometeram terra lavrada em Ntete mas o que acontece é que a partir daquela data até hoje ninguém tem machamba. Agora fico em dúvida, se até hoje os que foram reassentados não tem machambas, o que sera de nós no futuro. Se a empresa tivesse entrado num acordo era so dar dinheiro pelas machambas e mais nada, cada um arranjaria terra alternativa e evitaria confusão de terras. Nos so queremos dinheiro, n ão precisavam lavrar as machambas nos iriamos nos responsabilizar por encontrar alternativas.	Sobre o reassentamento, o que eu percebi foram duas coisas, a primeira é que as pessoas deviam receber dinheiro para depois comprar machambas onde elas quisessem. A outa coisa é que os pacotes de compensação foram acordados com o governo, os afectados e a empresa de grafite. É importante saber que as pessoas receberam a compensação completa, pagamos 63 mil meticais por cada héctar. Para cada árvore havia uma tabela do governo. A gest ão o da terra é feita pelo governo, mesmo para empresa adquirir o DUAT precisa do governo, o governo é que identificou a área e autorizou a empresa a fazer limpeza de tal área para o reassentamento. Mais tarde as pessoas reassentadas em Ntete foram escorassadas. Este assunto ja foi reportado ao governo do distrito, e nos como empresa vamos ajudar o governo a resolver esta situação. A compensação foi para tudo (machamba, cultura, celeiros). Célio Panquene-Twigg Vou começar por tocar a questão de dar dinheiro para comprar terreno, a empresa não pode dar dinheiro para comprar terreno, a empresa não pode dar dinheiro para comprar terreno. A empresa e o governo arranjaram um espaço que não seja distante para fazerm machambas. Os problemas que temos em Nteta temos certeza que vamos receber o mais breve possível e ia
	Quero falar sobre a escola. No ano passado fizeram medições da escola mas depois não fizeram mais nada.Quendo há admissão ao emprego, as mulheres de Pirira não são procuradas, só uma mulher de Pirira esta a trabalhar na Grafite. Gostei de tudo que ouvi, mas o que aconteceu foi o seguinte, ha pessoas que foram abrangidas pelo reasentamento e foram indeminizadas, prometeram terra lavrada em Ntete mas o que acontece é que a partir daquela data até hoje ninguém tem machamba. Agora fico em dúvida, se até hoje os que foram reassentados não tem machambas, o que sera de nós no futuro. Se a empresa tivesse entrado num acordo era so dar dinheiro pelas machambas e mais nada, cada um arranjaria terra alternativa e evitaria confusão de terras. Nos so queremos dinheiro, n ão precisavam lavrar as machambas nos iriamos nos responsabilizar por encontrar alternativas.

		outra área para a proxima fase. Dinis Napido-Twigg
Nuno Afonso	A empresa pediu documentos tais como cópias do BI, NUIT, CV para questões de emprego e nada.	Vou investigar essa questão a nível da empresa para perceber o que aconteceu. Dinis Napido-Twigg
Emprego	·	
<u>Saibo Ali</u>	A grafite criou uma associação femenina de camponeses para trabalhar na barragem e produzir cebola, mas não aconteceu até agora,Esta mesma associação recebeu capulanas, botas etc mas de lá até hoje não aconteceu nada. Quem está impedir este processo?	Os representantes da empresa estiveram ca para criar uma associação para produção de hortícolas as quais seriam a posteriaor compradas pela grafite. Criamos uma associação de 28 mulheres. Na produção de horticulas é necessario água. Nos não somos espcialistas em agricultura, então fomos pedir apoio a aqueles que são tecnicos na área. Compramos motobomba e ja temos na grafite, tambem compramos botas para as mulheres da associação, estão l'a na grafite. Os tecnicos ajudaram a identificar lugara para o horta, mas a CMC empresa de construção de estradas estão actualmente a trabalhar na estrada a beira da zona onde a associação vai produzir, estraem água do mesmo riacho, então os técnicos de agricutura aconselharam a águardar que os trabalhos da estrada terminem. O programa não está esquecido. Célio panquene- Twigg
Maria Saibo	Não tenho muita coisa a dizer. Não estamos a conseguir emprego na Grafite, no mesmo dia que resposta para a mulher de Pirira é não para as mulheres de Balama admitem. Por mais que nós não saibamos escrever há serviços que sabemos fazer. Aquela montanha tambem é nossa.	Questão de emprego, nos aceitamos as criticas da comunidade e este tempo que estamos aqui permitiu-nos ter experiência nas questões de emprego. Há um plano que ja esta na mesa, não so a empresa, mas tambem o governo e o INEFP (Instituto nacional de emprego), a proposta é de criar um comite em cada uma das aldeias, esse comite vai ser escolhido por voces. Essas pessoas é que estarão a nos ajudar a selecionar as pessoas, mas entrada na empresa não sera automática, primeiro vão passar por testes de aptidão física e saúde, depois dalí faz-se treinamento, é um processo que vai decorrer assim que a empresa tiver todas licenças. Não haverá desigualdade entre homens e mulheres. A unica coisa que vou pedir é um pouco de paciencia. Dinis Napido- Twigg

Reunião com Comunidade de Maputo-Mualia Data: 28/01/15 Hora: 09h00 – 11h00 Local: sede da aldeia

Nome/Organização	Comentários/Pergunta	Respostas
Emprego		
Pedro Antomane	Nos agradecemos a vinda da empresa. Pediram-nos certificados, CV, copias dos documentos e ate hoje nada aconteceu	Vou falar do plano de emprego que a empresa tem, desde que a empresa chegou a Balama aprendemos muito, estamos a trabalhar tambem com o governo, vamos trabalhar com líderes comunitarios e
Pedro Antomane	Outra coisa é que a grafite não quer que o pessoal de mualia trabalhe na empresa. So pessoas de Ntete e Nquide trabalham la na gafite.	esta trabalhar com o ministério do trabalho e uma estrutura chamada INEFP- Instituto Nacional de Emprego e Formação profissional, para nos ajudar a fazer um plano de etreinamento e emprego.
	O director disse a eles que não devriam ir ao acampamento para não criar agitação	Vamos formar comitês, que serão formados por pessoas da empresa, pessoas do INEFP e estruturas da comunidade. Vamos encoraiar para que a comunidade escolha os seus representantes
Agira Raisse	Quero falar sobre empresgo, Mualia tem muitas jovens que não estão a conseguir emprego na grafite.	Esse comitê tem função de selecionar as pessos que a empresa pedir porque a empresa não conhece as pessoas.
Latifo Celiano	Emprego	É preciso entenderem o que é emprego numa empresa minera, primeiro, vamos selecionar a pessoa atraves do comite, os selecionados vão passar por textes de aptidao fisica e consultas medicas.
		Depois disso há um processo de treinamento para aprender a fazer o seu trabalho.
		Sobre a lista de pessoas, nós ontem dissemos que estamos a investigar como essa lista chegou a empresa, e queremos esclarecer dentro de uma semana, vamos reagir. Dínis Napido – Twigg
Victor Assane	Empregos, gostariamos de ter informação sobre emprego, so Ntete e Nquide consegue emprego la, ja entregamos documentos e nada.	O meu apelo vai ser o mesmo, não espere por reuniões para colocar preucupações. Podem ir até a grafite para podermos resolver. Célio Panquene-Twigg

Nome/Organização	Comentários/Pergunta	Respostas
Issufo Tankar	Em relação a emprego, concordo com o director mas gostaria de apelar que a empresa olhasse para as outras áreas, para ver que tipode emprego pode ser dado a aqueles que não passaram no textes fiscos por exemplo, o importante é que o director foi claro, amanha ninguem poder'a reclamar dizer que prometeram emprego para todos.	
Reassentamento e co	mpensação:	
Tonito Mario	Voces como responsaveis dessa empresa dizem coisas que nos agradam. O probema aqui é dos responsaveis desta aldeia. O que acontece é que Mualia é que esta a beira da montanha. O governo e a empresa deve se entender com a comunidade. Quando chegar a fase do reassentamento vão nos levar para áreas que tem donos. Nãofalam com as populações hospedeiras antes do reassentamento.	Foi constituido um comite de reassentamento a nivel provincial, distrital e da comunidade, os representantes da comunidade foram escolhidos pela comunidade para estabelecer um elo de ligação com a comunidade. Em relação a zona de reassentamento que esta agora a ser preparada tivemos reuniões com os lideres comunitarios com o governo e pessoal da grafite. O lugar foi identificado não so pelo comite de reassentamento mas tambem pelos lideres comunitarios da área. Confiamos a responsabilidade aos representantes da aldeia para qualquer problema comunicarem a empresa, para mim é uma surpresa saber agora que houve distruição cajueiros.
	maquinas e derrubaram meus cajueiros e minhas mangueiras, quem vai se responsabilizar? Esse grafite é mais de Mualia que qualquer outra comunidade.	empasse das árvores de frutas e averiguar e pagarmos. Vou apelar que quem tiver problemas, não espere que tenhamos reuniões, aproximem-se dos representantes para tratarmos com a empresa. Foi feito um levantamento das machambas, árvores de frutas dentro
Canisio Andurabe	No quintal do meu irmao fizeram um furo. E nunca esclareceram o que é.	da área de interesse da mina, a empresa de consultoria registou celeiros, árvores de frutas, fotos, etc. Na altura de compensação serão usados os dados do levantamento. Caso um produtor não
Wacina Jamal	Na minha machamba, abriram furos de água. Quase não há lugar para semear. Peço para a empresa resolver isso.	tenha senha não é um grave problema porque criamos mecanismos de reclamação, pode ser que na altura do Ivantamento o campones não estava na machamba, a pessoa pode usar desses mecanismos e receber a sua compensação. Célio Panquene-Twigg
Pedro antomane	O primeiro ponto é que o projecto não trás problema, mas as pessoas que trabalham no projecto é que trazem	

Nome/Organização	Comentários/Pergunta	Respostas
	problemas, as pessoas que foram indeminizadas no ano passado so tem dinheiro mas não tem machambas, a recomendação é que para além do dinheiro darem aos camponeses terra, aquela área que deram aos camponeses é arrenosa e não é possivel produzir mais de dois anos.	
	Para arrancar esta camisa aqui eu devo dar outra camisa melhor, a grafite precisa da nossa machamba entao deve nos dar terra e dinheiro melhor que o anterior, se por exemplo o campones tinha um hectar, deve se dar ao campones, 1 hectar emeio.	
Almeida Piu	Acontece que eu tenho uma machamba, meus vizinhos receberam senha, agora nós que não recebemos senha como vamos ser tratados.	Temos um programa de apoio de água potavel para as comunidades, depois de um tempo o furo colapsou, teve alguns problemas. Agora estamos com programas de furos melhorados com paineis solares onde a água vai descer por gravidade. Recentemente tive uma reunião com todos lideres para falar sobre água porque o morrador contruiu um murro que fechou o acesso a água, colocou dentro do seu quinta, tentamos mas não conseguimos contacta-lo.
Raita Mussa	Nos somos esposas do mesmo homem, que perdeu a vida, o que acontece é que a machamba é de nos duas, mas temos so uma senha em nome de uma de nos. Entao, estamos preucupados com a fase do dinheiro. O que esta acontecer é que a minha colega ficou com a senha para eela, mas somos duas.	Vamos reunir o comite de reassentamento e a empresa grafite para podermos vos receber e discutirmos essa situação. Vamos trabalhar no terreno, ou dividimos a machamba em duas, na devida altura vamos discutir isso. Célio Panquene-Twigg
Jaime Elias	So agora estou a receber sementes e ainda não tenho terra, essas sementes vou plantarr aonde?	Tivemos um emprevisto na fase piloto de reassentamento. Mas ja houve um entendimento, as pessoas de Mualia terão machamba , venham amanha para o acampamento Célio Panquene-Twigg

Nome/Organização	Comentários/Pergunta	Respostas
Issufo Tankar	estou feliz porque nesta reunião ha espaco para todos falarem. Ja acompanhei reuniões em outros sitios oonde não se deixa todos falarem. Entao, voces tem que aproveitar esta oportunidade senão amanha vai ser tarde e é dificil ter pessoas da empresa que assume compromisso de amanha resolver a preucupação.	Agradecemos pela contribuição do sr Tankar e notei que precisamos reforca a ligação entre a comunidade, grupo de trabalho e a empresa, temos reuniões periodicas, vamos estudar a possib ilidade de termos reuniões periodicas. Célio Panquene-Twigg
	colocar algumas perguntas e sugestões.	
Issufo Tankar	Primeiro sobre a questão da qualidade da terra dos reassentados, a lei dita que deve-se dar melhores condições aos camponeses, se tinha um hectar que produzia um camiao de milho, deve receber uma machaba que faz mais do que um cami ão de milho, ate pode ser menos que um hectar, mas é preciso que de facto aquela terra produza mais do que a anterior, tecnicas de regadio e treinamentos podem ajudar. Queria saber se a empresa tem DUAT, se sim, quantos hectares tem, se as populações foramconsultadas.	A área que o Ministerio do Recursos minerais deu é de 11300 hectares. Mas quando chegamos aqui percebemos que nem existe grafite em toda essa área entao, a empresa esta fazer uma delimitação para so englobar o acampamento, o deposito, foi a razao pela qual a geografia e cadastro deu reuniões sobre DUAT. O DUAT esta numa fase avancada, nenhuma comunidade estara dentro do DUAT. Dinis Napido-Twigg
	Eu em conversas procurei saber se as pessoas sabiam qual é a área fisica onde vai estar a empresa e ninguem sabia. Esse é um aspecto importante, u queria recomendar que mostrem os locais fixicos as comunidades. Se calhar ate podem fazer isso com os lideres, mas não basta trabalhar com os lideres, porque depois os lideres não ransmitem a comunidade. Sobre o reassentamento, existe um regulamento que deve ser respeitado em	A questão de aumentar a produção na zona de reassentamento, a empresa esta alocara as primeiras pessoas para novas áreas. Tem que pensar que são 667 machambas que devem ser tiradas no total,por enquanto so cerca de 40 foram reassentadas.A empresa tem um programa de desenvolvimento agricola,exactamente para poder ajudar os reassentados a melhorar a sua produção, neste momento estamos a selecionar a empresa para fazer isso. Agradecer ao sr Issufo e dizer que a empresa trabalha com varias organizações. O plano seguiu o decreto 31/2012, todas as reuniões foram

Nome/Organização	Comentários/Pergunta	Respostas
	Mocambique, so esse regulamento obriga a 4 realizações de consulta pública, percebi que aqui so sera para as 'áreas agricolas mas tambem é reassentamento, queri saber se os consultores estão a trabalhar com este regulamento ou não.	seguidas entao para alem da lei mocambicana tambem seguimos de outros financiadores, como o BM e o IFC, todas as reuniões comunitarias sobre o reassentamento foram realizadas. Lina Buque- CES
Descrição do projecto	os e avaliação de impactos	
Issfo Tankar	Por exemplo em relação a respeitar a velocidade e andarem devagar, mas a coloção de um dispositivo que pudesse limitar ou registar as velocidades que	Quanto a questão da velocidade e da monitoria do ar, questões de velocidade, trablahar com a policia de transito etc, ja foi acautelado e consta do relatorio. Lina Buque-CES
Issfo Tankar	Apessoa esta usar serio o ideal. O mesmo aconteceu com relação a poluição do ar e da água, mas não ouvi o que vai ser feito de concreto para evitar que essa poluição passe dos limites. Porque não basta medir so,devemos evitar esse tipo de problema.	Ja foi lançado o consurso nacional e internacional para questões de transporte de grafite daqui para Nacala ou Pemba. E ha muitas exigencias, uma delas é sobre controle de velocidade, sobre contrele da rota etc. Haverão planos em que se a estrada passa por um aaldeia, vamos fazer estradas alternativas para não afecta as comunidades. Sabemos que esta é uma das áreas de risco e vamos tomar muita cautela em relação ao trafico. So para ficarem a saber, serõ 34 camiões basculantes por dia, a chegar e partir, entao estamos a tomar atenção a isto. Dinis Napido-Twigg
	Hoje apareceram problemas como árvores destruidas etc e me pareceu que os meios de chegar a empresa são deficientes, queria sugerir que facam encontros mensais ou semanais para saber dos problemas da comnidade.	Comenario registado. Dinis Napido-Twigg

<u>Reunião em Pemba</u> Data: 29/01/15 Hora: 11h00 – 12h00 Local: Sala de Reuniões da Universidade Católica de Moçambique

Nome/Organização	Comentários/Pergunta	Respostas
Descrição do project	os e avaliação de impactos	
Patricio	Vou falar das queimadas, em Manica incentivam as comunidades a criar fundos, que beneficiam as comunidades que nào realizarem queimadas, é importante incentivar atravez de formas de caça diferentes, muitas vezes as queimadas são por causa da caça. Sensibilizem as comunidades, trabalhem mais com incentivos para os comites que fazem a sensibilização contra as queimadas.	Comentario registado. Lina Buque- CES
Reassentamento e co	mpensação:	
Issufo Tankar	Percebi na esplicação de um dos tecnicos que existe um comite de reassentamento, por acoso o regulamento preve a criação de um comite a niivel distrital, mas na explicação que deu percebi que não faz parte desse comite a sociedade civil entao, gostava de saber se de facto tem la algum membro da sociedade civil ou não, o regulamento preve isso, se não tiver, aqui em cabo acho que seria uma instituição que podiam contactar para por la alguem a trabalhar. Acredito que o comite provincial tem olhdo para Balama Montepuez e Palma	não tenho razões de contestações do relatorio apresentado ca hoje, queria so fazer, não resposta mas comentarios de algumas perguntas, O comite de reassentamento, o secretario permanente é responsavel, é primeira ez que Balama cria um comite de reassentamento, e sendo primeira vez não podiam faltar dificuldades, fomos aprendendo e superando algumas dificuldades. É importante assumir as propostas como inclusão da sociedade civil, o distrito precisa da empres para o desenvolvimento, se calhar por desconhecimento não incluimos a sociedade civil, é pacifico. Dinis Napido-Twigg Quanto ao reassentamento não vamos ter problemas graves, o comite trabalhou , percorreu as comunidades e não so fez reuniões públicas mas tambem nas familias afectadas, o que temos que reter é que o problema de dinheiro é muito sério. Nas nossas comunidades quando
Issufo Tankar	Na questão do pactote de compensação, disseram que usam a tabela do governo, não sei ate que ponto essa tabela esta actualizada, mas xiste uma directiva de reassentamentoque da-nos a orientação	aparecem visitas expoem os seus problemas. Os afectados pelo reassentamento receberam algum incentivo, gostari de apelar que quando nos tecnicos vamos as comunidades não é para levantar problemas, é para resolver problemas. Não sei porque numa aldeia, so se levanta um que reconhece que o trabalho foi feito e os restantes não, portanto o trbalho foi feito. Mussa Rachide- secretario permanente de Balama

	geral, por exemplo para cajueiro, em função do tempo de vida util, a idade do cajueiro determina o valor a pagar, mas para alem desse pagamento, a pessoa deve receber outro cajueiro na nova residencia sob pena de depois de 5 meses esgotarem o dinheiro e não terem fontes de sobrevivencia. E voltarem a exigir dinheiro da empresa,	Nos como empresa, notamos a necessidade de inclusão da sociedade civil nesse trabalho e de facto o fizemos, convidamos nível distrital, a entidade que zelapela agricultura, a UNAC (União Nacional dos Camponese) e disponibilizou pelo menos tres membros que estiveram la e trabalharam muito com os afectados, testemunharam todo processo piloto da compensação e pensamos que com a sugestão avancada so temos a agradecer pelas sugestões inrequecidoras.
	tem que pensar em pacotes que permitem a subsistencia.	Com relação as queimadas descontroladas é um problema ciclico que pode estar ligada a questões tradicionais e antropologicas, eu acho que a sugestão da experiencia em Manica podemos aprender algua
Issufo Tankar	Tive impresão que as novas machambas são distantes, se a nova machamba é distante é importante pensar em mecanismos de compensar porque s pessoas vão levar mais tempo para	coia, mas eu penso que não pode ser uma acção so da grafite, mas uma colaboração entre o governo (agricultura) e a mina de grafite, e ate a socirdade civil, ONG's, podiamos discutir melhor formas de parar com essas queimadas.
chegar a machamba. Encontrem um Com r mecanismo de fontes alternativas de provin rendimentos. autono Gostaria de pedir que a empresa pense fruta e nas comunidades directamente usamo afectadas. mais r indem entend maxin familia indem proxin apesa	Com relação ao pacote de compensação, existe ao nivel de cada provincias, as direções provinciais de agricultura tem alguma autonomia de eleaborar uma tabela de compensação de árvores de fruta e de culturas alimentares. Para o nosso reassentamento nos usamos a tabela fornecida pela Direcção provincial da agricultura, a mais recente que existia e portanto seguimos essa tabela para indeminização de árvores de fruta, a outra coisa importante e que nos entendemos que a ditruição das árvores devera ser evitada ao maximo possoivel porque essas árvores constituiem rendas para as familias. Entao para a empresa dar algum estimolo, a empresa indeminizou todas as árvores pelo valor maximo da tabela, e nos proximos reassentamentos vamos fornecer mudas para incentivar apesar da tabela do governo não prevê isso.	
		Com relação a questão da distancia, tivemos esse cuidado para que as pessoas consigam ir a machamba e voltar, sem percorrer grandes distancias. O projecto tem impacto directo sobre 4 comunidades (Nquide ntete mualia e pirira) e a área de Ntete pode beneficiar Ntete e Nquide, e a área de reassentamento de Maputo pode beneficiar (Pirira e Maputo). A distancia media que estimamos era de 8 kilometros. Etretanto tambem estamos abertos a sugestões de como suprir essa distancia

		fizemos houve mudanca do padrão de vida, alguns camponeses abriram moageira, negocios de projecção de filmes etc, deixaram de ser simples produtores agricolas e passaram a ser comerciantes podemos criar planos para ensina-los a gerir negocios. Célio Panquene-Twigg
Issufo Tankar	A questão de identificação fisica da área é fundamental, as liderancas da comunidade tem muitos problemas de comunicação. No estudo de impacto ambiental é importante respeitar o meio ambiente mas a questão do reassentamento tem implicações praticas na vida das pessoas portanto, gostaria de ter a certeza que foi feito, se foram colocadas as atas das reuniões nos locais da reunião, se não foi feito ainda vão a tempo. Ainda consegue-se controlar Peco que colem as atas de consulta nas comunidades. gostaria de saber onde	Estou confiante que vamos ter resultados positivos com relação a este projecto. A geografia e cadastro fez o trabalho da questão de DUAT, oportunamente vai ter acesso ao processo do DUAT. As comunidades ainda não conhecem a área porque estamos ainda a fazer algumas alterações da área,faremos todos possiveis que a comunidade saiba qual 'a área, é um processo ainda em execução. Dinis Napido-Twigg Todos os registos das reuniões constam do relatorio de consulta publica do prosente projecto. Foram feitas actas de todas as reuniões feitas no ambito do reassentamento e foram entregues a administração no sentido de termos a assinatura da administradora. Esteve tambem a sugerir a assinatura e a fixação das atas, faremos chegar as comunidades. O nível de analfabetismo é alto. Não basta pendurar as atas mas tambem explicar. Carina Saranga-CES
	foram públicados os anuncios para elaboração do plano de reassentamento, esse e um aspecto muito sensivel	

THE BALAMA GRAPHITE MINE CABO DELGADO PROVINCE IN THE DISTRICT OF BALAMA, MOZAMBIQUE

PUBLIC PARTICIPATION PROCESS REPORT

Prepared for:		
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TABLE OF CONTENTS

1.	1. INTRODUCTION				
	1.1	Overview	1		
	1.2	Public Participation Principles	2		
	1.3	Legislative Requirement	3		
	1.4	The Consultant	3 ว		
	1.5	The Public Participation Process Team	J		
2.	INT	ERESTED AND AFFECTED PARTY IDENTIFICATION	5		
	2.1	Overview	5		
	2.2	Interested and Affected Party Identification	5		
		2.2.1 Means of Identification	5		
		2.2.2 Interested and Affected Party Identification	5		
		2.2.3 Continuous Identification of Interested and Affected Parties	8		
3.	PUI	BLIC PARTICIPATION ACTIVITIES TO DATE	13		
	3.1	Overview	13		
	3.2	Environmental, Social and Health Impact Assessment Process	13		
		3.2.1 Pre-Assessment Phase (Scoping Phase)	13		
		3.2.2 EPDA Disclosure Phase	15		
		3.2.3 Specialist Phase	16		
	• •	3.2.4 ESHIA Phase	17		
	3.3	Resettlement Action Plan	1/		
		3.3.1 Direct Project-Affected Community Engagements	17		
	2 1	3.3.2 Future Public Participation Activities	19		
4	J.4		19		
4.	133	UES IDENTIFICATION AND RESPONSES	20		
	4.1	Overview	20		
	4.2	A Summary of Key Issues and/or Concerns	20		
	4.3	Issues and Response Irail of the Environmental, Social and Health Imp	pact		
	A A	Assessment Process to Date	28		
_	7.7				
5.	CO	NTINUOUS STAKEHOLDER ENGAGEMENT COMMITMENTS	53		
	5.1	Overview	53		
	5.2	Implementing a Stakeholder Engagement Plan	53		
	5.3	Continue to Build a Dialogue through the Established TWG	54		
	5.4	Regular Reporting	54		
		5.4.1 Monthly Reporting	34		
~	<u></u>		54		
6.	501	WIWART AND CONCLUSION	55		
APPENDICES					
AF	APPENDIX 1: MINUTES OF MEETINGS 57				
AF	PEN	DIX 2: INITIAL STAKEHOLDER ENGAGEMENT REGISTERS	68		
AF	APPENDIX 3: NOTIFICATION LETTERS FOR EPDA DISCLOSURE				

LIST OF PLATES

Plate 2.1: Establishing the Balama Graphite Mine Technical Working Group	11
Plate 2.2: Establishing a Grievance Mechanism during the RAP process	12
Plate 3.1: Disclosure the EPDA during community meetings	16
Plate 3.2: Focus group meetings as part of the Social Impact Assessment	17

LIST OF TABLES

Table 2.1: Stakeholder Identification and Analysis	6
Table 2.2: The Balama Graphite Mine Technical Working Group	10
Table 3.1: Open Meetings with Project-Affected Communities as part of the Pre-Assessment	
Phase	13
Table 3.2: Focus Group Discussions as part of the specialist phase	. 16
Table 3.3: Public Participation Activities as part of the Resettlement Action Plan	. 17
Table 4.1: Issues and Response Trail of the Pre-Assessment Phase	22
Table 6.1: Summary of how the PPP has complied with regulatory requirements	. 55

LIST OF ACRONYMS

AfDB	African Development Bank
Aol	Area of Influence
ARA	Regional Water Administration
BID	Background Information Document
CDO	Community Development Officer
CES	Coastal & Environmental Services
CLO	Community Liaison Officer
DIPREME	Direcção Provincial de Recursos Minerais e Energia/Provincial Directorate of
	Mineral Resources and Energy
DUAT	Direitos de Uso e Aproveitamento da Terra'
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
EPDA	Environmental Pre-feasibility Scoping Study
EPFI	Equator Principles Financial Institution
ESIA	Environmental, Social and Health Impact Assessment
ESIA	Environmental and Social Impact Analysis
GDP	Gross Domestic Product
На	Hectare
HDI	Human Development Index
HR	Human Resources
HRD	Human Resources Department
I&AP	Interested and Affected Party
	International Finance Corporation
ILO	International Labour Organisation
	National Statistics Institute
	International Union for Conservation of Nature
	Ministerio Para a Coordenação da Acção Ambientai
	Multilateral Investment Guarantee Agency
	Ninisterio de Recursos Minerals/Ministry of Mineral Resources
	Non-Governmental Organisation
	Operation Environmental Management Plan
PS	Performance Standard
PPP	Public Participation Process
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SEMP	Social and Environmental Management Plan
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
TWG	Technical Working Group
UCT	University of Cape Town
UNDP	United Nations Development Programme
WWF	World Wildlife Fund

1. INTRODUCTION

1.1 Overview

This report describes the Public Participation Process (PPP) undertaken as part of the Environmental, Social and Health Impact Assessment (ESHIA) study for the Balama Graphite Mine. The mine is to be developed in the Balama District of the Cabo Delgado Province of Mozambique by Syrah Resources Ltd. and the Mozambique-based company, Twigg Mining & Exploration Lda. (hereafter collectively referred to as the "proponent"). The mining site is encircled by four villages, namely Nquide, Ntete, Maputo (formerly known as Mualia) and Pirira. Together with the town of Balama (around 9km from the site), for purposes of this report, these are referred to as the mine"s Project-Affected Communities (PACs). To the east, the town of Montepuez is the area"s main economic centre (around 45-50km from the mine).

The report fulfils the Mozambique Environmental Impact Assessment (EIA) Regulations (Decree No. 45/2004 of 29 September, as amended by Decree No 42/2008 of 24 November). Under these Regulations, the project is classified by the Ministry for Coordination of Environmental Affairs [*Ministério para a Coordenação da Acção Ambiental* (MICOA)] as a Category A Project, which requires a PPP report. As the project will economically displace productive farmland (locally referred to as machambas), public participation activities as part of the project's Resettlement Action Plan (RAP) have also been included.

The following requirements have been met by this report:

- Identifying relevant Interested and Affected Parties (I&APs);
- Identifying issues raised during the project's PPP;
- > Supplying MICOA with responses to issues raised by I&APs during its PPP; and
- > Indicating to MICOA how the proponent commits itself to future, on-going public participation.

For the purposes of this report, I&APs are defined as any stakeholder of the project. The International Finance Corporation's (IFC) definition of a stakeholder has been applied in this report "[...] persons or groups who are directly or indirectly affected by a project, as well as those who may have an interest in a project and/or the ability to influence its outcomes, either positively or negatively" (*ibid*.:10)1. The term "stakeholder" is also more broadly applied to refer to organisations or groups of people collectively who have a vested interest in the project and who have a direct influence in it. Stakeholders might include, but are not limited to:

- > National and local Government departments and officials;
- Conservation organisations/bodies;
- Non-Governmental Organisations (NGOs);
- Farmers" associations etc.

Stakeholders (or, then, I&APs) also include any public member who has an interest in the project, who is directly affected by it or who desires to be kept informed about the project on a regular basis. Specifically in the context of this project, this definition includes, but is not limited to, the following individuals:

- Affected machamba-owners;
- Mine labour (current and potential);
- > Project-affected households and their dependants; and
- Project-Affected People (PAP).

¹ IFC. 2007. Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. [Online]. Available:

http://www1.ifc.org/wps/wcm/connect/938f1a0048855805beacfe6a6515bb18/IFC_Stakeholder Engagement.pdf?MOD=AJPERES [2013, June 12].

1.2 Public Participation Principles

Good international practice sees public participation as a broad, yet inclusive on-going process for a proponent to interact with its stakeholders. The intention is for engagement to continue throughout a project's lifecycle and to consider the interests and/or concerns of those who are directly and indirectly affected by the project. In essence, the fundamental principle of the consultation process is to ensure free, prior and informed consultation with I&APs.

The purpose of the PPP is to build and maintain over time a constructive relationship with I&APs, which should be built at an early stage of a project"s lifecycle. This should ideally start as part of the EIA process, through which it can be developed during the disclosure of project information, including draft documents and plans. This disclosure should focus on relevant social and environmental risks and adverse impacts, subsequently the proponent"s proposed measures and actions is to address these risks and impacts.

The nature and frequency of public participation is a reflection of a project's risks to, and adverse impacts on, its PACs. This is the reason why community engagement is often stressed as one of the most important aspects of the PPP. It is therefore important for community engagement to be free of external manipulation, interference, coercion and intimidation, and conducted on the basis of timely, relevant, understandable and accessible information. Failure to ensure this, could cause disputes and disagreements between communities, the proponent and government authorities. This could disrupt established structures and can even delay or cause a total failure of the project.

On-going public participation is particularly important for this project, since it will have a direct impact on current farming practices and result in economic displacement of some machambas (refer to the RAP report; EOH CES, 2014 - Part 6). Therefore, in this report, public participation activities have not been limited to the ESHIA process, but also include community engagements as part of the RAP process, currently being undertaken by CES in fulfilment of the Mozambique Regulations for the Resettlement Process Resulting from Economic Activities (Degree 31/2012).

Through the ESHIA and RAP processes, the following public participation principles have been upheld:

- Ensuring an open and transparent consultation process at an early stage of the project design;
- Identifying, engaging and informing I&APs of the project details and associated environmental authorisation process;
- Understanding I&APs issues and concerns about the project and their contribution to the identification and evaluation of the project impacts. This allows awareness of the issues, concerns and questions raised by the I&APs;
- Compiling Issues and Response Trails of all issues, concerns and questions, together with their relevant proponent responses; and
- Establishing and managing a Grievance Mechanism for I&APs to voice their issues, concerns and/or comments on the project directly to the proponent.

To date, the main vehicle for public participation has been through organised and planned community meetings and focus group meetings to afford all I&APs the opportunity to express their concerns, expectations and comments on the project.

1.3 Legislative Requirement

By nature, the PPP is a dynamic process which allows for the dissemination of information about a proposed project. It requires the identification of direct and indirect I&APs (or stakeholders). An integral part of this process is also an analysis of all I&APs, through which each party is categorised by different variables, such as their vulnerability, age and location, as part of a stakeholder analysis. Thereafter, the analysis focuses on the effect of adverse project impacts and risks on each group.

In Mozambique, both the Constitution (1990) and Environment Law establish the rights of citizens to have information about, and to participate in, decision-making about activities which may affect the environment. Public participation is a legal requirement for Category A projects, for which MICOA prepared a Directive for the Stakeholder Engagement Process, published as a Ministerial Diploma 130/2006 of 19 July. The need for public participation is further reinforced by Mozambique's Regulations on the Resettlement Process resulting from Economic Activities, Decree 31/2012 of 8 August. In particular, Article 13 of these Regulations points out the need to ensure public participation throughout the entire RAP process.

As per these legislative requirements, but also inherit commitment to community participation, the proponent initiated a PPP as part of the ESHIA and RAP processes. The processes identified I&APs, disseminated project information, assimilated and took into account public comments received, and provided responses. Most importantly, it created a dialogue between the proponent and its I&APs, which will be strengthened and built upon as the PPP continues throughout the project's lifecycle.

1.4 The Consultant

The ESHIA and RAP studies upon which this report's public participation activities are based are being conducted by:

Coastal & Environmental Services Mozambique Lda.

Rua da Frente de Libertação de Moçambique, Nº 324 Maputo- Moçambique Tel: (+258) 21 243500 • Fax: (+258) 21 243550 Website: www.cesnet.co.za/www.eoh.co.za Email: l.buque@cesnet.co.za

1.5 The Public Participation Process Team

The following team members were and continue to be involved in the project's public participation activities:

Mr Lungisa Bosman - CES Senior Environmental Consultant

Lungisa Bosman is a *Senior Environmental Consultant* and public participation specialist within CES. He holds a Bachelor of Social Science (1993) from University of Cape Town (UCT), with majors in Public Administration and Sociology, and a Post Graduate Diploma in Organisation and Management. Over the past ten years, Mr Bosman has gained considerable experience in social facilitation and community liaison. He is currently involved in a number EIAs and Social Impact Assessments (SIAs), and particularly in the co-ordination and facilitation of the PPP. Mr Bosman has extensive experience dealing with the legislative and regulatory framework in South Africa and Mozambique, as well as expertise in renewable energy developments. Some of the projects in which he has brought his facilitation skills to bear include (*inter alia*) the Knysna N2 Toll Highway EIA, Malawi Monazite Mine EIA, and numerous EIAs and scoping studies. His mother tongue is Isi-Xhosa.

Ms Lina Buque - CES Senior Environmental Consultant

Ms Buque holds an MSc in Environmental Science focused on Conservation and Environmental and Social Development from São Paulo University-Brazil. She has a graduation degree on Biological Sciences from Eduardo Mondlane University in Mozambique. Ms Buque has gained considerable experience in implementation of Environmental Management Plans (EMPs), such as the Onshore 2D Seismic Acquisition for Hydrocarbon Prospection and Water Supply Project, environmental management and impact assessments, environmental site officer and community liaison officer. She has a broad academic background including EIA, characterisation of vegetation for environmental licences, solid waste management, monitoring of soil pollution, interrelation between environment and health.

Mr Jan Anton Hough - CES Social Scientist

Jan Anton Hough is a social scientist primarily involved in social baseline studies, SIAs, Social Management Plans and RAPs. His academic qualifications and accomplishments include an MA (Sociology) obtained from the University of Stellenbosch in South Africa, and two published ISI-listed academic publications in Social Dynamics and The South African Geographical Journal, followed by one forthcoming manuscript currently being reviewed in the South Africa Journal of Science. In CES, some of the projects which he has been involved in to date include a RAP for Equatorial Palm Oil in Liberia, an SIA for Samshi Africa Ltd. in Sierra Leone and social due diligence gap-analysis in accordance with the Performance Standards (PSs) of the IFC. Prior to his work at CES, he gained experience as a Social Scientist in the mining and community development sectors, but also the socio-environmental arena; in which latter connection he has published web-based articles on socio-environmental concern in Africa.

Ms Carina Saranga - CES Administrative Assistance in Mozambique

Ms Carina Saranga holds a B.Sc. Degree in Law with majors in Public Law (2011), obtained at St. Tomas University in Mozambique. She is currently finalising her B.Sc. Honours thesis studying the "Complexity of the Resettlement Process in Mozambique". Carina joined CES in 2013 where she is involved in the preparation and coordination of the PPP, as well as in field survey and coordination of RAPs. Prior to that, she worked as a public participation assistant liaising with a variety of stakeholders.

2. INTERESTED AND AFFECTED PARTY IDENTIFICATION

2.1 Overview

As explained, one of the first steps of the PPP is to identify and categorise all I&APs or stakeholders by their disaggregation (numbers, locations etc.) in terms of different levels of vulnerability to adverse project impacts and risks. What follows is an analysis of the effect of adverse project impacts and risks on each group.

2.2 Interested and Affected Party Identification

2.2.1 Means of Identification

Interested and Affected Parties have been identified through a number of means, guided by the proponent who already identified relevant regional- and district-level authorities, as well as the PACs and possible vulnerable groups prior to the ESHIA process. With this baseline, the primary means of identification was through meetings and workshops held at national, provincial, district and local levels.

As the community literacy level is low, most interactions where done through community and focus group meetings. Presentations were done in the local language for community members to be able to understand the information presented to them. This also ensured that community members were able to participate freely and with confidence in the discussions. Community meetings are usually planned through local- and village-level authorities and advertised beforehand. For example, during the Pre-Assessment Phase of the ESHIA (the EPDA Phase), principal village chiefs were first engaged with, and they then provided appropriate dates and times for community meetings. The local (secondary) chiefs then organised the meetings. Attendance at community meetings was usually good.

As the project is currently in its design stage, stakeholder analysis is still largely limited to the identification of key stakeholders. Vulnerability to particular project risks will be assessed during the implementation of the RAP and throughout the project's lifecycle. This initial stakeholder identification and analysis therefore serve as a starting point for the PPP, and will continue to broaden throughout the project's lifecycle.

2.2.2 Interested and Affected Party Identification

Table 2.1 below analyses different I&APs in accordance with each I&AP's interest in the project.

Table 2.1: Stakeholder Identification and Analysis

ORGANISATION/GROUP	LEVEL OF INTEREST	POSSIBLE ISSUES TO BE ADDRESSED	
Pr	oject Proponent and International C	Drganisations	
Twigg Exploration & Mining Lda. shareholders Syrah Resource Pty Ltd. shareholders Proponent lenders NGOs	<i>Directly interested</i> Individual or corporate shareholders/investors in the project	 Investing in the project Profitability of the operation Corporate responsibility and good governance Enforcing environmental and social responsibility Minimising project risks 	
	National Government of Mozan	nbique	
Government of Mozambique	 Directly interested Regulates project Receives royalties and other tax payments Infrastructure development Contribution to Mozambique economy and local development 	 Land provision and Socio-Economic Services Sharing in project benefits contributing to community development benefits Project monitoring 	
Directly interested Ministry of Energy Responsible for electricity supply Mozambique (EDM)		Electricity supply to the mine site	
Ministry of Mineral Resources (MIREM)	Directly interested Responsible for regulating mining aspects of the project.	 Regulating mining licence Contribution to the economy Regular reporting 	
Ministry of Environmental Affairs (MICOA)	<i>Directly interested</i> Regulates environmental and social aspects of the project	 EIA processes Environmental licensing Annual environmental reporting Annual audits 	
Ministry of Finance	<i>Directly interested</i> Receives and approves royalties and other tax payments	Regular auditing of accounts to ensure correct taxes are paid	
	Provincial Government of Moza	mbique	
Governor of Cabo Delgado Province.	<i>Directly interested</i> Politically responsible for all activities in the Province	Regular progress updates	
Provincial Directorate of Energy	<i>Directly interested</i> <i>Responsible for electricity supply</i> <i>through Electricidade de</i> <i>Mozambique (EDM)</i>	Electricity supply to the mine site	
Labour Department	 Directly interested ➤ Assist in the management of the mine's labour force ➤ Assist with any strike action 	 Ensure Mozambican labour standards are implemented Assist in union formation and management Assist with in-migration management 	
Ara Centro-Norte (Water authority)	Directly interested	 Income from license agreement Monitoring of project abstraction 	
Ministry of Public Works	Indirectly interested Infrastructure (roads, port, communications, community facilities)	Maintenance of road infrastructure	
Provincial Directorate of Fishing	<i>Directly interested</i> Project activities may impact on fishing activities in Chipembe Dam	Monitor impacts on existing fishing activities	

Women and social action department	<i>Directly interested</i> Project activities may impact more severely on women and children as they are more vulnerable to marginalisation	 Upliftment programmes for women, children, and disabled people Development of education and training programmes Assist in promotion of women in the workplace Assist with land disputes
Department of Agriculture	Directly interested ➤ Hold DUATs to all land ➤ Support farming development ➤ Assist in land allocation during resettlement	 Monitor land acquisition, resettlement, rehabilitation and reallocation Provide support during land disputes
Provincial Ministry of Mineral Resources (MIREM)	<i>Directly interested</i> Responsible for regulating mining aspects of the project	 Regulating mining licence Contribution to the economy Regular reporting
Provincial Office of Ministry for Co-ordination of Environmental Affairs - MICOA	Directly interested Assist with regulating environmental and social aspects of the project	 > EIA processes > Regulating Environmental Licence > Receiving Annual Environmental Reports
	District-Level Stakeholder	S
The District Administrator and his Chief Secretary	<i>Directly interested</i> Responsible for administration of Balama district within which the mine is located	 Employment benefits for people in the District Benefits arising from improved infrastructure in the area (e.g. roads and power)
The District Administrator	 Directly interested ➢ Responsible for administration of the smaller, more localised administrative area within which the mine is located ➢ Responsible for approving the RAP report 	 Employment benefits for people in the Administrative area Benefits arising from improved infrastructure in the area (e.g. roads and power) Resettlement issues Effects of the mine on villages
District Resettlement Commission	<i>Directly interested</i> Responsible for approving and monitoring the RAP process	 Transparent and correct implementation of the RAP Community conflicts Grievances
	Local-Level Stakeholders	3
Village secretaries and chiefs	<i>Directly interested</i> Elected leader of the village	 > Employment benefits for people in their village > Benefits arising from improved infrastructure in the area (e.g. roads and power) > Resettlement issues > Direct effects of the mine on the villages within and surrounding the area > Indirect interests including - Environmental impacts; Community benefits; Employment and other economic opportunities for
School teachers	Indirectly and directly interested Regarded as community leaders, and provide assistance to the community during engagement	 Employment benefits Benefits arising from improved infrastructure in the area (e.g. roads and power)
Traditional healers	Indirectly interested Regarded as community leaders, and provide assistance to the community during engagement	As above

Women's groups	<i>Indirectly and directly interested</i> Represent vulnerable group	 Employment benefits Higher vulnerability to negative impacts associated with the project, particularly resettlement, food shortages, loss of access to land, loss of income
Youth groups	<i>Indirectly and directly interested</i> Represent possible vulnerable groups and those who might receive employment	As above
Potential future labour	Directly interested Employment	Human resources issues, labour relations and project benefits
Potential future suppliers	Indirectly interested Benefits indirectly from employment	Local supply and transparent procedures
Disabled Groups	Indirectly and directly interested Represent vulnerable group	As above
Affected landowners and households to be economically displaced	Directly interested Affected by economic displacement and related impacts on land-loss	 Economic displacement compensation-related entitlements Agricultural support Project benefits

2.2.3 Continuous Identification of Interested and Affected Parties

2.2.3.1 Overview

The following mechanisms have been established by the proponent for its future on-going I&AP identification and engagements. These include:

- A Social Department;
- > A Community Development Department;
- > A Human Resources Department;
- Establishing a PAC-liaison committee/group; and
- > A Grievance Mechanism.

2.2.3.2 A Social Department

A Social Department is currently being established by the proponent for the implementation of the RAP. Figure 2.1 below provides the structure of this department. Much of the proponent's public participation activities during the RAP process will be managed and implemented through this department. In addition, the department will also bear the responsibility for implementing a Farmers Development Programme (FDP), through which the proponent will assist affected farmers with their new alternative farmland.



Figure 2.1: The Balama Graphite Mine Social Department

2.2.3.3 A Community Development Department

A Community Development Department has been created by the proponent. Mr Célio Panquene has been appointed by Twigg Exploration & Mining Lda. as the project"s Community Development Officer (CDO) and is responsible for managing this department, which includes ensuring timely and accessible communication between the project and its stakeholders. Mr Panquene holds Bachelor degree from the Faculty of Arts and Social Sciences, Eduardo Mondlane University, Mozambique. He also holds a Master"s Degree in Sustainable Development Practice from the Federal Rural University of Rio de Janeiro, Brazil. Mr Panquene"s office will be open to the public and will have all relevant information on the project including:

- Information brochures on the project and status of the RAP;
- > All company policies, plans and programmes that are relevant to the project; and
- A recruitment register where residents will be able to lodge their names, indicating the type of work they are interested in and the skills they possess. This register will be used by the Human Resource Department (HRD) for recruitment.

In this position, Mr Panquene is responsible for:

- Maintaining regular contact with the local communities (through workshops and meetings etc.);
- Receiving comments and grievances from the local population (filling out the grievance register);

- Facilitating access to local communities for workers and contractors (organising meetings, distributing information, ensuring that local protocol is adhered to, i.e. in terms of culturally appropriate invitations for meetings, language use, etc.); and
- Managing the Social Department for the RAP and sensitising community members prior to economic displacement.

2.2.3.4 A Human Resources Department

An HRD has been created by the proponent to adopt and implement human resources (HRs) policies and procedures to manage its workers consistent with the labour requirements of Mozambique. This department will facilitate the on-going identification of I&APs by liaising with the CDO to complete a recruitment register where residents will be able to lodge their names, indicating the type of work they are interested in and the skills they possess.

2.2.3.5 Project-Affected Community Liaison Committee/Group

To ensure on-going reliable communication and collaboration with communities, a Technical Working Group (TWG) was been established in 2013 during the RAP process. It is proposed for the same group to be used for future community engagement.

The District Administrator was consulted on 8 July 2013 in order to obtain her authorisation to establish this TWG, referred to as the Balama Graphite Mine TWG. With her assistance, the relevant district-level government representatives were invited to sit on the TWG. The TWG was formally established on 10 July 2013 during a short meeting where each of the two elected village representatives (eight in total) met with the RAP social study team in Ntete Village. Table 2.2 lists the members who sit on the TWG.

Name	Company/Village	Position	
Célio Panquene	Twigg Exploration & Mining Lda.	Community Development Officer	
Ms Carina Saranga	CES	Social Administrative Assistant	
Mr Lunguisa Bosman	CES	Social Scientist	
Ms Laura Rodolfo	Twigg Exploration & Mining Lda.	Community Liaisons Officer (CLO)	
Mr Júlio Mabote	DSPI	Government Ministry Representative	
Mr Celso Nhumaio	DSEA	Covernment	
Mr Lucio Nazário	District Administration	Government	
Constantino Arlindo	Ntete	Chairperson	
Jarifo Raimundo	Ntete Committee membe		
Bachir Euse"bio	Pirira	Committee member	
Jorge Chiquira	Pirira	Committee member	
Adelino Sadique	Maputo	Committee member	
Chabane Elisa	Maputo	Committee member	
Useno Buana João	Nquide	Committee member	
Lowrenço Gimo	Nquide	Committee member	

Table 2.2: The Balama Graphite Mine Technical Working Group



Plate 2.1: Establishing the Balama Graphite Mine Technical Working Group

The group was primarily established in fulfilment of Article 8 of Mozambique's Regulations on the Resettlement Process Resulting from Economic Activities (2012), requiring representatives of the affected population to participate in the RAP process. This group was initially tasked to manage the RAP implementation process, and therefore it's most important objectives remain to:

- Be part of the mine's planning process, especially with regard to the mine's infrastructural layout plan, in order to avoid areas that are culturally significant or regarded as sacred to the villagers;
- Identify those households and/or farmers who might be in danger of becoming economically displaced;
- > Discuss matters related to the possible removal of graves and reburial arrangements;
- > Discuss compensation mechanisms (using this report as a baseline indicator);
- Agree upon alternative land to be offered in replacement of land that might be acquired by the project; and
- Manage the established Grievance Mechanism (explained shortly) for any issues, concerns and/or complaints with regard to the economic displacement process.

It is recommended for the group to include more community representatives as the project develops. Such representatives should include (but are not limited to):

- Women representatives;
- > NGO representatives; and
- > Youth representatives.

The TWG should be one of the main contact points for community members to engage with the proponent. A formal constitution for the group should be developed for its continuous role following the RAP process, including responsibilities and aims of the group, names and tasks of the members and schedules for regular meetings. In addition to this group, other committees may be required in terms of health, agriculture support programmes and/or other development programmes.

2.2.3.6 A Grievance Mechanism

Using the guidelines from the IFC, a Grievance Mechanism has been established during the RAP process; the procedures of which were disclosed during most RAP-related community meetings. The steps involved in this mechanism were meticulously explained to community members with a

poster, not only during most RAP-related community meeting, but also during the TWG workshops and individual household and/or farmer interviews as part of census data gathering. For example, community members were notified that they could lodge any economic displacement-related complaints (or any other project-related issues/comments) with one of the TWG members, the village chiefs or the District Administrator. The latter party is responsible for lodging such complaints with a representative from the mine, who shall be tasked with registering each complaint in a book.



Plate 2.2: Establishing a Grievance Mechanism during the RAP process

3. PUBLIC PARTICIPATION ACTIVITIES TO DATE

3.1 Overview

To date, several public participation activities have been undertaken as part of the ESHIA and RAP. This is elaborated upon in the following section, which has been divided into the following sections:

- > Environmental, Social and Health Impact Assessment Process
 - Pre-Assessment (Scoping Phase)
 - EPDA Disclosure Phase
 - Specialist Phase
 - Draft ESHIA Disclosure Phase
- Resettlement Action Plan
 - Government Engagements
 - Direct Project-Affected People Engagements

3.2 Environmental, Social and Health Impact Assessment Process

3.2.1 Pre-Assessment Phase (Scoping Phase)

3.2.1.1 Public Meetings

Table 3.1 below summarises the stakeholder engagement activities for the Pre-Assessment Phase of the ESHIA. The table is elaborated upon below.

Table 3.1: Open Meetings with Project-Affected Communities as part of the Pre-Assessment Phase

Stakeholders	Time	Date	Location	Participants	
Public Meetings with the Project-Affected Communities					
Nquide Community Members	10:00	04/03/2013	Nquide	150	
Ntete Community Members	14:00	04/03/2013	Ntete	100	
Maputo Community Members	10:00	05/03/2012	Maputo	80	
Pirira Community Members	14:00	05/03/2012	Pirira	40	

Meeting Preparations

As regulated by Decree 45/2004 of the Mozambique EIA Regulations, 15 days notification period should be advertised in the press prior to a public meeting. Information regarding the ESHIA process was advertised on Rádio Moçambique, Rádio Sem Fronteiras and Television of Mozambique (TVM) and sent to all the following I&APs:

- Sovernment of the Province of Cabo Delgado;
- > Provincial Directorate of Public Works and Housing;
- > Provincial Directorate of Agriculture;
- Provincial Directorate of Tourism;
- > Provincial Department of Health;
- > Provincial Directorate of Education;
- Provincial Directorate of Mineral Resources and Energy;
- Provincial Directorate of Labour;
- > Provincial Directorate of Industry and Commerce;
- Provincial Directorate for Coordination of Environmental Affair;

- Provincial Department of Women and Social Affair;
- > Provincial Directorate of Fisheries;
- > National Institute for Fisheries Research;
- > National Institute for Development of Small Scale Fisheries;
- > National Institute of Statistics;
- > Centro Terra Viva Association of the Friends of Environment;
- > Aga Khan Foundation;
- ➢ EPAM;
- Catholic University;
- > National Institute of Petroleum;
- ➤ Unilúrio;
- > WWF;
- > Journal Notícias; and
- > ARA-Nort (Regional Directorate of Weather)

The method used to inform the communities about the public meetings was *via* local chiefs and community leaders. Prior to each meeting, a focus group meeting was held with the local chiefs and community leaders to inform them about the ESHIA process and finalise dates for the public community meetings. At the focus group meetings, dates and times for the community meetings were agreed upon. Presentations were delivered by CES in Portuguese and translated into the local language (Macua) by community representatives. Background Information Documents (BIDs), with attached comment registers and forms were circulated at each of the meetings.

Meeting minutes and attendance registers are attached as Appendix 1 and 2 of this report.

Meeting Procedures

Generally, all community meetings followed the same format. Presentations were made in Portuguese and then translated into the local language by community representatives. The presentations provided project background information, such as the locations of the deposits in relation to the communities using illustrative maps, whilst explaining the legal procedures of the ESHIA process. In this way, the main environmental and social issues were highlighted, whilst outlining how the various specialists studied will aim to study and address these issues.

Early notification was provided to the communities of each meeting in order to prepare them and to ensure that all I&APs were aware of the project status; having the opportunity to raise issues, concerns or comments. The communities were also informed of the manner in which information would be disseminated about the dates and time of the meetings, which was principally through the local media and chiefs.

After the presentations, communities were provided with the opportunity to raise questions, comments and/or concerns. The questions were answered by a CES consultant or a proponent representative. Subsequent to this, the chiefs present at the meetings would make closing remarks, and would thank all for attending the meeting.

Meetings Held

As shown in Table 3.1, four public meetings were held in Nquide, Pirira, Maputo and Ntete.

Both the Nquide and Pirira meeting were held on 4 March 2013. The meetings were attended by the villages" secretaries and chiefs, together with approximately 150 community members during the Nquide meeting, and 60 during the Pirira meeting. CES was represented by Lungisa Bosman, whilst Ms Laura Redolfo represented the proponent as the CLO.

The Maputo and Ntete meetings were held on 5 March 2013. Both meetings were attended by the village chiefs, followed by about 120 community members attending each meeting. CES was represented by Lungisa Bosman, whilst Ms Laura Redolfo represented the proponent as the CLO.

The questions, comments and concerns raised during these meetings provided useful insight into the aspirations, perceptions and expectations of the PAP with regard to the project. Refer to Section 4 for the Issues and Responses Trail.

3.2.2 EPDA Disclosure Phase

The main objectives of the PPP during this phase were to disclose the main findings of the EPDA Report to the relevant government officials and community members.

Both community and government meetings were held for this phase. The same planning procedures were followed for the EPDA public disclosure period, as regulated by Decree 45/2004 of Mozambique's EIA Regulations. Adverts were published in newspapers and local radio station as was done for the initial engagement process.

Copies of the EPDA draft report were available for review at the following places:

- Twigg Balama Camp Site;
- > Balama District Administration Office in Balama Town;
- At MICOA's office in Pemba;
- > Coastal & Environmental Services Office in Maputo; and
- > On CES website.

Government Engagements

Invitation letters were sent to all key I&APs (i.e. provincial government and district representatives, as identified during the first PPP) for the EPDA disclosure meetings (refer to Appendix 3 for these written notification letters). A meeting was held in Pemba on 22 August 2013 to present the draft EPDA report to provincial stakeholders. About 80 people from different departments attended the meeting. Prior to these meetings, copies of the draft EPDA were sent to the stakeholders; allowing them to review the report prior to the meeting. The meeting was held in Portuguese. The minutes were collated into an Issues and Response Trail, included under Section 4 of this report.

Community Meetings

Five community meetings were held to disclose the EPDA to the affected communities. Firstly, the meetings were advertised on local radio and through local leaders, who were informed about the meetings in order to notify the rest of the community members. Meetings were held in Nquide and Ntete on 19 August 2013 and in Pirira and Maputo on the following day. The fifth meeting was held with the District Administrator on 21 August 2013. All the meetings were conducted in Portuguese and Macua. The meeting minutes were collated and are attached to this report as Appendix 1. An Issues and Response Trail was also drafted, which is presented under Section 4 of this report.



Plate 3.1: Disclosure the EPDA during community meetings

3.2.3 Specialist Phase

During the Specialist Phase, eight focus group meetings were held as part of the SIA. These focus groups elaborated upon the ESHIA process and provided an opportunity to obtain baseline socioeconomic data on the PACs and their livelihoods. Table 3.2 below provides a list of these focus groups.

Group/Affected Party/Village	Date	Venue	Nr of Attendees
All the four chiefs of the affected villages	2 March 2013	Ntete	4
Nquide youth	6 March 2013	Nquide	40
Maputo women	11 March 2013	Maputo	40
Pirira women	11 March 2013	Pirira	30
Maputo youth	10 March 2013	Maputo	60
Pirira youth	12 March 2013	Pirira	30
Nquide school teachers	13 March 2013	Nquide Primary School	4
Traditional healers	13 March 2013	Nquide	5

Table 3.2: Focus Group Discussions as part of the specialist phase

During each focus group discussion, the chiefs informed the attending village representatives of the ESHIA process. Thereafter, Mr Bosman and a supporting project staff member made a brief project presentation and informed the attending villagers that this was only the initial process of consultation as part of the ESHIA. It was explained that the project was only in its development phase, and that more village-level consultation would follow after the project"s basic infrastructure had been provided and mining plans finalised. Villagers were then provided with the opportunity to raise any issues and/or concerns on the project. All the meetings were well-attended, with around 100-150 people at each.



Plate 3.2: Focus group meetings as part of the Social Impact Assessment

3.2.4 ESHIA Phase

As part of the disclosure of the ESHIA report, several public meetings will be held with the PACs and relevant government officials. Similar planning procedures will be followed, regulated by Decree 45/2004 of the Mozambique EIA Regulations.

3.3 Resettlement Action Plan

3.3.1 Direct Project-Affected Community Engagements

Table 3.3 below lists all the public participation activities undertaken as part of the RAP, as at the end of August 2014.

village	Date	Nr of Attendees	Objective/s			
Resettlement Action Plan Site Visit One and Two (July-August 2013)						
Ntete	08/07/2013	23				
Nquide	09/07/2013	25	To introduce the RAP social team and to establish a			
Maputo	09/07/2013	41	village			
Pirira	10/07/2013	102				
Nquide		44	To explain the farmland assessment process and introduce the CEC received fieldwarkers to each			
Maputo		30	village:			
Pirira		102	To read to the villagers their resettlement-related			
Ntete	06/08/2013	52	 rights according to the Constitution of Mozambique and resettlement guidelines; To introduce the TWG members and explain the functioning of this group; and Establishing a Grievance Mechanism. 			
	Resettleme	nt Action Plan Site Visit T	hree (November-December 2013)			
All village leaders	28/11/2013	14	To inform them of the third site visit"s purpose, i.e. to assess more machambas, but also to survey some machambas which were missed during the previous survey period in August 2013.			
	Resettlement Acti	ion Plan Site Visit Four: D	isclosure of the RAP Report (May 2014)			
Ntete	14/05/2014	14	> To explain the purpose of the site visit, which was			
Nquide	15/05/2014	45	and affected farmers and obtain their input:			
Balama Town	15/05/2014	26	To assess the remaining machambas that might			
Pirira	16/05/2014	25	possibly be affected by the mine; and			
Maputo	16/05/2014	38	TWG members and affected farmers.			

Table 3.3: Public Participation Activities as part of the Resettlement Action Plan

The First Round of Public Participation (July 2013)

This visit aimed to introduce the social team to each village and to establish a TWG by electing two representatives from each village. Village members were asked to elect these representatives themselves, after the purpose of the TWG in the displacement process had been explained to all. The RAP team's independence from the mine was also explained, as well as the RAP's purpose to ultimately safeguard the interests of the villagers in order for the mine not to affect the villagers" livelihood negatively.

The Second Round of Public Participation (August 2013)

A second RAP site visit was undertaken in August 2013 with the aim of surveying and assessing all the households and machambas within the mining's Area of Influence (AoI). A community meeting was held in each village in order to explain the household survey and farmland assessment process, and also to introduce the CES recruited fieldworkers and TWG members. Moreover, the Grievance Mechanism was also established in each village. During these meetings, the mine's progressive development was also explained, i.e., it was stressed that the entire mine site would not be developed overnight. In this way, villagers were reassured that only a certain number of farms would actually be lost and/or affected, and that not all the households to be studied should therefore expect to lose their landholdings. A distinction was also drawn between the loss of land and the loss of crops/structures on such land. It was explained that the proponent would assist those farmers who will lose land to find alternative land, whilst the proponent would be responsible for compensating the loss and/or disturbance of crops, trees and/or associated structures.

Third Round of Public Participation (Nov/Dec 2013)

During the third site visit in November and December 2013, a meeting was held with the four PAC leaders on 28 November 2013. During this meeting, they were informed of the site visit's purpose, which was to assess additional machambas, but also some machambas which were missed during the previous survey period in August 2013. Permission was granted to proceed.

Fourth Round of Public Participation (May 2014)

Lastly, a fourth site visit was held from 8-16 May 2014. The site visit was undertaken by Mr Bosman, Ms Saranga and Ms Buque (CES). The purpose of this visit was to:

- Assess some remaining machambas;
- Disclose the draft RAP Report to the District Administrator and affected communities and obtain any feedback;
- To discuss compensation packages with the TWG members and all the affected farmers; and
- > To meet with the District Resettlement Commission.

The District Administrator was requested to convene all the meetings that were held during this visit. Article 23 of the Mozambique Regulations on the Resettlement Process Resulting from Economic Activities (2012) requires for at least four public consultation meetings to be held as part of the disclosure of the RAP report. In fulfilment of this requirement, a disclosure meeting was arranged by the Administrator in the villages of Pirira, Ntete, Nquide, Maputo and Balama. The proceedings of each meeting are briefly elaborated upon below.

The TWG members were presented with a list of all the affected farm owners whose farms are located inside the mine's AoI. From this list, each community representative sitting on the TWG was asked to invite those farmers in their respective villages to attend these RAP disclosure

meetings. Each meeting was advertised in the villages by the TWG members (minutes and attendance registers of these five meetings are provided in the RAP report" EOH CES, 2014_Part 6).

Each meeting commenced with Ms Saranga (CES) disclosing the RAP report, drawing specifically on the compensation strategies as proposed in this report. After this disclosure, the floor was open for discussion. Most discussions centred around compensation issues. Therefore, an Issues and Response Trail has been collated following this disclosure period. This trail is included under Section 4 of this report.

3.3.2 Future Public Participation Activities

On-going public participation is foreseen during the implementation phase of the RAP. This includes, but is not limited to:

- Engaging with affected machamba-owners and their households;
- Further TWG engagements (throughout the lifecycle of the project or whenever the District Government of the proponent discontinues the group for whatever reason); and
- > Continuous government engagement through the District Resettlement Commission.

The RAP report should be referred to for such further engagements.

3.4 A Future Forum for Mine Decommission

Lastly, a future forum will be established for the project's decommission (closure) phase. Through this committee, engagement can take place on issues (such as possible job losses) that directly affect the labour force, and can assist in finding solutions to these issues. This forum will include government, community and labour representatives to discuss the following issues (amongst others):

- Future land-use options;
- > Environmental and ecological rehabilitation;
- > Labour retrenchment and compensation strategies; and
- > Alternative income generation strategies.

A general community meeting will be held before the decommissioning of operations to present a Mine Closure Plan (including retrenchment and compensation strategies, development of alternative livelihoods, future status of services and infrastructure and land-use planning). Comments and suggestions from the stakeholders will be heard and, where possible, included in the final Mine Closure Plan.

4. ISSUES IDENTIFICATION AND RESPONSES

4.1 Overview

The following section of the report provides three Issues and Response Trails (IRT). The first trail was prepared during the Pre-Assessment Phase, the second one during the ESHIA process, whilst the third one was drafted following the RAP disclosure period. These trails illustrate how issues have been addressed and resolved during the PPP to date.

4.2 A Summary of Key Issues and/or Concerns

A number of key issues were raised during ESHIA and RAP phases of the project. These include the following:

Accommodation

Community members raised concerns about the availability of accommodation for local workers.

Gender Issues

The possibility of employing female workers was also a concern for community members, or wished to ensure that woman will also be employed on the mine.

Employment

Most of the community members have high expectations regarding future employment, and almost half the comments in the IRT relate to this issue. It is therefore not surprising that employment and questions regarding recruitment were raised during most meetings and focus group discussions. Related issues revolved around the need for local recruitment, as many raised concern over the use of outside workers or expatriates. In many cases, this concern was reinforced by the fact that many claim not to have the required documentation for employment at the mine, as well as lack mining-related skills.

Many community members feel that they will not benefit directly from the project. They raised concerns related to corruption in the recruitment process, allowing foreigners to get the job opportunities, availability of work for people with disabilities; woman and youth, a lack of equity and a desire for training so they can improve their skills.

Community Benefits and Social Infrastructural Development

Community members highlighted several community challenges, such as a lack of infrastructure and social services, such as water provision, roads and schools in the area. Most schools are said to be in a deplorable state without any furniture. Many community members enquired whether the proponent would provide any assistance with upgrading such infrastructure. Infrastructural aspects such as electricity availability, improved access to schools, water provisions in terms of new wells, health facilities and sport and recreational facilities were amongst the concerns and requests raised by community members.

Resettlement and Compensation

This was an issue raised during most community meetings. The issue of crop compensation is clearly one of the most important issues raised during the meetings, as many machamba-owners will lose their land to the project. Initially during the community interactions, villagers were reassured that there would be no physical resettlement, as only economic displacement is triggered by the project. This contributed to concerns over how the proponent would compensate farmers for their land and crops. Many discussions followed during which the economic displacement process was meticulously explained, as well as how affected landowners would be compensated only for their crops, and not their land. It was explained that the Government would provide them with alternative land, as per the legislation. To date, careful RAP planning and a very strategic and focused farmland assessment process with the support of the District Resettlement Commission have served as safeguards, and very few grievances related to the RAP process in

general have been raised. However, grievances are a natural part of any RAP process, and some are certainly foreseen during the implementation of the RAP. These will be dealt with through the Grievance Mechanism.

General

Community members expressed their gratitude for being included in the consultation process. However concerns were raised in terms of the lack of trust they have towards the client who promised to complete the Mosque, but no progress has been made. Amongst other concerns raised, community members are concerned about in-migration and loss of land, monitoring of sacred sites and cemeteries; and agricultural issues in terms of loss of irrigation land and water.

Issues were raised in Pemba about the loss of biodiversity as well as the potential impact that the mine may have on the vegetation and Miombo Woodland. It was stated that specialist assessments should be presented to them.

In terms of the consultation and EIA process in general, community members requested that the information channels be improved. They requested more information on the description of the project and specialist studies, impacts and mitigation measures.

Community members remain happy that the project will provide employment opportunities and further development in order for them to sustain their families.

Table 4.1 - Issues and Response Trail of the Pre-Assessment Phase

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION				
Issue 1: Accommoda	Issue 1: Accommodation						
Community member	Nquide (04-03-2013 @ 10:00)	Are the 200-300 houses for workers at the camp going to be people from this area?	No these people will be managers and other skilled people who will be coming from other places. The plan is that all local people will stay at their houses and travel to work daily.				
Community member	Maputo/Mualia (05- 03-2013)	Are there going to be houses built for people working at the mine?	Yes there will be houses at the mine for workers but these will be for people who are coming from far places and local people. The aim is for local people to stay at their homes and travel to work daily.				
Issue 2: Resettlemen	nt and Compensations						
Community member	Nquide (04-03-2013 @ 10:00)	What will happen if the project goes through Mashamba?	If any Mashambas are affected there will be a process of negotiations with affected families. The process will involve chiefs, government officials and the mine people. The families will then be compensated as per what will be agreed upon.				
Community member	Ntete (04-03-2013 14:00)	Some people from Ntete have Mashamba in the project area and we want to know how are going to get compensated for loosing Mashamba as a result of the Emine?	At this stage we are still not sure if there will be any Mashambas that will be affected as a result of the mine but if there are Mashambas that will be lost as a result of the mine a process of negotiation will be conducted with the affected household and a compensation amount will be agreed upon. This process will include community leaders and government departments will be involved to ensure that people get proper compensation for their lands.				
Community member	Piriria (05-03-2013) 14:00	If we are to be moved because of the mine are we not going to be taken to places far from here?	No if people will be moved this will be done via a process of negotiations with the affected communities and families. A site will be identified and agreed upon with the affected				

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
			community and families.
Issue 3: Gender Issu	es		
Community	Ntete (04-03-2013	Are the women going to work in the project?	Yes women will be employed at the mine. For example,
member	14:00)		currently there are already women working at the campsite.
Issue 4: Employment	t		
Community member	Nquide (04-03-2013 @ 10:00)	How are we going to get jobs at the mine?	There will be a clear process of employment that will be outlined to the communities. Once there are jobs available at the mine community leaders (i.e. chiefs) will be informed about the availability of jobs and they will then inform communities. At first only local villages will be informed unless there are certain skills needed that are not available locally then those jobs will be advertised to areas outside of the project area.
Community member	Nquide (04-03-2013 @10:00)	Are we going to need documents to get jobs at the mine as most people here do not have documents?	Chief – yes you will need documents because the government want people to have documents in order to work. Since there will be government departments involved in this process a plan can be developed to ensure that local people can get the requirements so that they can get jobs at the mine.
Community member	Nquide (04-03-2013 @10:00)	The problem with attaining the documents is that we can get them in Montepeuz or Balama and they cost money which most people do not have here.	Since it is important that local people get jobs at the mine some sort of arrangements can be made in order to support those who cannot afford to get the documents. For example government departments are involved in this process and plans can be made to ensure that all those who get employment at the mine can get the necessary documents. In this way people will get both jobs and the required documents. So there are ways and strategies that can be used to ensure that local people get jobs at the mine and will not be excluded because of documents.
Community member	Nquide (04-03-2013 @10:00)	How many people will be accepted in the project?	The number of people to be employed is about 250
Community member	Ntete (04-03-2013 @ 14:00)	We are happy with the project as it will bring development in the area but how are we going to get jobs at the project?	Community leaders, that is, the chiefs will be informed of the jobs available at the mine and they will then inform the communities. A clear process of employment will be developed and will be discussed with the communities so that everybody knows how to get employment at the mine.
Community member	Ntete (04-03-2013 14:00)	How many people can get jobs now in the mine?	At this stage there are no jobs at the mine. When there are jobs available this will be communicated with the chief who will inform local chiefs from the four neighbouring villages

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
			and they will inform community members about the
			operational For example the mine will be operating 24/7 all
			vear and this will require lot of people.
Community	Piriria (05-03-2013)	As you can see many people here are poor and we	Noted this is the aim of Twigg and the Mozambican
member	14:00	hope with the mine people will work and earn money	government by bringing the mine to the area. The aim is to
		to improve their lives.	develop these communities.
Community	Piriria (05-03-2013)	Is the project not going to employ people from places	Yes there will be people from other places employed at the
member	14:00	far from here?	mine especially people with special skills that are not
			available from here. But for general work people from the
			surrounding villages will be employed.
Community	Piriria (05-03-2013)	We are happy with the mine because we want to	There will be more job opportunities once the Twigg start
member	14:00	work and there is no work in this area.	constructing and operating the mine.
Community	Piriria $(05-03-2013)$	We are currently not nappy with now jobs are	I his is noted and will be communicated with I wigg
member	14.00	closest community to the mine but only one percent	of jobs available at the mine as they are still building the
		from our village is employed at the mine currently	camp and doing the different studies
Community	Maputo/Mualia (05-	We do not want to see people from Pemba	No people will be employed from outside areas for work
member	03-2013)	Montepeuz getting jobs first at the mine while we are	that can be done by local people. It is only those jobs that
		not working.	local people cannot do such surveyors, mine engineers.
			etc. that the mine will get people from outside areas.
Community	Maputo/Mualia (05-	The problem is that the BI documents take long to be	People must start looking for the BI documents as it still a
member	03-2013)	processed and this can cause people to miss	long way before the start of the project. We are not saying
		employment opportunities.	local people without documents will not be employed. This
			will depend on the situation when the mine starts. Maybe
			with the involvement of the government a plan can be
0 ''			developed to ensure that people get BI documents.
Community	Ntete (04-03-2013	People from Ntete are poor and they want to get jobs	Local people from all surrounding areas will be considered
member	14:00)	at the mine – now are you going to ensure that	first with regards to employment at the mine unless the
		people from Mele get jobs at the mine?	then the mine will employ people from other areas
Issue 5: Education			Then the mine will employ people from other areas.
Community	Nauide (04-03-2013	The school also has no furniture like desks and	As mentioned above certain projects will be implemented
member	@10:00)	chairs pupil sit down we would like the mine to	as part of a social responsibility of the mine and these will
		support the local school also.	be discussed with communities and prioritise once the mine
			is operating.
Community	Ntete (04-03-2013	In terms of community needs they are similar to other	While at this we are not sure what support the mine will give
member	14:00)	areas. For example there is a school but not desks	to the communities as there are many challenges facing
		and chairs can the mine help?	communities it certain though that the mine will give support

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
			to communities as part of social responsibility which is promoted by the Mozambique government and international donors. For example maybe Twigg Exploration & Mining can afford to build a well for the community at this stage but support in terms of school materials might be possible when the mine is operational.
Community member	Maputo/Mualia (05- 03-2013)	The school principal told us about the challenges facing the school and that they do not have electricity while they have computers. It will be better if they can be provided either with a generator or solar power. The school is from Grade 1 -7	This will be considered as part of the social responsibility for the project but at this stage we are still doing studies and more will be done once the mine is in operation.
Community member	Piriria (05-03- 2013)14:00	We do not have a school in the area as you have noticed. Is the mine going to give support to the school?	Yes there will be support given to communities once the mine is approved and especially when it is operating.
Issue 6: Water			
Community member	Nquide (04-03-2013 @10:00)	We have no water in the area people have to walk long distances to get water. Can the mine help with a well or borehole in the area.	The mine will give support to the communities as part of its social responsibility but at this stage not much can be promised as we are still doing ESHIA studies. As soon as the mine is operational communications will be done with communities to see which priority projects will be implemented first.
Community member	Ntete (04-03-2013 14:00)	The priority must be water for the community –can the mine help the community with a well?	While at this stage we are not sure what support the mine will give to the communities as there are many challenges facing communities it is certain though that the mine will give support to communities as part of social responsibility which is promoted by the Mozambique government and international donors. For example maybe Twigg Exploration & Mining can afford to build a well for the community at this stage but support in terms of school materials might be possible when the mine is operational.
Community member	Maputo/Mualia (05- 03-2013)	There is a problem of water in the area will the project help the community with wells?	The project is willing to support the community as promised previously but a process of ground water testing is being undertaken and once the result have been produced alternative water source will be considered.
Community member	Maputo/Mualia (05- 03-2013)	The water in the well is not good and we think a new well close to the school can be better.	Water quality test are being undertaken as part of the EIA study and alternative will be considered once the result are known. There will be a number of tests done to ascertain the quality of the water in the area and if found to be of poor quality alternatives will be considered.

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
Community member	Maputo/Mualia (05- 03-2013)	The project promised to build two wells in the area but only one was built and the quality of the water is not good. Is there a possibility of building another well close to the school?	This will be considered as part of the social responsibility for the project.
Issue 7: General Infra	astructure		
Community member	Maputo/Mualia (05- 03-2013)	Are you going to bring electricity to our area supply in the mine?	No the mine will also use generators for power supply but maybe with the mine operating in the area the government will be encouraged to bring electricity to this area also.
Community member	Maputo/Mualia (05- 03-2013)	The road to the school is not accessible and a small road to the school with a bridge will help as children do not go school when raining.	Noted this will be considered but as mentioned the project will not be able to do all the things but priorities projects will be chosen with the help of communities and government.
Community member	Ntete (04-03-2013 14:00)	As you can see the road from the camp is small and not clear with all the cars that will be running around here as a result of the mine there is a possibility of accidents if it is not cleared. Can the mine clear the road to avoid any possible accidents?	Noted this will be communicated to Twigg Exploration & Mining. According to the current plan a new road will be built that will link Ntete with the main road. Certainly the new road will be of better quality that the current road.
Issue 8: Health			
Community member	Nquide (04-03-2013 @10:00)	We also do not have clinic or hospital in the area. Can the mine help build a clinic for the community?	There are a number of issues the community need support with and once the mine is in operation these will be considered and as part of the social responsibility from the mine and certain projects will be implemented. For example the mine might be able to build a clinic but this will need support from the government in terms of staff and medicinal supplies.
Community member	Maputo/Mualia (05- 03-2013)	The major problem is access to health facilities and people suffer when they get sick as they have to go all the way to Balama or Montepeuz.	The issue of community support or social responsibility will be part of the project and all these will be considered once the ESHIA studies have been approved by MICOA. The community should be aware though that the project might not be able to help with all community needs.
Issue 9: Sports and recreation			
Community member	Maputo/Mualia (05- 03-2013)	The football team does not have a ball – can we get at least a ball so that we can start some training?	Support will be given to local clubs as has been done for football clubs in Ntete and Nquide as part of the social responsibility of the mine.
Issue 10: Consultation	on process		
Community member	Maputo/Mualia (05- 03-2013)	We are thankful of the Twigg Balama project as they are consulting with us first and not like CMC who employed people from the market and never consulted with the community.	Noted it is the intention of Twigg Exploration & Mining to consult with communities for the duration of the mine.
Issue 11: Complaints			

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
Community	Piriria (05-03-2013)	When representatives from Twigg visited the	We are not sure about this but we will follow up and give
member	14:00	community previously we were promised that the	feedback in the next meeting if nothing has been done by
		Mosque will be completed but nothing has happened.	then.
		How can we trust that other promises will be fulfilled?	
Issue 12: Overall Pro	ject benefits		
Community	Maputo/Mualia (05-	The project will bring work and that people will be	Noted, this is the aim of the project to ensure that people
member	03-2013)	able to get work and after food to eat.	from local areas get employed in the mine
Community	Nquide (04-03-2013	The project is major and will bring development to the	Noted this is the aim of Twigg Exploration & Mining
member	@10:00)	community. The people will be able to give children	
		money to buy other things.	

4.3 Issues and Response Trail of the Environmental, Social and Health Impact Assessment Process to Date

Issue 1.1 : Employment Nquide Meeting Enrique Rame NQUIDE MEETING I have not much to say but to thank the company for bringing this project to the area. The company employs less than three people from Nquide. Can we not wit be employed as guards or to pick up employs has the camp? The project is the good but we need jobs.	<u>Dinís Napido - Twigg</u> Ne understand that the main problem is employment. The project is noving fast and soon we will be opening the mine. We are working vith the district government to resolve the issue of the distribution of
Enrique Rame NQUIDE MEETING I have not much to say but to thank the company for bringing this project to the area. The company employs less than three people from Nquide. Can we not wit be employed as guards or to pick up employed as guards or to pick up employed as guards or to pick up employed as the camp? The project is good but we need jobs. Dir.	<u>Dinís Napido - Twigg</u> Ne understand that the main problem is employment. The project is noving fast and soon we will be opening the mine. We are working vith the district government to resolve the issue of the distribution of amployment
in gov witi Rig qui the mir we cas We cas We we we	There is a plan in which the recruitment of workers will be made by community committees. These committees will be created here and n all communities and will be assisted by members of the government- the Ministry of Labour. The Ministry of Labour will assist with this selection process according to the type of work required. Right now we have few jobs and we understand that we have to act quickly to cover all communities. We will not employ everyone but here will be benefits even for those who are not employed at the nine. <u>Cabral Mutiquinhene- Twigg</u> We do not have work for all but there are a few jobs that are needed casually and for those we employ people at the gate. We try to distribute the jobs to all communities. Recently we employed 7 people from Nquide and the work will finish next week. We are still looking at strategies to improve the recruitment process
Katchatepa NOLIIDE MEETING I would like to support Enriques From Th	The priority now is to complete the process of land-owner.
Nassir 19/08/2013 I would like to support Enliques. From the mountain to here, the land belongs ide to Nquide, but we are not benefiting job from the project. We do not have jobs. where the mountain to here, the land belongs ide to Nquide, but we are not benefiting job from the project. We do not have jobs. where the mountain to here, the land belongs ide to Nquide, but we are not benefiting job from the project. We do not have jobs. where the mountain to here, the land belongs ide to Nquide, but we are not benefiting job from the project. We do not have jobs. where the mountain to here, the land belongs ide to Nquide, but we are below. I hope that job opportunities can be for all. If we get jobs, we will dance all night. We have people that can drive tractors, heavy machinery, masons, carpenters, but we are suffering	dentification to allow the mine to start. At that time we will have more obs. The cake is small now and the jobs are not permanent. But when the mine starts, more people will be employed.

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
Martins Nicula	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	We need jobs for Nquide. We leave homes to look for employment at the camp and spend all day without any information whether there is employment or not. Sometimes the company say that there are no jobs, but after that we hear that someone has been employed.	Regarding people who go and stay at the gate to look for work, we cannot tell them to leave and give them a day to come back. We allow people to be at the gate because sometimes we have temporal jobs that last for 1-3 days.
<u>Pedro Manuel</u> <u>Mustafa</u>	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	Can a foreigner who is a resident in Mozambique be employed? Will a person who comes from Maputo during the recruitment stage be employed at the mine?	<u>Dinís Napido - Twigg</u> For the issue of the foreigners, our government prioritizes Mozambicans because the resources belong to them. For any kind of work, we look first to Mozambicans and only in the absence of qualified people we look for foreigners. People from Maputo, Niassa, Cabo Delgado are all Mozambicans and we do not want discrimination between Mozambicans. However, priority will be given to the locals.
<u>Mahamudo</u> <u>Jesefo</u>	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	It is certain that the team will come to the village and talk to our leaders. I would like to recommend the leaders to not employ only their family.	Regarding corruption in the recruitment process, the team will not be formed only by the community leaders we will have representatives from government departments such as the Ministry of Labour, district authorities, and company representatives. We have to follow our organization and trust on our heads.
<u>Catarina</u> Jeremias	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	We do not have much to say, we just want to see our husbands employed. They will work and bring money to us.	 <u>Dinís Napido – Twigg</u> When it comes to work there is no discrimination if the person gets sick during work, the company will ensure it does everything to assist. There is a social security system, if there are accidents, there are ways to compensate. For the selection process, there are forms of assessments that are done according to the difficulty of the work.
<u>Augusto</u> <u>Cassimo</u>	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	When the company arrives it will not want to employ sick (disabled) people. What kinds of diseases are permissible? What about people with some kind of disability?	<u>Dinís Napido – Twigg</u> When it comes to work there is no discrimination and if the person gets sick during work, the company will ensure it does everything to assist. There is a social security system, if there are accidents, there are ways to compensate.

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
Issue 1.2: Emplo	yment: Ntete Meeting		
<u>Fernando</u> <u>Cassona</u>	<u>NTETE MEETING 19/08/2013</u>	We are grateful to receive information which we did not know before. We are suffering due to lack of employment. We are being registered since last year but we do not know the results of these registrations. We do not mind if we lose the mosque, we will be happy if we get job.	<u>Dinís Napido – Twigg</u> We understand the worries presented and recognize that employment is very important; the company began two years ago and is now thinking to establish the mine. We started talking to the government to cover all communities in employment. Not only employment in the project but also in projects that will come due to the project.
			It is not possible to employ all the people, so we are looking for a way to benefit those who are not in the mine. We will work with the Ministry of Labour to create a team composed by members of the community, the District government, the Provincial Department of Labour and the company. The team's objective will be to study how to recruit people for the mine. We know that you have never worked in a mine. The team will study how to fit you in the mine. The people sitting at the gate of the mine, we mean that we are not recruiting full time, in the mine we will work differently, now we recruit for short periods of 2-4 days. The company has not started recruiting people for the mine. People are working in the exploration phase of the project. It is necessary to be calm and patient and we will work with the government.
<u>Manuel Razão</u>	NTETE MEETING 19/08/2013	We Mozambicans are bad because with the arrival of the company we will have limitations because the agricultural areas are few and the land is limited in the District Balama. What will be given to our children? I know that the company will bring benefits but not all will be employed. What will happen to those who are not employed?	 <u>Dinís Napido – Twigg</u> It is not possible to employ all the people, so we are looking for a way to benefit those who are not working for the mine. We will work with the Ministry of Labour to create a team composed by members of the community, the District government, the Provincial Department of Labour and the company. The team will have an objective to study how to recruit people for the mine. For those who do not have jobs there will be other benefits and projects that the company will be doing as part of their social responsibility. So there will be other opportunities for people to develop. Foreigners will not have rights while we are here. They are hired only when there is no one in Mozambigue with their gualifications.

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
			Foreigners come to teach Mozambicans and then go back. For the case of Tete, Niassa, etc, they are also Mozambicans, but the priority
			is for the locals. We have to expect people of other provinces because we have to promote national unity.
			The team leader spoke about the benefits of the development of the
			region, not just jobs. We can have good roads, hospitals, schools, etc.
Issufo Jaisse	NTETE MEETING 19/08/2013	I am very satisfied with this program. It	<u>Dinís Napido – Twigg</u>
<u>Narape</u>		is good to know that the company will	We will work with the Ministry of Labour to create a team composed
		come and bring jobs. People from	by members of the community, the District government, the
		outside will come, but will be in our	provincial Department of Labour and the company. The team will
		control. There are difficulties because	have an objective to study how to recruit people for the mine. Local
		there are people who have studied but	people with skills relevant to the mine will be given preference in
		take some of these people	terms of getting jobs.
Mamado		Lam young and Lam concerned	As mentioned currently there are no jobs excent for casual labour for
Muhalo	INTELL MEETING 19/00/2013	because young people are in the	2-3 days so the company cannot chase people who stay at the gate
manare		company every day but are not hired	away as jobs come randomly.
		There are people who are there since	
		last year but are not employed.	
Lordino Sawalé	NTETE MEETING 19/08/2013	These jobs were taken over by people	Dinís Napido – Twigg
		from Maputo, we want the company to	We noted the issue of Ms Bibiana and we think this is a problem for
		bring people from the community.	all women of Ntete. Thank you for having raising this issue, we will
			correct the mistake and employ woman from Ntete.
			Your children and grandchildren will benefit by this mine. If you have
			another program we advise you to do your schedule because we do
			not hire for long periods and sometimes we can have 15 days
			without recruiting. We are in conversation with government regarding
			the recruitment.
<u>António</u>	NTETE MEETING 19/08/2013	I would like to thank the good	Cabral Mutiquinhene (Twigg)
<u>Muatuca</u> -		contributions of the community. People	I appreciate the presence of all. I want to talk about the issue of
Chief of the		want to see the project working.	employment, as Mr Dinís Napido said we will use a transparency to
<u>Village</u>		People want to work, but we know that	deal with the issue of employment. Nobody pays to join the
		not everyone will be employed. We are	company, we do not want to hear that someone paid to get a job.
		asking for job, at least women are	
		employed in the graphite mine.	It you see someone asking for money to give jobs, please denounce

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
			them. People will have jobs according to company's needs. At this stage we do not have many vacancies because we are not yet operating.
			DPCA Latifa António
			Thanks to all to who came and hear about the project. We are sure
			that the project will bring benefits.
			<u> Dinís Napido – Twigg</u>
			We are brothers and we know we have many young people in Ntete.
			The company has programs to encompass all people, children,
			young and adults.
Issue 1.3: Emplo	yment: Pirira Meeting	· · · · · · · · · · · · · · · · · · ·	
Simão Roberto	PIRIRA MEETING 20/08/13	I would like to hear the members of the	<u>Dinis Napido – Twigg</u>
Amimo		government confirming if the	we are pleased to be here, we were warmly welcomed at our
		MICOA is for the government or for the	campsite is in Pinra so thank you for the hospitality.
		neople in general?	We are in the third year of the project and everything is fine. We will
			start the next phase of the project to have our mine, there will be
		We know that the promises will not be	much extra work such as roads construction brick laving etc. The
		fulfilled: we received people from the	company gives jobs to the people but a recruitment strategy will be
		government, but from the Electricity	developed. This recruitment strategy will be done with the
		Department and they cut our coconut	government and the community. The government department is the
		trees and said that we will be	Ministry of Labour.
		compensated, but we were not	
		compensated. We want to know if the	
		government is for the population or for	
		the company.	
		In the early days we liked the way the	
		company I wigg worked but not now.	
		At that time it was easy to get job at	
		the gate, but now is difficult. There are	
		arrangement for employment How can	
		people who are not from the company	
		promise employment? The company is	
		to be responsible in employing people	
Josefina	PIRIRA MEETING 20/08/13	Our concern is regarding the	Dinís Napido – Twigg

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
<u>Lumasse</u>		employment, the benefit has been	As mentioned, a recruitment strategy will be developed to ensure
		given only to women from Balama	that we solve these problems and that people from these areas get
		Headquarters and not from Pirira while	iobs but only casual iobs for few days
Maria Saibo	PIRIRA MEETING 20/08/13	We need jobs, but when we go to the	Dinís Nanido – Twigg
	<u></u>	mine we are not hired because we do	There will be no discrimination for jobs except where work requires
		not know how to speak Portuguese	special skills. With regards to age there are limits for example the
		and because of the age.	company cannot employ people under the age of 18 years. So old
locus 1 4: Emplo	vment: Muelie Menute Meeting		people and people under the working age will not be employed.
Sumaila		This mountain is port to Muelia, but	Dinís Napido Twigg
Nandioca –	20/08/13	only people from Balama are	<u>Dinis Napido – Twigy</u> I would like to clarify that the company did not send anyone to take
Deputv's first	20100110	employed. To have a job it is	the list of names and or ID's for employment. The issue of
district		necessary to have an ID, but there are	employment will be treated in coordination between the government
		people with ID left their names, but still	and the community. This project is at the first step, so only has 50
		have no job because the company did	workers. We will enter to the construction phase and will employ 300
		not come to Mualia.	people. When we reach that stage we will work with the four
			communities because they are directly affected by the project.
			we will work with the Ministry of Labour and communities in the
			process of selection of workers.
			The teams that are doing the survey realize that people are waiting
			for something. This is the process that the government has decided
			on before the project, so we hired CES. Right now we are only doing
			the survey; we are not taking out people from their areas. People can
			continue farming and when the mine comes, we will pay for
			everything found in the machamba. The government has already
			fruit trees. We are working and we want to keep good relations with
			the population.
Arlindo White	MUALIA-MAPUTO MEETING	Thanks for presenting the project in	Dinis Napido - Twigg
<u>Siare</u>	<u>20/08/13</u>	detail. This is the first project to	This company never ask names for job. When we want some casual
		happen in the district. Thanks for the	workers we recruit them immediately. We must be vigilant as some
		presence of the team and I would like	people can take chance to create confusion.
		to recommend that the government is	
		informed that the population of Mualia	
		ns nappy with the project. There are	
		people registered but do not	
RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
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		understand the purpose of the	
		registration. What are the formalities to	
		have jobs?	
		He said that this mountain is close to	
		Muala but only people from Balama re	
		Nuclia who left names but still has no	
		ind hereines the company did not	
		come to Mualia	
Community		The information we got is that the	Dinís Nanido - Twiga
Leader	20/08/13	number of workers was reduced but	<u>Dims Napido – Twigg</u> Thanks for the suggestion to hire the same number of workers in
Leader		there are a large number of workers	each community. Regarding people in front of the gate I encourage
		from Balama in the mine. The day at	people to not leave their work to stay at the gate
		the meeting I found nearly 20 people.	
		The director said he would inform	We took a group of people to collect a sample but this will not
		people when there is a job available.	happen anymore, the project was to begin when we recruit people
			and we recognize that we have to correct this situation through a
		The mine should follow the example of	good recruitment program.
		equity, and employment should be	5 1 5
		divided equally between the	The land demarcation process has started as part of the RAP.
		communities. Do not know whether the	
		person should stand in the gate to get	
		job. If so I will send the young of the	
		community to the gate of the camp.	
		I heard that there was land	
		demarcation. Will this take place here	
		too?	
<u>Adelino</u>	MUALIA-MAPUTO MEETING	People who are doing the survey say	DPREME
<u>Sadique</u>	<u>20/08/13</u>	that affected people will not be paid	As members of the government we are witnesses of this marriage
		when they find land only and ask if we	and we hope to continue this marriage forever. This project relies
		want money.	heavily on community involvement. If you do not help, the project will
			not work. If there are doubts, you should approach us and avoid
			gossip.
Issue 1.5: Admin	istration of Balama		
Administrator	ADMINISTRATION OF	Thank you for the presentation, the	<u>Dinís Napido – Twigg</u>
	BALAMA 08/19/2013	government already knows about the	A project never develops on its own. We have the administrator
		project. We want to have good co-	Cabral who is responsible for the management and we have three

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		ordination between government, the company and communities.	directors, I am the Mozambican director, we have had the experience of other mining companies and we want to work with the government with respect to man-power. We will approach the government to
		I would like to know about the foreign	discuss terms of a policy for jobs.
		man-power. We know that the	There are management models for foreigners. In our company the
		technicians and foreigners and we had	foreigner can only get two years and their mission is to teach we
		problems with foreigners in other	have to find people willing to learn to occupy these positions after
		companies. In the Ancuabe project, the	this period.
		camp was divided between	
		Mozampicans and foreigners, Mozampicans could not cross foreign	As for discrimination, in the camp, we have areas of senior and junior staff. There is no racial discrimination: we try to minimize the intake
		side of the camp.	of foreign labour. The foreigners that we have now in the camp are consultants.
Issa Rachide	ADMINISTRATION OF	The project is welcome, as it will help	The issue of foreigners is complex. One way we've found to avoid
(Permanent	BALAMA 08/19/2013	develop the district and members of	the problems of foreigners is to work in coordination with local
<u>Secretary of</u>		the district government are aware of it	authorities. The Labour Law sates the percentage of foreigners that a
Ralama)		would like to better understand the	there will be ways to accommodate the specifics of each project.
		market of graphite and uranium as I had heard that we have uranium.	Foreigners should come here to share their knowledge. This will come through by written agreements and memoranda with the government.
		We are aware that the company will	
		train our citizens based on foreigners,	
		sometimes we forget that the role of	
		should incorporate the issue of training	
		of Mozambicans.	
Issue 1.6: Emplo	yment: Pemba Meeting		
<u>Mbeua Cabudo</u>	PEMBA MEETING 21/08/2013	What work will be done by local	<u>Dinís Napido – Twigg</u>
		people?	I ne issue of employment is very sensitive as Balama has never had
			There are a number of programs to be carried out and training for
			young people and women, even before the construction of the mine.
			It is difficult to employ everyone. But there are other benefits that
Omar Martina		L oncourage the project to work with	may accrue.
<u>omar wartins -</u>	FEINIDA INEETING 21/00/2013	i encourage the project to work with	$\underline{DIIIIS NAPIUU - TWIGG}$

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
<u>Student</u>		the government. "The son of the house	The issue of employment will be monitored by the government to
		cleans the floor better than the guest .	ensure that local people get jobs. We will work closely with the
Abdul-Student	PEMBA MEETING 21/08/2013	The mega projects fail to meet their	Department of Labour. We want 99% of workers to be Mozambicans.
Abuul-Student		promises Regarding the employment	We cannot stop people with special skills from working in the project
		will the people working there be from	but the aim of the company is that these people must train local
		outside the country?	people to do their jobs in the long run.
Issue 2.1: Resett	lement and compensation: Nqu	ide Meeting	
Ussene Bwana	NQUIDE MEETING	I work on the farm, so I would like to	Yes for now the process is to identify all those whose lands will be
	<u>19/08/2013</u>	know if we can continue to farm or not.	affected by the mine. The mine will inform the people who are
			affected when the mine will start construction of infrastructure so that
			people can harvest what is on their land before the mine can take the
Issue 2.2 · Reset	tlement and compensation: Nte	te Meeting	
Basílio Paiume	NTETE MEETING 19/08/2013	The land belongs to the state What	This will be discussed with the community and affected people
	<u></u>	are the mechanisms that will be used	before the mine starts operating. There will be government
		for compensation?	departments involved in the process.
Agostinho	NTETE MEETING 19/08/2013	We know that the mine has not started.	No, people must not stop farming but they supposed not to make
<u>Paulo</u>		Should we stop farming?	new mashamabs. Before the mine starts people will be given time to
			harvest their land or they will be compensated for what is on the land
Nozária Alv		There are staken in our fields and we	at the time.
Nazario Aly	NTETE MEETING 19/08/2013	saw people passing through the farms	as are temporary
Issue 2.3 · Reset	tlement and compensation: Piri	ra Meeting	
Salvador	PIRIRA MEETING 20/08/13	appreciate the detailed presentation	Ana Maria Jone-DPCA
Raiabo Momola		am not against the project we know	The company called the Provincial Directorate for the Coordination of
		that where there is a company, we will	Environmental Affairs is to witness everything that will happen. The
		have benefits, even if we are not	environment is everything around us. We're on the side of the people
		working there. We are worried about	and we are witness to the promises made by the project.
		our machambas we need machambas	
		for our livelihood. I would like to see	
		people who lose their farms having a	
		decent compensation.	
		I am happy to know that not all land	
		will be affected. We will also reserve	
		important areas and are pleased to	
		hear that the project will not use those	

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		areas.	
Simão Roberto	PIRIRA MEETING 20/08/13	I would like to hear the members of the	<u> Dinís Napido – Twigg</u>
<u>Amimo</u>		government confirming if the	We are pleased to be here, we were warmly welcomed at our
		information we received is correct.	campsite is in Pirira so thank you for the hospitality.
		MICOA is for the government or for the	
		people in general?	We are in the third year of the project and everything is fine. We will
			start the next phase of the project to have our mine, there will be
		We know that the promises will not be	much extra work such as roads construction, brick laying, etc. The
		fulfilled; we received people from the	company gives jobs to the people but a recruitment strategy will be
		government, but from the Electricity	developed. This recruitment strategy will be done with the
		Department and they cut our coconut	government and the community. The government department is the
		trees and said that we will be	Ministry of Labour.
		compensated, but we were not	
		compensated. We want to know if the	
		the company	
		the company.	
		In the early days we liked the way the	
		company Twigg worked but not now.	
		At that time it was easy to get job at	
		the gate, but now is difficult. There are	
		people who say that they can make	
		arrangement for employment. How can	
		people who are not from the company	
		promise employment? The company is	
		to be responsible in employing people.	
Simão Roberto	PIRIRA MEETING 20/08/13	We want to know who will pay the	The company will pay compensation for land and not the
<u>Amimo</u>		compensation- will it be the district or	government. What Anton was saying is that the process of
		the company?	compensation for loss of land will be done according to the World
			Bank or international standards.
		We are in doubt, it was said that the	
		district would pay for compensation,	
		DUI TODAY WE DO NOT SEE ANY	
		that the componention will be noted by	
		the World Bank and Twigg	
Simão Roberto		There was another meeting on the 6th	People will not be compensated for land but will be compensated for
		of August and it was said that we will	crops and trees in their land. This is because the land belongs to the
		or ragust and it was salu that we will	stops and rees in their land. This is because the land belongs to the

Assamo PIRIRA MEETING 20/08/13 I am worried because the provincial government members present here (DPREME) were here in another project that still not paid our compensation. How can we trust these members? Ana Maria Jone-DPCA Molande PIRIRA MEETING 20/08/13 I am vorried because the provincial government members present here in another project that still not paid our compensation. How can we trust these members? Ana Maria Jone-DPCA Molande PIRIRA MEETING 20/08/13 I do not have a big concern just Dinis Nanido – Twing			1350E/CONCERN/COMMENT	RESPONSE/ACTION
Assamo Calmane PIRIRA MEETING 20/08/13 I am worried because the provincial government members present here (DPREME) were here in another project that still not paid our compensation. How can we trust these members? Ana Maria Jone-DPCA Molande PIRIRA MEETING 20/08/13 I am worried because the provincial government members present here project that still not paid our compensation. How can we trust these members? Ana Maria Jone-DPCA Molande PIRIRA MEETING 20/08/13 I do not have a big concern just Din(s Napido – Twing)			not be paid because the land belongs	state.
Assamo PIRIRA MEETING 20/08/13 I am worried because the provincial government members present here (DPREME) were here in another project that still not paid our compensation. How can we trust these members? Ana Maria Jone-DPCA Molande PIRIRA MEETING 20/08/13 I am worried because the provincial government members present here in another project that still not paid our compensation. How can we trust these members? Ana Maria Jone-DPCA Molande PIRIRA MEETING 20/08/13 I do not have a big concern just Din(s Nanido – Twing)			to the state.	
Calmane government members present here (DPREME) were here in another project that still not paid our compensation. How can we trust these members? The company called the Provincial Directorate for the Coordina Environmental Affairs to witness everything that will happen. on the side of the people and we are witness to the promises by the project. This is also a different project by a private cor and not the government Molande PIRIRA MEETING 20/08/13 L do. not have a big concern just Din(s Nanido – Twing)	<u>Assamo</u>	PIRIRA MEETING 20/08/13	I am worried because the provincial	Ana Maria Jone-DPCA
(DPREME) were here in another project that still not paid our compensation. How can we trust these members? Environmental Affairs to witness everything that will happen. Molande PIRIRA MEETING 20/08/13 L do not have a big concern just Dinis Nanido – Twing	<u>Calmane</u>		government members present here	The company called the Provincial Directorate for the Coordination of
project that still not paid our compensation. How can we trust these members? on the side of the people and we are witness to the promises by the project. This is also a different project by a private cor and not the government Molande PIRIRA MEETING 20/08/13 L do not have a big concern just Din(s Nanido – Twing)			(DPREME) were here in another	Environmental Affairs to witness everything that will happen. We're
Compensation. How can we trust these members? Dy the project. This is also a different project by a private con and not the government Molande PIRIRA MEETING 20/08/13 L do not have a big concern just Dinis Nanido – Twing			project that still not paid our	on the side of the people and we are witness to the promises made
Molande PIRIRA MEETING 20/08/13 I do not have a big concern just Dinis Nanido – Twigg			compensation. How can we trust these	and not the government
	Malanda		members?	
Tumona	<u>Wolande</u> Zumana	FIRIRA MEETING 20/08/13	a do not have a big concern just	<u>Dinis Napido – Twigg</u> Voc. you can continue with farming. Poople will be given expertunity
<u>Zumane</u> wondering if we can continue to faith the system of the land before the mine starts operating	Dumbwa		or not	to harvest what's on the land before the mine starts operating
Mário António PIRIRA MEETING 20/08/13 We know that these lands are Dinís Nanido – Twigg	Mário António	PIRIRA MEETING 20/08/13	We know that these lands are	Dinís Nanido – Twigg
Mário Mário borrowed within the community if If there are already people who lost crops because of the	Mário		borrowed within the community if	If there are already people who lost crops because of the mine
someone has a land with cashew and operation they will have an opportunity to complain once the	<u></u>		someone has a land with cashew and	operation they will have an opportunity to complain once the RAP
mango trees that did not pay, it is process has started.			mango trees that did not pay, it is	process has started.
better to pay and avoid disturbing the			better to pay and avoid disturbing the	
company.			company.	
Issue 2.4 : Resettlement and compensation: Mulia-Maputo Meeting	Issue 2.4 : Reset	ttlement and compensation: Mu	lia-Maputo Meeting	
Aquino Aide MUALIA-MAPUTO MEETING I am not satisfied because the Dinís Napido – Twigg	<u>Aquino Aide</u>	MUALIA-MAPUTO MEETING	I am not satisfied because the	<u>Dinís Napido – Twigg</u>
20/08/13 brigades do not tell the truth, you are You need to pay much attention. We are talking about land		<u>20/08/13</u>	brigades do not tell the truth, you are	You need to pay much attention. We are talking about land where
Iving. The people doing survey in the you are doing machambas as the same land that the company			lying. The people doing survey in the	you are doing machambas as the same land that the company wants
farms say that the person will lose to establish the graphite mine. We will not fight with the commendation in the graphite mine. The government is reaponed			farms say that the person will lose	to establish the graphite mine. We will not fight with the community
to be paid. We do not want the project, quiding us, which is the same government that is responsible			to be paid. We do not want the project	guiding us which is the same government that is responsible for
to exploit the people and we thought water power etc			to exploit the people and we thought	water nower etc
the Administrator would be in the			the Administrator would be in the	
meeting. In the fields they will only find			meeting. In the fields they will only find	
corn and sorghum. We already			corn and sorghum. We already	
harvested and if there is nothing in the			harvested and if there is nothing in the	
machamba, how will the compensation			machamba, how will the compensation	
be paid?			be paid?	
We agree that the land belongs to the			We agree that the land belongs to the	
state, and it is better to obey the law,			state, and it is better to obey the law,	
not worth threatening. People should			not worth threatening. People should	
forme			forms	
Gil António Alí L beard that the people will have other Dinís Nanido Twigg	Gil António Alí		I heard that the neonle will have other	Dinís Napido - Twiga
				<u>Dinis Napido – Twigy</u>

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		fields and will not have profit. Is it	The government seeks money in taxes and other companies. The
		possible to work without benefit?	government will want the money from the graphite mine for roads
			and other houses. The government says that we should work well
			with people. The government says that no one can move from their
			farm to stay poor and not have anything to eat. So the government
			already has a policy that says that we should support people when
			they are taken away from their land. It is necessary to support not
			only where they are being removed but also where they will be
			allocated. The company's mission is to ensure that no one suffers
			from loss of machamba.
Amade	MUALIA-MAPUTO MEETING	It is good to know that people will not	Dinís Napido – Twigg
Quiname Nipira	20/08/13	be relocated in a bad way of the fields.	Regarding the demarcation, currently the company does not have
		I never imagined that one day we	any schedule for this area so keep working.
		could get a project in Balama. I lived a	
		long time in Balama, and did not know	
		that we have resources. We received	
		wrong the information form the people	
		who are doing the survey because	
		they say that there will be no benefits.	
Community	MUALIA-MAPUTO MEETING	The information we got is that the	Dinís Napido – Twigg
Leader	20/08/13	number of workers was reduced, but	Thanks for the suggestion to hire the same number of workers in
		there are a large number of workers	each community. Regarding people in front of the gate, I encourage
		from Balama in the mine. The day at	people to not leave their work to stay at the gate.
		the meeting I found nearly 20 people.	
		The director said he would inform	We took a group of people to collect a sample but this will not
		people when there is a job available.	happen anymore, the project was to begin when we recruit people
			and we recognize that we have to correct this situation through a
		The mine should follow the example of	good recruitment program.
		equity, and employment should be	
		divided equally between the	The land demarcation process has started as part of the RAP.
		communities. Do not know whether the	
		person should stand in the gate to get	
		job. If so I will send the young of the	
		community to the gate of the camp.	
		I heard that there was land	
		demarcation. Will this take place here	
		too?	
Issue 2.5 : Reset	tlement and compensation: Adr	ninistration of Balama	

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
Mbeua Cabudo	BALAMA MEETING 21/08/2013	People being resettled will have land for production?	<u>Elisa Vicente – CES Consultant</u> Resettlement is not a new subject in Mozambique and we have the example of Tete that had many problems. We will learn from those mistakes not to make the same. At country level we already have regulations and will also use the IFC performance standards that present the procedures on involuntary resettlement. Alternative land will be identified for people who will lose land as a result of the mine.
Issue 2.6 : Reset	tlement and compensation: Pen	nba Meeting	
<u>Angela</u>	PEMBA MEETING 21/08/2013	We are learning from mega-projects to understand the risks. We saw that there will be resettlement and monitoring was mentioned but we never see the follow up.	I would like to correct this and inform that this project will have no physical resettlement. We foresee economic resettlement due to loss of fields. Both the national and the international regulations say that when people are removed from their farms should receive other areas of equivalent size to continue to work their fields. In our regulations, it is the responsibility of government to provide new areas and the project proponent must create conditions so that the areas are used.
Issue 3.1: Water	Supply: Nquide Meeting		
<u>Martins Nicula</u>	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	I heard that if the farm has been identified, the person will be compensated for crops loss, but the land will be under the responsibility of the government. The company promised to bring a tank of water 1000 L. Nothing happened until today.	<u>Dinís Napido - Twigg</u> I do not know who said it would be a tank of 1000 L. We are still considering a very large project where the water comes from Chipembe, goes through Ntete to our camp, from there we will have water to Ntete and Nquide and we can have more than 1000 L
<u>Secretary of</u> <u>the Quarter</u>	NQUIDE MEETING 19/08/2013	I have not much to say just to thank all present. The people contributed too much. In this village of Nquide we do not have water. We would like to have water. We have fountains and this is not working we would like to have help for repair. We have a stream that if it is excavated, we would also consider as a source of water. We are ready to receive the mine.	 <u>Dinís Napido – Twigg</u> The problem of water will be solved once the mine is operational as we will take water from the Chipembe dam and some of this water can be used by the community. All your concerns and issues will be considered in the process. <u>Maria Jone</u> Thank you to the people of the village for their patience and the freedom to ask questions. I hope that the project proceeds. <u>Miguel Francisco (DPREM)</u> Thanked everyone for their contributions and patience.

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
			 <u>Dinís Napido – Twigg</u> On behalf of the company we have received your opinions and realize that your concerns are related to few people being employed in the mine. We will make every effort to meet your concerns we already have two more ladies from Nquide working in the mine. The process will continue for men. As you know we will be neighbours. The camp will be under that mountain up ahead, we are neighbours, which means that there will be benefits. We will want to eat lettuce, corn, tomatoes and we want to buy these products here. The project is for all and we will correct the mistakes of the past. Thank you
Issue 3.2: Water	Supply: Pirira Meeting		
Amane Nusso	PIRIRA MEETING 20/08/13	Thank you for your presence, I am only	<u>Dinis Napido</u>
		worried about the water pump that is	We will repair the water pump. Our administrator (Twigg) will arrange
		damaged.	a technician to repair the pump.
Issue 4.1: Comm	unity Support – Sports and reci	reation: Nquide Meeting	
<u>Santos Romey</u>	<u>NQUIDE MEETING</u> <u>19/08/2013</u>	I do not have much to say. I am on the football team and the company promised equipment and balls but so far we only received one ball.	Regarding the football team, Ntete is the Locality and has many communities and Nquide is one the communities of Ntete. We talked with the leaders and agreed that we would have a team that represents the Locality. It is this team that will compete in the District Championship. We will give more balls later, and we already gave balls to the Primary Schools, then we will give balls to youth.
Issue 4.2 Comm	unity Support – Sports and recr	eation: Mualia-Maputo Meeting	
Janito Eugénio		I am in the group of young people we were promised that we would receive balls. In Ntete Nquide they already received balls, but so far we have not received, Ntete have equipment and balls but we do not have anything.	<u>Dinís Napido – Twigg</u> As for the youth, it was agreed with the leader that the community should have a team. The Locality has several communities. The team of Ntete is a selection of the best players of all communities. This team was formed and is called Grafinhos. The company is now promoting sport in the schools and then will see how to support young people. In Nquide we gave balls only to the Schools. So, we will make a program to cover all.
Issue 5.1: Gende	r Issue: Ntete Meeting		
Bibiana Ermente	NIETE MEETING 19/08/2013	We participate in all meetings, we	<u>Dinis Napido – Twigg</u>
Ernesto		Manuto were employed we also want	work with the government and Nitete with the objective of presenting
		maputo were employed, we also want	work with the government and Miete with the objective of presenting

Image: series of the series
Issue 5.2: Gender Issue: Mualia-Maputo Meeting and even disabled people- we will find ways to cover them all. Luisa Aquino MUALIA-MAPUTO MEETING 20/08/13 There was a meeting and I was anxious because it was said women can work. In the graphite mine women do not work? Dinis Napido – Twigg Regarding the question of employment, the company does not discriminate against women. There is employment for men and women, the employment process will include women in the plan. Even now the mine has not started but women are working. Issue 6: Education: Administration of Balama Muscale and the pople and
Issue 5.2: Gender Issue: Mualia-Maputo Meeting Luisa Aquino MUALIA-MAPUTO MEETING 20/08/13 There was a meeting and I was anxious because it was said women can work. In the graphite mine women do not work? Dinis Napido – Twigg Regarding the question of employment, the company does not discriminate against women. There is employment for men and women, the employment process will include women in the plan. Even now the mine has not started but women are working. Issue 6: Education: Administrator MVE know that in the villages the already asked the company to open a literacy school as Balama has high levels of illiteracy. I would like to know if there will be a national laboratory for the processing of graphite. Dinis Napido – Twigg As part of developing skills for the Balama district there will be a skills development programme that will be developed by the company to ensure that the skills within the communities are improved. Celso Nhumaio (Mineral Resources ADMINISTRATION OF BALAMA 08/19/2013 I would suggest that at the time of training a basic school for geology, similar to what have been done by Dinis Napido – Twigg (We will take into account all the proposals given. We will try and find middle ground to best cover labour and training needs.
Luisa AquinoMUALIA-MAPUTO MEETING 20/08/13There was a meeting and I was anxious because it was said women do not work?Dinis Napido - Twigg Regarding the question of employment, the company does not discriminate against women. There is employment for men and women, the employment process will include women in the plan. Even now the mine has not started but women are working.Issue 6: EducatorAdministrator of BalamaWe know that in the villages the population is unskilled and I had already asked the company to open a literacy school as Balama has high levels of illiteracy. I would like to know if there will be a national laboratory of the processing of graphite.Dinis Napido - Twigg As part of developing skills for the Balama district there will be a vomen, the enployment programme that will be developed by the company to ensure that the skills within the communities are improved.Celso Nhumaio (Mineral ResourcesADMINISTRATION OF BALAMA 08/19/2013I would suggest that at the time of training a basic school for geology, similar to what have been done byDinis Napido - Twigg Ne will take into account all the proposals given. We will try and find wide ground to best cover labour and training needs.
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Interview
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Resources BALAWA 06/19/2015 Italining a basic scrool for geology, we will take into account all the proposals given. We will us and find a basic scrool for geology, we will take into account all the proposals given. We will us and find a basic scrool for geology, we will take into account all the proposals given. We will us and find a basic scrool for geology, we will take into account all the proposals given. We will us and find a basic scrool for geology, we will take into account all the proposals given. We will us and find a basic scrool for geology, we will take into account all the proposals given. We will us and find a basic scrool for geology.
similar to what have been done by middle glound to best cover labour and training needs.
Technician) Vale in Tete be created
Before any exploration, there are a lot of studies to determine if there
is a viable resource or not. This must be done using satellite images
and geological information. For the case of Balama the satellite
images showed a different mountain and it was assumed that it could
contain uranium. Studies have been conducted, but we did not find
uranium but graphite.
Issue 7: In-Migration: Pemba Meeting
Mbeua Cabudo PEMBA MEETING 21/08/2013 I am concerned about in-migration and Dinis Napido – Twigg
loss of land. The mega projects move The issue of in-migration is very sensitive and cannot be ignored.
many people. Young people settle in The aim is to limit the number of in-migrating into the area as it will
the project area and arrange girlfriends be difficult to stop people from going into the area to look for
and create problems. What will be the employment opportunities.
future?
MUCAURIMA PEWIDA WEETING 21/08/2013 Welcome to the project, I think that <u>Elisa Vicente – CES Consultant</u>
Americo when assessing the impact of health During the evaluation of health impacts we will work closely with the
we will have more opportunity to be nearth sector in order to gather information about what the main

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		project brings challenges for the health	bring and elaborate on mitigation measures and monitoring for these
		sector. We would like to see	problems.
			We are in a preliminary phase and still do not know what areas will
			be affected by the project. Our specialist studies will address this
			aspect. The environmental regulations state the need for
			ensure that there are acceptable conditions such as water and fertile
			soils. If there are no conditions we will recommend measures for
			improvement.
Issue 9: Transpo	rt: Pemba Meeting		Dista Manida - Talan
<u>Fakir Sevenna-</u>	PEMBA MEETING 21/08/2013	I would like to know about the use of railways because in the presentations	<u>Dinis Napido – Twigg</u> We have talked with CEM-Norte to determine what the plans are for
Environmental		only roads were mentioned. Since	the harbour and railways in Pemba. There will be a railway line that
Management at		Cabo Delgado has no railways, how	will go from Lichinga and Pemba that will pass through Balama. The
Pedagogic		will be the load be taken to the Pemba	Director of CFM is satisfied that the Balama Project is going to
University		Port?	support the railway line. However, at this time all products will be transported by road, either to Pemba or Nacala
			As for the port, this will be expanded to the north of the bay and will
			create a jetty for the export of minerals.
Issue10: Econon	nic: Pemba Meeting	· · · · · ·	
Joel Paulo-	PEMBA MEETING 21/08/2013	We are concerned when we see in	<u>Dinís Napido – Twigg</u>
Entrepreneur		African companies I would like see	nere is room for hallonal companies; nowever we need to be
		priority being given to local services.	propared for the fields of the market.
Issue 11: Cultura	II: Pemba Meeting		
<u>Student</u>	PEMBA MEETING 21/08/2013	How will the monitoring of sacred sites	Elisa Vicente – CES Consultant
		and cemeteries be conducted?	According to our experience in relation to the sacred places, the first
			are some sites that cannot be removed and therefore it is necessary
			to ensure that communities continue to have access to these places.
			When it comes to graves, we have proposed the relocation of the
			graves if there are any graves affected by the mine. The process
			traditional ceremonies are held and that these are supported and
			funded by the project proponent.
Issue 12 1. Agric	ultural. Administration of Balan	na	

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
<u>Administrator</u>	ADMINISTRATION OF BALAMA 08/19/2013	The company spends a lot of water and water that will be pumped from Chipembe is vital for agricultural irrigation. The company will not disturb the agriculture?	 <u>Dinís Napido – Twigg</u> As for the Chipembe Dam, we know that it is a public good and that the government have plans. We are working with ARA-Norte and we are negotiating to support in the rehabilitation of the Dam to avoid losses and increase its capacity. We have agricultural projects in Australia, because the focus of sustainability is to create other projects. Control of carbon, we will use diesel equipment which will emit
			carbon and it will be necessary to compensate this carbon emission through creation of green projects such as agricultural projects and forests.
Issue 12.2: Agric	ultural: Pemba Meeting		
Joel Paulo-	PEMBA MEETING 21/08/2013	The ToR would warn about the water	The use of the dam by different projects will be discussed with the
Entrepreneur		issue, there are many agricultural interests in the area. It is better to be aware because I have heard that the irrigation of Chipembe will boost agriculture in the region.	government and a decision will be made once the mine is operating. Other alternatives for water can be considered such use of groundwater.
Issue 13: Biodive	ersity: Pemba Meeting		
FakirSevenha- ofStudentofEnvironmentalManagement atPedagogicUniversity	PEMBA MEETING 21/08/2013	Thank you for the presentation, which stated that the loss of vegetation and biodiversity will be high. Being a preliminary phase, I suggested that the final studies be presented to us too.	<u>Elisa Vicente – CES Consultant</u> For the loss of biodiversity, we already have specialist studies that will cover this aspect. From our experience, we will develop studies that will bring recommendations on conservation and biodiversity offsets, translocation of species, etc. At the end of the studies, we will have a meeting like this one to present the results of the studies.
<u>Matias</u>	PEMBA MEETING 21/08/2013	We had bad experiences with Anadarko. Graphite is in Miombo Woodland. There are endemic species discovered, did you take this into account?	<u>Elisa Vicente – CES Consultant</u> The different specialist studies being conducted as part of the project will highlight these as important as no-go areas that need to be protected.
Sean Nazerali	via email	Only brief mention is made of the existence of significantly important conservation areas in the near vicinity (Quirimbas National Park, Niassa National Reserve and Hunting Blocks).	<u>CES Response</u> Protected areas are discussed in section 4.3.2 (page 37) of the EPDA. The QNP is approximately 85 km away at its nearest border (Figure 4-5 page 37). Noted. The specialist report will provide more details.

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		The impact on these should be	
		assessed.	
		Especially, Twigg should assess	
		impact on water usage for the	
		Montepuez basin, including the	
		Quirimbas National Park. NB the QNP	
		has a buffer zone of 10km, making it	
		that much closer to the proposed mine.	
		(this is not shown on your map)	
Sean Nazerali	via email	The EPDA mentions that the IFC	CES Response
		Performance standards will be	Noted. Many of these points are implicit in PS6- no need to
		adhered to. PS 6 stipulates the use of	incorporate in ToRs. PS6 also does not stipulate the use of
		Biodiversity Offsets for residual	Biodiversity Offsets, in fact it states their use as a last resort, after
		impacts, which while mentioned in the	other avenues (mitigation, rehabilitation etc.) have been explored.
		section on PS6, does not seem to be	
		in the TORS for the EIA.	1. Will be assessed in the vegetation study
		1. The EIA should assess the	2. Will only be done if offsets are deemed necessary by
		amount and extent of	specialists
		critical and natural habitats	3. Noted. Wording on p 87 updated to highlight QNP as
		as per PS6	potential for biodiversity offsets
		2. need to assess potential	4. Noted. Corrected to Direcção Nacional de Areas de
		offset areas as well as their	Conservação (DNAC)
		current state of blodiversity	
		3. The possible offset of	
		supporting the VVVF is	
		Incorrect. More likely	
		should be the support of	
		line QNP of Massa	
		Reserve.	
		4. NB the DNFFB is NOT the	
		relevant govt entity for	
		creating conservation	
Soon Neterali	via amail	A number of vegetation studies days in	
Sean Nazerall	via emaii	A number of vegetation studies done in	
		available control to info in costion	I nank you for bringing this to our attention. These studies will be
		available, contrary to into in section	reviewed and relevant information incorporated into the draft ESHIA,
		4.2.1., particularly in the protected	vegetation and raunal assessments.
Joour 14: Consul	tation process Muslie Manute	Mooting	
issue 14: Consu	nation process: muana-maputo		
		45	

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
<u>Constantino</u>	MUALIA-MAPUTO MEETING 20/08/13	It is true that there is a lack of information.	<u>Dinís Napido – Twigg</u> We promise to improve communication with the communities and a
			better strategy will be developed soon to ensure that information is given to people.
Secretary	MUALIA-MAPUTO MEETING	I would like to thank all and inform that	Dinís Napido – Twigg
	<u>20/08/13</u>	the mountain belongs to us. People should approach us for any questions.	We promise to improve communication with the communities and a better strategy will be developed soon to ensure that information is given to people.
Community	MUALIA-MAPUTO MEETING	As already said by the secretary, we	<u>Dinis Napido – Twigg</u>
Leader	<u>20/08/13</u>	have to live in peace. People who go	We are thankful for this statement - we want be sure that all
		looking for jobs and cannot find plant	information is shared with no disturbances.
		discord. It is necessary to listen	
Issue 15.1: Proie	ct description and project detai	I: Administration of Balama	
Issa Rachide	ADMINISTRATION OF	Where will the graphite be processed	The graphite market is small because the products made from
(Permanent	BALAMA 08/19/2013	and marketed? Where will it be	graphite are limited. For example it is used in countries that smelt
Secretary of		extracted? I believe that the specialist	aluminium, produce batteries and other products that use graphite as
the District of		reports will bring more detailed	an insulator. When there is a lot of graphite available, the price is
<u>Balama)</u>		contributions.	low. We will produce and process a graphite concentrate. The final product will depend on the application for which it is intended
			To obtain graphite it must be removed from the rock which must be
			crushed and washed. After processing, the product will be shipped in
			bags that we think will be produced here in Balama. This is another
			project that could arise for the community. This is detailed in the final
			The product is then packaged in containers to be shipped overseas.
			We have countries interested in our graphite, for example Japan
			(Panasonic), China, the U.S. and the United Arab Emirates. We
			already have agreements for the next 10 years for what we are
Issue 15.2: Proie	ct description and project detai	I: Pemba Meeting	
Januário	PEMBA MEETING 21/08/2013	The project is welcome but I have a	As mentioned previously currently the project is still in the exploration
Muaramassa		concern as the community life remains	phase and different studies are being done. Once all these have
		the same. What is failing?	been completed and the mine starts there will be more jobs and
			people will see the difference.
Lucia Lurdes	PEMBA MEETING 21/08/2013	How will the tailings be treated?	<u>Dinis Napido – Twigg</u>

RAISED BY EVENT & DATE	ISSUE/CONCERN/COMMENT RESPONSE/ACTION		
		We will have various types of waste and each will have specific treatments. The final tailings will have proper treatment due to the	
		occurrence of sulphur and other elements. We will also create a	
		Black water-recycling system. More details will be in the ESHIA.	
Alberto PEMBA MEETING 21/08/2013	What are the methodologies that the	Dinís Napido – Twigg	
Ernesto	project will use regarding to the	Regarding O_2 and CO_2 , the company will use equipment moved by	
	protection of the atmosphere. What are	diesel. Ecological offsets may be made through the creation of	
	the steps used to raise public	forests. The projects should be green.	
	awareness, and what is the project		
	designing?		
<u>J. B. Sixpense -</u> PEMBA MEETING 21/08/2013	What it the main market of graphite?	<u>Dinís Napido – Twigg</u>	
Nunisa		Graphite is for batteries, steel, aluminium and iron smelting.	
J. B. Sixpense - PEMBA MEETING 21/08/2013	Is there a possibility of creating parallel	<u>Dinis Napido – Twigg</u>	
nunisa	companies to use the graphite?	res this will be considered once the mine starts operating. At this starts we are still exploring to see how much graphite is available	
		and what is the quality of the graphite?	
Raposo- PEMBA MEETING 21/08/2013	At what time of the day do the 30	Dinís Napido – Twigg	
Unilúrio	trucks circulate through Pemba?	Mostly during working hours as it will be more dangerous to drive at	
		night. A traffic study has been conducted to look at the impacts of the	
		mine trucks on the roads.	
Issue 16: EIA process; Pirira Meeting	· · · · · · · · · · · · · · · · · · ·		
Simão Roberto PIRIRA MEETING 20/08/13	We do not have problems with mine	Jordão-DPREME	
Amimo	but with the two members of the	There are 3 projects. One area was granted to Twigg that begins	
	government that came with faise	after the mountain, there is another company called DAMBEIA, and a third preject is the electrification of Polema, the company doing this	
	promises. They came to harm us.	electrification shall identify the trees and houses along the line	
		People should be compensated for these. We will follow up to see	
		what really happens in this project.	
Angela PEMBA MEETING 21/08/2013	The worst affected are the	The company is working closely with the government to ensure that	
	communities, it is necessary to	communities are not left worse off as a result of the mine.	
	communities, it is necessary to safeguard their interests. I am satisfied	communities are not left worse off as a result of the mine.	
	communities, it is necessary to safeguard their interests. I am satisfied with the way they are working. I hope	communities are not left worse off as a result of the mine.	
	communities, it is necessary to safeguard their interests. I am satisfied with the way they are working. I hope you told the communities that they will	communities are not left worse off as a result of the mine.	
	communities, it is necessary to safeguard their interests. I am satisfied with the way they are working. I hope you told the communities that they will have more time for sowing.	communities are not left worse off as a result of the mine.	
Raposo- PEMBA MEETING 21/08/2013	communities, it is necessary to safeguard their interests. I am satisfied with the way they are working. I hope you told the communities that they will have more time for sowing. What is the prediction of possible	communities are not left worse off as a result of the mine. Elisa Vicente – CES Consultant The surgess of this meeting was to support the main victor and	
Raposo- PEMBA MEETING 21/08/2013 Unilúrio PEMBA MEETING 21/08/2013	communities, it is necessary to safeguard their interests. I am satisfied with the way they are working. I hope you told the communities that they will have more time for sowing. What is the prediction of possible problems that may arise and what are the possible studies to solve?	communities are not left worse off as a result of the mine. <u>Elisa Vicente – CES Consultant</u> The purpose of this meeting was to present the main risks and possible studies that will be conducted in order to propose measures	

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION	
			social, health, etc., are being conducted to identify any impacts that	
			may be caused by the mine.	
Sean Nazerali	via email	The impacts on the port and the	CES Response	
		transport corridors do not seem to	This will be addressed in the Traffic, Transport and Visual	
		have been included.	Assessment	
Sean Nazerali	via email	The socioeconomic aspects should	CES Response	
		include the identification of potential	The Socio-Economic Impact Assessment will address these issues,	
		employment for local people and the	and incorporate these worthwhile suggestions.	
		skills needed to take advantage of		
		these opportunities, as well as an		
		overview of the current		
		educational/skills level. It should		
		beginning to create the basis on which		
		local people can be trained up to		
		employable levels Attention should		
		also be given to training for the spinoff		
		opportunities the mine will bring, i.e.		
		providing goods and services to the		
		mine and the mine workers.		
Sean Nazerali	via email	P38 "the tribe does not have legal title	CES Response	
		to the land" Incorrect. Under the land	Land use rights and ownership are separate issues in our opinion. It	
		law, they have indeed a legal title to	is our understanding that while the communities enjoy land use rights	
		land use rights based on customary	which require no formal documentation, the land belongs to the	
		usage. There is no requirement for it to	government. The legal framework for land rights and the acquisition	
		be formalized or a certificate to be	thereof is underpinned by the country's constitution and the Land	
		given.	Law of 1997. Article 109 of Chapter V of the Constitution, for	
			example, states that land cannot be sold, and that all land ownership	
			eventually vests in the state. Rights and assignment thereof will be	
			Posottlement Action Plan (PAP)	
Isabol Forroira	via email	Considering that the project will have	CES Perpanse	
ISabel I ellella		two areas of activity	The impact of traffic at the extraction & process site as well as the	
			delivery of product to the port at Pemba will be specifically addressed	
		a. Balama – extraction	in the Traffic. Transport and Visual Assessment The emissions	
			denerated during construction and operational phases will be	
		b. Pemba – Delivery of the	captured in an emissions inventory and included in a dispersion	
		products	model, as part of the Air Quality Assessment. Please see the Terms	
			of Reference for the Specialist Studies on page 88 & 90 of the	

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		And given that the increase in truck	EPDA.
		traffic of large tonnage and high	
		number will circulate in the city,	
		creating tremendous pressure to the	
		existing infrastructure (e.g. access	
		roads to the port of Pemba,	
		maintenance of roads, traffic	
		congestion, parking, etc) and to the	
		air quality, due to the emission of CO ₂	
		into the atmosphere, will the impacts	
		on the city of Pemba be considered	
		and studied in the EIA?	
Isabel Ferreira	via email	The management plan should consider	CES Response
		the capture of carbon, probably	No specific management plan for the capture of carbon will be
		supported by the secondary activity of	developed. Large scale agro-industrial projects are planned in
		agricultural production including the	existing agricultural areas (no carbon loss) as part of the socio
		planting of larger trees that have a	economic development plans for the project and vegetation
		greater impact and longer lasting	rehabilitation (carbon capture), particularly of Miombo Woodland, will
		compared to shrubs and crops?	form a critical part of the recommendations coming out of the ESHIA.
			The agro-industrial projects may also divert economic activity away
			from small-scale charcoal production in the area and reduce carbon
			emissions thus generated.
Isabel Ferreira	via email	Will the EIA identify the quantity of CO ₂	CES Response
		emissions into the atmosphere for	The emissions generated during construction and operational phases
		comparison with international values,	will be captured in an emissions inventory and included in a
		the degree of pollution generated from	dispersion model, as part of the Air Quality Assessment.
		GHG gases?	
Isabel Ferreira	via email	The increase in vessel traffic in the	CES Response
		Bay of Pemba, generated by the	A marine ecological study for Pemba Bay was not included in the
		project will have an impact on marine	scope of the ESHIA.
		life. The Pemba Bay is a place of	
		passage of whales and other species	
		of ecological importance, as well as	
		important areas of coral. What	
		measures will be taken to protect these	
		ecosystems?	
Issue 17: Mitigat	ion measures: Pemba Meeting		
J. B. Sixpense -	PEMBA MEETING 21/08/2013	What is the strategy for implementation	<u>Dinís Napido – Twigg</u>
<u>Nunisa</u>		of the social responsibility; will this	Our Social Responsibility will not depend on other companies. The

RAISED BY	EVENT & DATE	ISSUE/CONCERN/COMMENT	RESPONSE/ACTION
		function be handed over to the	other companies are only partners because programs cannot be
		government?	isolated.
Sean Nazerali	via email	For land use and land ownership, why <u>CES Response</u>	
		not consider the possibility to bring the	The future benefits of the mine come via distribution of potential
		communities in as joint shareholders of	profits and revenues. There is 3% royalty on sales and 32% tax on
		subjected to forced resettlement and	profit. This is all paid to the "owners" of the land being the
		loss of access to their traditional	some of the benefits these funds can realise are felt locally in
		lands?	addition to any mine driven Community Social Responsibility.
Issue 18: Genera	al		
Issufo Jaisse	NTETE MEETING 19/08/2013	How will the mine be established? It	In the first years we will not use explosives, so will use excavators to
<u>Narape</u>		will be open mine? Will use chemicals?	get the ore that will be processed later. The amount of graphite can
		Will not contaminate people?	be exploited for 100 years.
Issue 19: Benefit	ts	1	
Inês Manuel	PEMBA MEETING 21/08/2013	What is the benefit that the project will	<u>Dinís Napido – Twigg</u>
<u>Cesário</u>		bring to local communities?	Except for employment opportunities that will be generated during
			the operation of the mine the company will discuss with stakeholders
			the need to undertake other projects that have social sustainability.
A		M/Lish seciel were will the unside t	I hese projects are meant to benefit local communities.
Amissina	PEMBA MEETING 21/08/2013	vvnich social work will the project	<u>Dinis Napido – i Wigg</u> The company will discuss with stakeholders to undertake projects
wibuazori			that have social sustainability. There will be some projects to
			upgrade social infrastructure such as schools and clinics in the area.

4.4 Issues and Response Trail of the Resettlement Action Plan

Issue Raised By	Meeting and Date	Issue Raised	Response Provided
Ms Laura Anthony (DSEA)	TWG Meeting 5 - 12 May 2014	Requested to know how the mine would compensate a farmer if, by the time of compensation, a particular farmer has nothing planted on his/her machamba.	Ms Saranga explained that the compensation would be based upon the individual entitlement sheets which have been signed during the machamba assessment period. Moreover, compensation is based upon the maximum productive value of the land. This calculation is not dependent on whether the farmer had any crops on his/her machamba at the time of survey.
Regulus Mualia		Requested to know how the mine would	Mr Celia Panquene (Svrah) explained that all the affected farmers
(Community		compensate a farmer if, by the time of	would benefit by means of some seeds and fruit seedlings
representative of		compensation, a particular farmer has no fruit	would belief by means of some seeds and nut seedings.

Issue Raised By	Meeting and Date	Issue Raised	Response Provided	
Maputo)		trees planted on his/her machamba.		
Antomane Majerica		Requested that the mine compensates them for all the manual labour that they have invested in their machambas.	Ms Saranga clarified that the mine would not be paying for land, as alterative land would be provided to ensure that the communities can continue with their subsistence agriculture.	
Rajabu Mussa	RAP Disclosure	Inquired whether he would receive any compensation if he has no fruit trees.	Ms Saranga assured that the mine would assist all the affected farmers with some seeds.	
Virgílio Antunes Nagera	Meeting in Pirira - 16 May 2014	Expressed a concern that the mine erected some structures on his machamba, for which he was never consulted.	Mr Célio Panquene (Syrah) assured him that the mine would inspect his machamba and resolve the issue.	
Assamo Calmane		Inquired how farmers would be compensated if, at the time of compensation, no crops have been planted on their machambas.	Mr Célio Panquene (Syrah) assured the farmers that all those affected would be assisted with seeds.	
Eugénio Augusto		Required about the issuing of ID numbers. He was issued with an ID number, but his name was not called for the meeting.	Ms Saranga clarified that only those farmers whose machambas are located inside the mine's Area of Influence were called for the meeting, as only these farmers are affected. Therefore, Eugénio Augusto's farm does not fall within the mine's footprint area. She informed him to save his number, as more machambas might have to be surveyed.	
Julião Kaue		Noted that there is no alternative land around Ntete, and inquired where their new farms would be.	Ms Saranga noted that the government representatives are still in the process of assessing alternative land. She noted that this is a complex process, and that no definite answer can be provided at this stage.	
Issa Abude	RAP Disclosure Meeting in Ntete - 14 May 2014	Noted that he has an alternative piece of land, however that this land is smaller than his current land. Inquired what the mine would do in such a case.	Mr Celio Panquene noted that the mine would assist farmers to have the same or improved living standard after land acquisition. Should a farmer have alternative land, the mine will assist the farmer to expand his/her farm. He further noted that the mine would assist all the affected farmers with seeds and seedlings, whilst those who require preferential treatment, would receive additional support. The mine will be responsible for arranging an assistant to help the farmer with his/her new land.	
		Noted that alternative land might not be available.	Ms Saranga stated that, although the provision of alternative land is the responsibility of the government, the mine would assist in this process. She then asked the farmers to help in this process by searching for alternative pieces of land, which the mine would assist them with in terms of clearing the land etc.	
Lourenço Gimo	RAP Disclosure Meeting in Nquide - 15 May 2014	Inquired whether they could continue to work on their machambas if they received an ID number during the farmland survey process.	Ms Saranga assured all the farmers that they could continue to work on their machambas, and that no farmer should stop working on his/her land. However, new structures should not be erected in their	

Issue Raised By	Meeting and Date	Issue Raised Response Provided	
			fields.
Nicula-Martins		Noted that he has a brother that has a medical deformity. In such a case, he inquired whether the mine would provide some kind of additional assistance.	Mr Celio Panquene stressed that the mine would record such cases and provided additional assistance as needed. Such assistance might include hiring more people to assist such farmers with their fields etc.
Sueti Nicula		Inquired how farmers are supposed to proceed with their machambas and whether they could continue to work on their fields.	Ms Saranga explained that the mining development will be gradual and that no farmer should stop farming. She assured all the farmers that they can continue to farm as usual.
Jacinto Agostinho	RAP Disclosure	Noted that he has land in Ntete which he would like to start cultivating and whether he is allowed to do this.	Ms Saranga assured him that he is allowed to continue to work on his new land. A degree of caution was just raised with regard to erecting new structures, especially for those who have received an ID number (those whose land is thus affected).
Calisto Bartolomeu José Lopes	Meeting in Balama - 15 May 2014	Inquired how the mine compensated farmers for the erection of some electrical power posts near the current camp site, and how those farmers are supposed to find alternative land.	Ms Antonio (DSEA) noted that the Ministry of Agriculture is in the process of determining how the mine should compensate for such crop losses.
Amida Ante	RAP Disclosure Meeting in Maputo - 16	Complained that his machamba was disturbed by the mine without him having been consulted.	Mr Celio Panquene recorded the farmer"s name and invited him to approach the mine in order to ascertain the degree of disturbance to her field and to take this forward. Ms Saranga reminded all the farmers of the Grievance Mechanism
Augusto Amir	May 2014	Inquired whether if could continue to work on and cultivate his machamba.	and that they should use this for formalising complaints with the mine.Ms Saranga reassured all those attending that they can continue to work on and cultivate their machambas.

5. CONTINUOUS STAKEHOLDER ENGAGEMENT COMMITMENTS

5.1 Overview

Good stakeholder engagement facilitates a dialogue between a project proponent and all of its stakeholders through building agreements around issues and ensuring that community members are at the centre of the project and engagement process. Proper stakeholder engagement builds trust and allows PAC members to be empowered; knowing that they are part of the project.

The next section provides three mechanisms through which the proponent will illustrate its commitment to future stakeholder engagement. These include (but are not limited to):

- Implementing a Stakeholder Engagement Plan (SEP);
- > Continue to build a dialogue with its PACs through the established TWG; and
- Regular monitoring and evaluation.

5.2 Implementing a Stakeholder Engagement Plan

A Stakeholder Engagement Plan (SEP) has already been drafted for the mine's own implementation. The plan adheres to the following principles:

- Stakeholders should continuously be identified and verified;
- The culture, fundamental human rights, values and traditions of stakeholder communities should be respected;
- Stakeholders should be treated with sensitivity and respect in terms of their issues, views and suggestions;
- Interaction with stakeholders should be meaningful, culturally appropriate, accessible, transparent and responsive;
- Vulnerable groups should be included in engagements in order to assess differential needs and perceptions of stakeholder groups (i.e. men, women, youth, landowners/tenants);
- Communication strategies need to be tailored to the needs of the different stakeholders groups; and
- Data and information from stakeholder engagement should be documented and incorporated in project reports.

Informed by the recommendations of the IFC and other international standards, the SEP includes several types of engagement strategies with guidelines that will be used by the proponent, such as:

- How information should be disseminated to stakeholders on a regular basis;
- > How consultation and reporting should be conducted; and
- How grievances should be handled.

Furthermore, through the SEP (which will be regularly updated), the proponent commits to keeping a dedicated record of monthly stakeholder engagement activities, such as:

- > Activities conducted during the month;
- Minutes of meetings held with stakeholders;
- Entries to the grievance register;
- Issues and comments on the stakeholder interactions (where relevant);
- In-migration (where relevant);
- New stakeholder groups (where relevant);
- Plans for the next month.

Lastly, as part of this SEP, the proponent will continuously update its own stakeholder database, as well as continue to update and address issues and/or concerns through its grievance database.

5.3 Continue to Build a Dialogue through the Established TWG

The established TWG will act as an on-going communication mechanism for the project, which will thus not be limited to the RAP process. For this, the group will be tasked with the following additional objectives:

- > To represent the voices and convey the issues and/or concerns of all the PAPs; and
- To represent members from relevant government ministries/agencies and provide a platform for the latter to engage with the PAPs and the mine regularly.

The TWG shall continue for the entire duration of the RAP process and shall continue to function for as long as it is needed. Powers to terminate the committee will be vested in the Administrator. Lastly, it was agreed by the mine's Country Manager for the TWG members to be compensated by the mine as their assistance is needed.

5.4 Regular Reporting

5.4.1 Monthly Reporting

The CLO will submit monthly reports to management which will include:

- Stakeholder activities conducted during the month;
- Minutes of meetings held with stakeholders;
- Entries to the grievance register;
- Issues and comments on the stakeholder interactions (where relevant);
- In-migration (where relevant);
- > New stakeholder groups (where relevant);
- Plans for the next month.

5.4.2 Periodic Reporting

Using the monthly reports, the public consultation activities will be internally evaluated periodically (six-monthly) by the proponent and incorporated into a Stakeholder Monitoring and Evaluation Report. The following indicators will be used for evaluation:

- Level of understanding of the project by stakeholders;
- Attitude towards the project amongst stakeholders;
- > Grievances received and how these have been addressed and resolved
- > Number of unresolved grievances; and
- > Level of involvement of affected people in committees and joint activities.

In order to measure these indicators, the following data will be used:

- Minutes of meetings;
- CLO monthly reports;
- Feedback from primary stakeholder groups (through interviews with a sample of affected people); and
- The grievance registers.

A summary of this Stakeholder Monitoring and Evaluation Report will be included in the proponent's annual reporting. A two-yearly evaluation should be conducted by an external consultant using a perception survey, which uses the same set of questions over time to achieve continuity. Analysis of the survey will be presented to the proponent in order for them to address key issues and improve its PPP.

6. SUMMARY AND CONCLUSION

Overall it can be concluded that the stakeholder engagement process to date has been thorough and a large proportion of PAP's and IAPs have been directly engaged with via meetings and focus groups. All the objectives that should be met in a stakeholder plan, as defined by the Mozambican requirements and outlined earlier, have been achieved in the initial stakeholder engagement process. These are summarised below.

Stakeholder Engagement	Achieved?
Principle	
Ensuring an open and transparent consultation process at an early stage of the project design	Yes. Extensive consultation at initiation of the EPDA. The public participation process was conducted transparently and with the testimony of the local community leaders and chiefs
Identifying, engaging and informing I&APs of the project details and associated environmental authorisation process	Yes. Undertaken at initial EPDA stage, at disclosure of EPDA, and during engagement for the RAP process. The interested and affected parties (I&AP's) were informed about the proposed project and also had the opportunity to understand the environmental assessment process. Contact details were left in all meetings to allow I&AP's to contact the project team whenever they feel relevant
Understanding I&APs issues and concerns about the project and their contribution to the identification and evaluation of the project impacts. This allows awareness of the issues, concerns and questions raised by the I&APs	Yes. Issues and concerns raised have been incorporated into the Terms of Reference for specialist studies, the RAP, and the ESHIA. I&AP's were informed about the activities and their feedback was noted. The I&AP's had opportunity to ask any questions relating to the project, while bringing suggestions for improvement in the subsequent phases, including specialist studies that are part of the EIA. The EIA process is therefore "issues driven".
Compiling Issues and Response Trails of all issues, concerns and questions, together with their relevant proponent responses	Yes. An Issues and Response Trail has been prepared.
Establishing and managing a Grievance Mechanism for I&APs to voice their issues, concerns and/or comments on the project directly to the proponent	Yes. A grievance mechanism has been established and implemented together with the proponent. It is working well.

Table 6.4 Cummer	v of how the DDD) haa aamaliad with	regulatory regulatores
rable b. i – Summar	v of now the PPP	' nas complied with	requiatory requirements.
	,		

During the initial engagement process all four villages were supportive of the project, although they raised valid concerns such as being concerned about not knowing whether they will be relocated or not. They also raised serious challenges that they face, such as lack of social infrastructure (especially schools, water supply and proper roads). The minutes reflect the community and their leaders appreciation of the efforts taken by the proponent and their consultants to meaningfully engage with them about the Syrah Balama Graphite mine project.

APPENDICES

APPENDIX 1: MINUTES OF MEETINGS

Meeting with community leadership (02-03-2013 @ 10:00)

Venue: Ntethe

A meeting was held with the chiefs and leaders of the four affected villages to introduce CES staff and make arrangements for public community meetings. Introductions were made by Mr Dinis from Twigg Exploration & Mining. He mentioned that CES is doing an Environmental Impact study for the proposed graphite mine project. Due the language barriers Mr Dinis acted as a translator for CES. Mr Bosman from CES stated that the meeting is part of the EIA process which is legislated in the Mozambican legislation. He mentioned that public participation process is to be carried out through the EIA process as stated in the legislation. Mr Bosman stated that this is initial stages of the public consultation process and that CES wanted to introduce the project to the community leaders first and then approach the communities. He mentioned that a number of meetings will be held with the communities and focus groups throughout the EIA process.

The chiefs stated that they were happy with the consultation. They said they did not know anything about the project and that they hope the public consultation process will give them more information on the project. They stated that they will raise issues at the community meetings as they do want to be seen as making decisions or discussing issues that affect the whole community without the knowledge of the community. A schedule of meetings was done and agreed upon. The meetings were going to be held at:

Nquide – Monday (04-03-2013) at 10:00 a.m. Ntete – Monday (04-03-2013) at 14:00 Maputo/Mualia- Tuesday (05-03-2013) at 10:00 a.m. Phirira Tuesday (05-03-2013) at 14:00

Meeting in Nquide (04-03-2013 @10:00)

The chief made the introductions and informed the community that CES has already had a meeting with the chiefs of the affected villages to inform them about the EIA study we are doing on behalf of the Twigg mining project. The meeting was well attended and we estimated about 150 people were present at the meeting.

Lungisa and Alfido made a presentation and informed the community that this is the initial process of consultation with communities as part of the EIA process. More consultation will be done as the process goes ahead. The community was given opportunity to raise issues and concerns.

Issues raised:

Issue: Are the 200-300 workers for the camp going to be people from this area?

Response: No these people will be managers and other skilled people who will be coming from other places. The plan is that all local people will stay at their houses and travel to work daily.

Issue: What will happen if the project goes through Mashamba?

Response: There will be a process of negotiations with affected families if any Mashamba are affected. The process will involve chiefs, government officials and the mine people. The families will then be compensated as per what will be agreed upon.

Issue: How are we going to get jobs at the mine?

Response: There will be a clear process of employment that will be outlined to the communities. Once there are jobs available at the mine community leaders (i.e. chiefs) will be informed about the availability of jobs and they will then inform communities. At first only local villages will be informed unless there are certain skills needed that are not available locally then those jobs will be advertised to areas outside of the project area.

Issue: Are we going to need documents to get jobs at the mine as most people here do not have documents?

Response: Chief – yes you will need documents because the government want people to have documents in order to work. Since there will be government departments involved in this process a plan can be developed to ensure that local people can get the requirements so that they can get jobs at the mine.

Issue: The problem with attaining the documents is that we can get them in Montepeuz or Balama and they cost money which most people do not have here.

Response: Since it is important that local people get jobs at the mine some sort of arrangements can be made in order to support those who cannot afford to get the documents. For example all those without documents who get employment at the mine can be given money to go and make the documents by the mine and the money can be deducted in their salaries later. In this way people will get both jobs and the required documents. So there are ways and strategies that can be used to ensure that local people get jobs at the mine and will not be excluded because of documents.

Issue: We have no water in the area people have to walk long distances to get water. Can the mine help with a well or borehole in the area.

Response: The mine will help with support to the communities as part of its social responsibility but at this stage not much can be promised as we are still doing studies. As soon as the mine is operational communications will be done with communities to see which priority projects will be implemented first.

Issue: We also do not have clinic or hospital in the area. Can the mine help build a clinic for the community?

Response: There are a number of issues the community need support with and once the mine is in operation these will be considered and as part of the social responsibility from the mine and certain projects will be implemented. For example the mine might be able to build a clinic but this will need support from the government in terms of staff and medicinal supplies.

Issue: The school also has no furniture like desks and chairs pupil sit down, we would like the mine to support the local school also.

Response: As mentioned above certain projects will be implemented as part of a social responsibility of the mine and these will be discussed with communities and prioritise once the mine is operating.

Comment: The project is a major and will bring development to the community. The people will be able to give children money to buy other things.

Issue: How many people will be accepted in the project?

Response: We are currently not sure of the exact number of people that will be employed at the mine once it is fully operational but a lot of people will be as the mine will be operating for 24 hours/ day and 7 days a week. This will need people to work shifts and as such more people will be employed at the mine.

Meeting at Ntete (04-03-2013 @ 14:00)

The chief made the initial introductions and a presentation of the project was made to the community. The community was informed that this is the initial phase of the project and we are currently doing an Environmental and Social Impact Study to see how the project will affect the environment and the people. Once the study has been completed and more detailed plans for the project and the relevant infrastructure have been completed there will be more meetings with the communities.

Issue: We are happy with the project as it will bring development in the area but how are we going to get jobs at the project?

Response: Community leaders, that is, the chiefs will be informed of the jobs available at the mine and they will then inform the communities. A clear process of employment will be developed and will be discussed with the communities so that everybody knows how to get employment at the mine.

Issue: Some people from Ntete have Mashamba in the project area and we want to know how are going to get compensated for loosing Mashamba as a result of the mine?

Response: At this stage we are still not sure if there will be any Mashambas that will be affected as a result of the mine but if there are Mashambas that will be lost as a result of the mine a process of negotiation will be conducted with the affected household and a compensation amount will be agreed upon. This process will include community leaders and government departments will be involved to ensure that people get proper compensation for their lands.

Issue: Are the women going to work in the project?

Response: Yes women will be employed at the mine. For example, currently there are already women working at the campsite.

Issue: How many people can get jobs now in the mine?

Response: At this stage there are no jobs at the mine. When there are jobs available this will be communicated with the chief who will inform local chiefs from the four neighbouring villages and they will inform community members about the available jobs. More jobs will be available once the mine is operational. For example the mine will be operating 24/7 all year and this will require lot of people.

Issue: As you can see the road from the camp is small and not clear with all the cars that will be running around here as a result of the mine there is a possibility of accidents if it is not cleared. Can the mine clear the road to avoid any possible accidents?

Response: Noted this will be communicated to Twigg and since Twigg does not want any accidents something might be done in terms of clearing the road.

Issue: In terms of community needs they are similar to other areas. For example there is school does not desks and chairs can the mine help? The priority must be water for the community –can the mine help the community with a well?

Response: While at this we are not sure what support the mine will give to the communities as there are many challenges facing communities it certain though that the mine will give support to communities as part of social responsibility which is promoted by the Mozambique government and international donors. For example maybe Twigg can afford to build a well for the community at this stage but support in terms of school materials might be possible when the mine is operational.

Issue: People from Ntete are poor and they to get jobs at the mine – how are you going to ensure that people from Ntete get jobs at the mine?

Response: Local people from all surrounding areas will be considered first with regards to employment at the mine unless the skills required for that particular job are not available locally then the mine will employ people from other areas.

The main issue that we noticed is that the meetings were attended by children who were supposed to be at school at the time in both areas. Secondly women did not raise any issues at the meetings

Meeting at Maputo/Mualia (05-03-2013)

The meeting was well attended with more than 100 people in attendance. The chief made the initial introductions and a presentation of the project was made to the community. The community was informed that this is the initial phase of the project and we are currently doing an Environmental and Social Impact Study to see how the project will affect the environment and the people. Once the study has been completed and more detailed plans for the project and the relevant infrastructure have been completed there will be more meetings with the communities. The community was given opportunity to raise issues and concerns.

Issue: There is a problem of water in the area will the project help the community with wells? **Response:** The project is willing to support the community as promised previously but a process of ground water testing is being undertaken and once the results have been produced alternative water source will be considered.

Issue: The football team does not have a ball – can we get at least a ball so that we can start some training?

Response: Support will be given to local clubs as promised for football clubs in Ntete as part of the social responsibility of the mine.

Issue: The project will bring work and those people will be able to get work and after, food to eat.

Response: Noted, this is the aim of the project to ensure that people from local areas get employed in the mine

Issue: The water in the well is not good and we think a new well close to the school can be better.

Response: Water quality tests are being undertaken as part of the EIA study and alternative will be considered once the results are known.

Response: There will be a number of tests done to ascertain the quality of the water in the area and if found to be of poor quality alternatives will be considered.

Issue: The school principal told us about the challenges facing the school and that they do not electricity while they have computers. It will be better if they can be provided either with a generator or solar power. The school is from Grade 1 -7

Response: This will be considered as part of the social responsibility for the project but at this stage we are still doing studies and more will be done once the mine is in operation.

Issue: The road to the school is not accessible and a small road to the school with a bridge will help as children do not go school when raining.

Response: Noted this will be considered but as mentioned the project will not be able to do all the things but priorities will be chosen with the help of communities and government.

Issue: The major problem is access to health facilities and people suffer when they get sick as they have to go all the way to Balama or Montepeuz.

Response: The issue of community support or social responsibility will be part of the project and all these will be considered. The community should be aware though that the project might not be able to help with all community needs.

Issue: The problem is that the BI documents take long to be processed and this can cause people to miss employment opportunities.

Response: People must start looking for the BI documents as it still a long way before the start of the project. We are not saying local people without documents will not be employed. This will depend on the situation when the mine starts. Maybe with the involvement of the government a plan can be developed to ensure that people get BI documents.

Comment: We are thankful of the Twigg Balama project as they are consulting with us first and not like CMC who employed people from the market and never consulted with the community.

Issue: Are you going to bring electricity to our area supply in the mine?

Response: No the mine will also use generators for energy

Issue: Are there going to be houses built for people working at the mine?

Response: Yes there will be houses at the mine for workers but these will be for people who are coming from far places and local people. The aim is for local people to stay at their homes and travel to work daily.

Issue: We do not want to see people from Pemba, Montepeuz getting jobs first at the mine while we are not working.

Response: No people will be employed from outside areas for work that can be done by local people. It is only those jobs that local people cannot do such as surveyors, mine engineers, etc. that the mine will get people from outside areas.

Issue: The project promised to build two wells in the area but only one was built and the quality of the water is not good. Is there a possibility of building another well close to the school?

Response: This will be considered as part of the social responsibility for the project.

Meeting at Piriria (05-03-2013)

The meeting was well attended with more than 100 people in attendance. The chief made the initial introductions and a presentation of the project was made to the community. The community was informed that this is the initial phase of the project and we are currently doing an Environmental and Social Impact Study to see how the project will affect environmental and the people. Once the study has been completed and more detailed plans for the project and the relevant infrastructure have been completed there will be more meetings with the communities. The community was given opportunity to raise issues and concerns.

Issue: We are currently not happy with how jobs are allocated in the project. For example we are the closest community to the mine but only one person from our village is employed at the mine currently.

Response: This is noted and will be communicated with Twigg Exploration & Mining. Currently, though there are not a lot of jobs available at the mine as they are still building the camp and doing the different studies.

Issue: The project promised to build two wells in the area but only one was built and the quality of the water is not good. Is there a possibility of building another well close to the school?

Response: This will be considered as part of the social responsibility for the project.

Meeting with Nquide young people (06-03-2013)

A presentation was made to the youth in Nquide who were all present at the meeting on the 06/03/2013. The aim of the meeting was to allow the youth to raise their issues and concern separately from the rest of the community.

The youth mentioned that they have a problem with support for sport e.g. soccer balls and kit. They normally play with other local teams such as Ntete, Phirira, Maputu and Balama and Montepeuz.

They also need a market place to sell their products as they are doing nothing and a market place will give them opportunity to sell things and make money. There are no cultural activities for the youth in the village all activities are for everyone in the village.

The school is from 7 -12 and other classes start in the afternoon. The problem is that teachers come from Balama struggle with transport so some days teachers do not come to school like today there are only two teachers at school.

Focus Group meetings with women

Due to the lack of participation of women in the community meetings CES decided to have focus group meetings with women in the affected villages. Only two meetings were successful and two meetings were postponed as result of heavy rains. The cancelled meetings were in Ncuide and Ntete.

Maputo Women

A meeting was held with women at Maputo and a questionnaire was used to guide the meeting and get some of the information. About forty women were at the meeting (see attached questionnaire for detailed responses). All women were supportive of the project and did not see any problems or challenges as result of the project. For example when asked about expats that will coming to the area as result of the mine women said this will not pose any problems as there are single women in the village that will be interested in these workers. This is similar to the response of the young people who mentioned that they will not have a problem with new people coming in the area as long as they engage with unmarried women in the villages. The women mentioned their desire to get jobs as priority in the project. According to the women this will improve their dependency on Mashambas as sometimes especially during the dry season when there is no harvest and shortage of food in the area.

With regards to sacred sites the women mentioned the mountain to the south east of Maputo can also be used by the community when praying for rain. According to the women another site can be identified by the community and this will not result in any problems for the community.

In most instances it was clear the responses were driven by desperation as people wanted to see the project work with hope that it will be improve the living conditions in the area. This meant that women did not want to highlight any negative issues with fear that the project might go away. For example when asked what will be the effect of the mine in their food production. They responded that there will be no problems as they will be able to alternate between cultivating the Mashambas and working in the mine. When we explained that people might work long hours in the mine they said that they will reduce the size of the Mashambas. It was explained to meeting that the reduction in Mashmbas simply means less food production

With regards to the safety of the people especially children as a result of increase in traffic in the road to Pemba they did not see any problem with this either. With regards to livestock they suggested that the mine will have to pay owners for livestock that killed by vehicles from the mine. They suggested that a bridge be developed for school children and people who have to cross the road if traffic is going to be a serious problem.

Pirira Women

A meeting was held with women at Pirira in the afternoon and a similar questionnaire used in Maputo was used to guide the meeting and get some of the information. About thirty women were at the meeting. All women were supportive of the project and did not see any problems or challenges as result of the project. For example when asked about the loss of access to natural resources they said there will not be any problems as there are a number of alternative areas that they can use to get same resources. This is similar to the response of the women in Maputo as they also said that there are other areas that can be used to get natural resources. The women mentioned their desire to get jobs as priority in the project. According to the women this will improve their dependency on Mashambas as sometimes especially during the dry season when there is no harvest and shortage of food in the area. With regards to sacred sites the women mentioned other mountains can be used by the community when praying for rain. According to the women another site can be identified by the community and this will not result in any problems for the community.

In most instances it was clear the responses were driven by desperation as people wanted to see the project work with hope that it will be improve the living conditions in the area. This meant that women did not want to highlight any negative issues with fear that the project might go away. For example when asked what will be the effect of the mine in their food production. They responded that there will be no problems as they will be able to alternate between cultivating the Mashambas and working in the mine. When we explained that people might work long hours in the mine they said that they will reduce the size of the Mashambas. It was explained to meeting that the reduction in Mashmbas simply means less food production.

With regards to the safety of the people especially children as a result of increase in traffic in the road to Pemba they did not see any problem with this either. With regards to livestock they suggested that the mine will have to pay owners for livestock that killed by vehicles from the mine.

Meeting with Maputo young people (12-03-2013 @ 10:00)

The meeting was well attended with more than 60 young people in attendance. The youth were informed that this is the initial phase of the project and CES is currently doing an Environmental and Social Impact Study to see how the project will affect environmental and the people. Once the study has been completed and more detailed plans for the project and the relevant infrastructure have been completed there will be more meetings with the communities.

The youth in Maputo were in support of the mine as they believe it will bring the required the jobs in the area. According to the youth in Maputo the major problem is that they do not have any recreational facilities and the only sports codes in the area are soccer and basketball. Even with the two codes that are present in the area, the lack of equipment and support makes it difficult for them to fully engage in these sports. For example at the time of the meeting they did not have any soccer ball to train with.

The youth mentioned that the loss of access to natural resources will not be a problem as there are other natural resources that can be used. They mentioned that the jobs from the mine will benefit them more than the old people in the area so for them the proposed mine is the best option. They were not concern about immigrants who might come and look for work as long as they will get preference over people from other areas.

The meeting was closed with the youth requesting that the process of advertising jobs and meetings should be advertised in the local radio as in most cases they hear very late about meetings and jobs.

Meeting with Pirira young people (12-03-2013 @ 14:00)

A meeting was held with the young people in Pirira and CES made a presentation and informed the youth that this is the initial phase of the project and we are currently doing an Environmental and Social Impact Study to see how the project will affect environmental and the people. Once the study has been completed and more detailed plans for the project and the relevant infrastructure have been completed there will be more meetings with the communities. A questionnaire similar to the one used for women's focus group meeting was used for youth meetings. Similar to other meetings the youth were supporting the project and the issues and responses given were positive.

The youth mentioned that for most of the time they work in Mashambas and sell goods at the local market. Some young people attend night school in Balama and very few attend secondary. They mentioned there are two soccer teams in Maputo one for the old and the other for young people. Their main problem is equipment such as soccer balls. They said they used self-made soccer balls for training. According to the youth there is an alcohol problem in the area as mostly old people drink. There are other recreational activities they engage in. They mentioned that they wish to be considered first for jobs at the mine. According to the young people in Pirira most jobs currently at the mine are given to people in Balama while they as the closest community have only one person working in the project. This makes them feel worried as they believe that this will be the case even when the mine is operational. They were assured that the mine will ensure that the people from the project affected communities get employment first at the mine.

Meeting with teacher at Ncuide Primary School Teacher (13/03/2013)

We visited Ncuide Primary School to as part of the SIA and had a discussion with Senior teacher. Unfortunately the principal was not present at the school.

According to the teacher, the school has five grades from grade 1 to 5 and the school has two sessions. One starts from 7:00 a.m. to 12:10 and the other group starts at 12:30 to 17:15. There are 525 learners coming from the two neighbouring villages which are Ncuide and Methe.

Most teachers at the school come from a village from Montepueuz and only one comes from Namuno. This was different from what we were told by youth in Ncuide who said the teacher travel daily from Balama and this is the reason that children do not go to school as most of the time there are no teachers at the school.

The teachers all stay in Ncuide during the week. The major problem identified by the teacher is lack of facilities especially classrooms as can be seen in the picture below. There are two proper buildings for the school but they are also not properly closed. This seems to be a trend in schools as most schools are half closed (see plate 5 below). The major problem with these structures is that when it is raining the rain comes into the buildings and results in the school not functioning when raining.

The teacher also mentioned the poor state of the school office with no proper shelves as can be seen in plate 7 below. Other issues identified by the teacher are lack of blackboards and chairs as can be seen in plate 5 where learners are sitting on self-made chairs which are not comfortable as they are made from poles. Some learners are even sitting on the floor as can be seen in plate 6. The teacher also mentioned that three grades do not have books at all.

The teacher mentioned that if the Graphite gives them support it will have to be classes whether they are the movable classes. Some of the challenges facing the school are lack of water as even the village struggles with water. The school also have football but no equipment such as balls. The grass in the soccer field is cut by learners using machetes (see plate 8).

Syrah Resources Pty Ltd. and Twigg Exploration & Mining Lda.



Plate 5: Some classes at Ncuide Primary School



Plate 6: Teacher in an open class at Ncuide Primary School (NB: Learners siting on the floor as there are no chairs)



Plate 7: Dilapidated shelves at Ncuide Primary School



Plate 8: Long grass at the Ncuide Primary School play ground

Meeting with traditional healers in Ncuide (13/03/2013)

The healers mentioned that they do get medicinal plants from the mountain but there are other places they can get medicinal plants even if the mine uses the mountain. They mentioned that there is a sacred site close to the mountain which they will feel strongly that it must not be destroyed. When we informed the people from Maputo and Pirira they said there would be no problem even if the sacred site is destroyed by the mine, their response was that the communities cannot get another site easily as this is a holy place. They both mentioned that even if the community want the graphite project to work they will go and pray at the site and the spirit will make the mine function. The traditional healers suggested that the site be protected and fenced so that whenever the community want to go and pray especially for rain they can always have access to the area. The traditional healers believe that removing the site will bring bad luck to the communities. According to the healers they do not use any animals for healing but only plants.

They mentioned that the mine will not affect their business instead it might improve as people will have more money and manage to pay for medicine. The healers stated that people use the traditional medicine and hospital for different purposes. For example job seekers and people who are burnt go to the healers and not hospital.

APPENDIX 2: INITIAL STAKEHOLDER ENGAGEMENT REGISTERS



ATTENDANCE REGISTER

SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 04 March 2013 () Nete Communely

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Aida Boile Dofume	Ntete		,
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elêncio Sveriano	Mille		
Baquima	Atete		
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joaquim LiHANE	NIETE	-	
GERNIAS BINAMO	NTETE		
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ASSANE SADIA	NITIT		
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AMADE	Ntite	866073818	
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ELIAS DAUTO	Mtete		
ROARIGUIES MACHIN	Ntete		
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Jorge Maubició	Ntete		
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Constantino Arlindo	htela		
Liang Annath	Ntete		
JULINHO ALVARO	NHEETE		
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BASILIO Abibo	Mate		
AMADE MARIANO	Ntete		
ARLINDO FERNANDO	Ateti		
Amioo Sapina	Ntete	-	
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VICENTE RASSE	Altele		
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ALI ALFREND	Ntete		
RAHISSI PEMPE	Ntete		



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MUGUEL GOOMAIO	NIEFE		
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JARIFO DAIMUNDO	NIÈTE		
ANTÓNIO JATISSE	NIEIE		
MANITO FALISTIND	NHETE		
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PONEFACIO GENEMI	NTETE		
CARLATOS TOAT	NIEFE		
Victors Filming S.	NTETE		
Frimando Manine	a ATETE		
ALBERTO CUMMAVIA	Altete		
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LIVIS MUBRUA	state		
BIRRES SUMAILA	Ntele		
BACAR CANA	Ntete		
PACARIAS CASONA	Ntete		
RAGIONIA NAMALARA	NI to te		
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Annando Jeão	Mete		
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NURO ANTONIO	Mtetx		
CARLITO ERNESTO	Nteté		
Chabarre Marriel	stele		
Supe Agestinho	Ntele		
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AMIMO MILIANIE	NETE		
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ANGOMANE ISSA	Attela		
JUMA RACHIZE	Ntite		
ALBERTO NOMINGOS	Mate		

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Solieho santo	Nteta		
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MAULANA BRUHANE	NTETE		
Agostinho Paulo	Ntite		
Amisse Rodniques	Meta		
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Redro GERALDO COBRIEL	NTETE		
Angelito kennando	Nteta		
Amorico Rachide	Ntete		

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ESNESTO FERNANDO	NTETE		
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Sabila Saboneir	NIETE		`
Histario Jerma	NTETE		
Ramadone Afososo	NEL		
Kamadan Albert	NIEIE		
AMIOSE LUIS	NTEIE		
ELISIO XAVIER CROID	k		
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ViERA Antonio	NETE		
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ATTENDANCE LIST OF NQUIDE MEETING

ATTENDANCE REGISTER

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Ino Sogar uni	Neuide		
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Genito Allindo	Naid		
Ribeiro Roberto	Naide		
Costincio Varsing	Naid		<u> </u>
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Laurenco Gimo	Naid		
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Parani Svide	Maride		
Santos Ramilu	Maria		
1 Wiene Bulana	Naide		
Modesto Iuís	Maria		

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Munico Daniel	Naide		
Ernelo Curuno	Neude		
RACHIDE GUAMIAS	Naide		
Mario Dallan	Naide		
Mauss A-ADRian	Nouide		
Q Jaile Adriano	Neido		
Saide Amade	Naide		
Assime Sian	Neaide		
Honinho PacherPo	Neide		
Adelino Nquija	Naid		
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Maride Community

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Colostino António Sumante	Neuide		
Domito geland	Ncuite		
Salimo ASGINIO	Negid		
Damingo hillion	Naide		
Murmore Lula	Nouide		
Riquito Sail	Naide		
Abibo Adriano	Neuide		
Manuel Sumaila	Maido		
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Patoninho BAQU. he	Neuide		
Emenico Vitor	Acuide		
Sinnaila Mihando	Neuide		
MARIO MASSE	Naide		
Juna Parapani	Naide		
MAMULO MANIO	Naide		
Peobe ALFANi	Naide		
Lavine Ellerania	Naide		
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Adwardo Niv	ssa Navide		
Amilo Edestine	Maride		
Saidi jooguin	Meaide		
Rattad Farmiqui	Maide		
Hanusse mis	Naide		
ASSAMO AWASSE	Maile		
Selamino Alberto	Marido		
Epanine Mishgo	Naile		
Francisco Manuel	Maid		
Seride Golelo	Neuide		
Edurandes RARAINAD	Neuide		
Vieter Salilima	Maide		

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AVI Katto	Nevide		· · · · ·
Luis bitalo	Naide		
Salihing Bat	mei Maide		
Childring Colorta	Neuide		
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ATTENDANCE LIST OF MAPUTU/MUALIA MEETING



ATTENDANCE REGISTER

SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05March2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
Usine Assennance	Maputo	\$61038479	NJoFe
Augusto Walacti	Mapito		Ntete
RAFAI REDEOREDIED	MAJuto		Niete
BERNANDO SCHIANE	MAJULO		,1
ZERIto LIENCO	MAPULO		
José MUSSA	MARULD		
Masani Sueti	Maputo		
Manuclo Assans	Maputo		
Abudul Dosane	Majuto		
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ATTENDANCE REGISTER

SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05March2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
Davie Redol 4	Nete		tet a
Miguel Jedra Eline	Maputo	163887010	Milin
Mario Nicopilo	Maputo		Mario Wiropits
Mung Vacupi	Maputo		Mussa
Siltern Amine	Delapito		Sidiana
ISSiano Reileo	MAMELITE		Ntote
Acácio Assano	Ababuto		Atte
Adding Sadidure	Halanto		NIEle
Padril A. Jonary	Nela 11 + 12		NTETE
Repuise Mbuti	Mabuto	an a	NIETE
Citmpela HiNentop	Mabuto		NIELE
Wasing Bacar	Mapyto		NIFIE



Public Meeting 05March 2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
Wag wina Sandi	Mghuto.		NIETE
Marti saime	Марито		NIETE
Saulene Pipera	Maputo		NIETE
Maulana Musais:	Mabulo		NT675
Alberto Dilali	Mahuts		NT016
Ralela Quanstinh			
Cebostico Muhata	Mabuto	8/15305662	Nie
Bussbie Binamo	Mabuto	**************************************	Nicio
Norania Albert	Knobala	860044941	···
Argentino Alden	MaPUTA		NIETE
NELLON ANTUMANE	марија	865601695	NTETE
Rugate Minane	Mapute		NIETE

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SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05March2013 (Maputo Village)

ADDRESS	TELEPHONE	SIGNATURE
Marieto		NELS
Маби Со		NEE
Habuto		NTEÍE
MARUJO	863887054	NTETE
Марита		NTEÌE
Maj uto		NT5ĨG
Maputo	The second se	N1616
Maputo	866853002	NÍETE
Mabuto	60205200	NIGTE
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Maputo		NTETE
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	АDDRESS <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u>	АДДRESS TELEPHONE <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u> <u>Марико</u>



Public Meeting 05March2013 (Maputo Village)

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fide Aquimo	Maputo		<u> </u>
Zito Arius	Matuto		NHOEL
Ali Maulana	Maputo	860036816	viete
#55ANE AUGUSÍO	MHPUTD		X T O T C
LAJO Antonio 2250	Mahisto		NIET5
To CE ADIR	AMONTE		NIETE
Lacuin Adelin	Maluip		NFETE
Augure Amidi	MANUTO		NTETE
PHOL: MORAN	Mabuto		NIELE
Niko Pineti	MapuTo		NIETE
Hago Chiela	maketo		NGGT65
This maker	Mahilto		NTELE
Egynaline Lanster	1 h all a a		anna an an Anna



Public Meeting 05March 2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
Manudo Marage	Naputo		IToto
Ramilo Saido	Maputo		NTEto
Josinto Masoela	Ma juto		NTE TE
Ampate Antonio	Roperto		Wiels
Sunto	Mabuto	-	NTETE
Assimo Aila	Mofuto		NIETO
Amisse bias	Maputo	· · ·	NETE
Valente & gestinho	Mobuto	199474-20	NEETE
Zacarias Muelin	a Mabiet		NIÓIG
Miquel Savani	Maputo		N 1616
Meio dia Ami	MapUTO		NIETE
spil Alfredo	MORUTO		NIETE



Public Meeting 05March2013 (Maputo Village)

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Hove Anlower	Mablet	862902764	Ntete
Juganeo Lassina	Muhto	861449515	Ntete
North Alexand	Maputo	843887046	NieTe
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Public Meeting 05March 2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
MUSTFA	Maduto		NETE
Aquistinho jose	Мария		NETE
Pamalio Antonio	Majuto		NETE
Usseme Florencia	Марито		NIETE
Abudala MuHati	Mabuto		NTE 16
Ribuan Saburat	: Mahusto		VIETO
lama Polizi	Manuto		NIET6
AMispo Balash	MobUTD		NTOTE
Ring mo Colestin	МариТо		NTETE
Monuel Moconte	Nepulo		NT676
Alberto Puckat	Mahu to		NIETE
Assomi Sida	Mahyto	· · · · · · · · · · · · · · · · · · ·	VIETE



Public Meeting 05March2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
Junilo Albero	Mobilto		DTS TO
IDSA BEACAIL	mojento		Ne
ABACAR VAVIER	Maputa		NHETE
ACHIMO HACBAN	MAZINO		Ntete
A CHER to MALANCA	MAZUto		NEELE
SAIDE JOSÉ	MAJUtu		NEEE
Abita Saluma	Maluto		Ntete
Allausta Ramidi	Makuta		Ntet
Somly Truliplice	Margita		NTETE
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I I D Adama	Maluto		stete
Daraff Maard	HADAN C		



Public Meeting 05March 2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
However Lino	Maplet		NIEIE
Somaine	Reparent	861830406	NIÊJ6
Geraldo kuns	Meduiti	823128879	NFETE
Cesterino	Maputo		NIETE
FRANSU CO	Mahuts		NIEIE
Anidaliza	ili Maputa	860022787	NTETE
Fernando Zaevi	Maluto		NIGIO
Laurado Dli	Mahuno	8678 S6.116	·····
locite Alberto	Mahuta		NTELE
Asrani Saulia	Modute		V
MANUL JANLOO	_ v _ [v _ [
Sunaila	Gullmaila		NTOLE



Public Meeting 05March 2013 (Maputo Village)

NAME	ADDRESS	TELEPHONE	SIGNATURE
annelinde sabante	Haputo	86	Ntete
Pachicle offi	Mahuto	860045535	Nieta
Manuel Laverus	Nabeto		NIETE
Muanzede Listano	Mohuto	,	NIGIE
Avelino Bacar	Mohuto		NÍETE
Riggli Riboni	Mahinto		NIBIB
Jaccum Binama	Meste Witz		VIETO
A t Inuimo Aide	Mahuto		NIEIG
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Same of Rains	Machieto	an	NIBIE
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ATTENDANCE LIST OF PIRIRA MEETING



ATTENDANCE REGISTER

SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05 March 2013 Philis re Community

NAME	ADDRESS	TELEPHONE	SIGNATURE
Ali Assane	Pihira		
Pedro Arlindo	Pituta		
Saeania Sadisu	a Pirina		
Adamo Erusto	liriza		
chabane-Machuc	le Pitrika		
Unmasse-Cassona	Piriha		
Omar-Rafito	Pikika		
hussiand Manuel	Pituna		
1050 Volenjanni	n Pinha		
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Saibo Ali	Pilika		



SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05 March 2013 Serie Physica Communely

NAME	ADDRESS	TELEPHONE	SIGNATURE
Yoin A. Omar	Pisina		Matris Autorio O.
Bachies Eugébio	Pinina		Mario Antonio O.
habane_Omar	Piliha		Mario Antonio O.
PURICIO S. MAR'HO	Piriha		Malo Antoino D.
Wuba Sawale	piliha		Maria Antonio O.
Tauaral Sebra	Dirira		Mario Antonio D.
samuel panuel	Pinira		Malio Antomo O.
Joan Raibo atung	piliku		Mario Antonio Q.
2a Tabo Pinamo	Pirira		Mand Antonio O.
Toac Alfane	Piriha		Maro Antonio Q.
Alfredo A. Naide	Pi Li La		Mairo Antonio O.
Tage Gueule	Pihi ha		Malto Antonio P.



SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05 March 2013 Philip Community

NAME	ADDRESS	TELEPHONE	SIGNATURE
AMoure NUSSO	Pitrika		
Cleateria Bune	Pitrita		
Gilberts Manthia	Pitita		
focas Alfane	Pitrika		
Alfane Alv	Pinikg		
Visatob simad	pining		
Avastasio Mecaqui	pirúha	·····	
Zito Lumassa	Pinina		
Svalehe Andris	a Piluha		
Nazario Almand	b Pikina		
Assaule Jauma	Disiha		
Adviant Maciambe	pitina		



SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05March 2013 Philira Community

NAME	ADDRESS	TELEPHONE	SIGNATURE
Camila Ali	Pitina		
Ohacio Ahmand	b pilira		
Mário Clenterio	Pituta		
Gezario Armand	Pining		
Omar Bendino	Pikita		
Rachide Electeric	Pinha		
Papaito celleito	Pilling		
Elias Soubo	Pikika		
Angelina Prge	pilking		
Mária Saibo	Vituka		
Albina Saibo	Piruha		
Salia Malque	frung		



SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 0 March 2013 Phirice Community

NAME	ADDRESS	TELEPHONE	SIGNATURE
Rafina Saide	Pikila		
Ancha Bruhane	Pitchag		
Joang Allasse	Pikika		
Assafia machude	Pihi 4g		
Clauding Jose	pining		
Valleria costantin	Pchila_		
Isabel lucais	Pchung		
Biolinde Cozdian	piking		
Belanning pamil	piùta		
Maria Janne	piresq		
Asia Salimp	bisha		



SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05 March 2013 Physica Community

NAME	ADDRESS	TELEPHONE	SIGNATURE
Olinda Antoni	b piting		
Arsema Diguiss	n pituka		
Maria Butate	pining		
Lussia chabane	piking		
Sauda Simae	- pising		
Tulieta Alchand	re pisika		
Colestino Ussene	1= crilg		
Monrade Mohaine	périla		
filisarda celesti	a piring		
Toat Alberto	piling		
Izaura Gima	pirika		
Jose Rousse	privilia		


ATTENDANCE REGISTER

SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting 05 March 2013 Proteine Communety

NAME	ADDRESS	TELEPHONE	SIGNATURE	
Allagso Ali	Pirisa			
Davice Redolto	Pitting		Edir a	
Ameida Maño	Pinz			
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Coastal & Environmental Services Lda.

ATTENDANCE LIST OF FOCUS GROUPS

Syrah Resources Pty Ltd. and Twigg Exploration & Mining Lda.

	4	
VILLAGE	Maputo Wonen	
FACILITATORS	Mr Bosman	W
DATE	j/ / 03 /2013	

ATTENDANCE REGISTER Focus group duration:

Flomma pequin Mapulo Difa Handioco Mopulo Jeaguirra Fait Russenra Selvaria Sali Achimo Aita Amisse Genita Diongg Gristina joan Muta Joan Matula Dionade Alta Selmane Duninha Achimo Maliva Manio	NAME	VILLAGE	Leadership position/role performed in the community [clan chief, elderly, youth etc.]	Contact details
Defa Francisco Mapulo Jedifuirra Fait Russenra Seboard Sali Alchimo Aita annisse Frenita Diong 9 Critotina Joac Auge Joac Alta Diong 9 Critotina Joac Auge Joac Alta Dionad Alta Dionade Duninha Achimo Malina Mario	Filosona Toquin	mapito		
Jodquima Fait Russenra Selanono Sali Achimo Aita Amisse Frenita Diong G Glistina João Auto João Auto João Auto João Alita Selanda Malina Morio Malina Morio	Mga Franciora	Mapula		
Russenra Selamento Sali Achimo Aita Amisse Frenita Diong 9 Gliotina Joaio Muza Joaio Alta Disalde Matula Disalde Ancha Selamana Malina Monio Malina Monio	Jodquing Fait			
Sali Achimo Aita amime Fenita Diong G Gliotina Joan Muzzi Joan Alta Diong G Muzzi Joan Alta Dioda Maliva Mario Maliva Mario	Russens Selensing)		
Aita Amisse Frenita Diong 9 Citistina Joaio Moza Joaio Alita Bradae Alita Bradae Matila Bradae Duninha Achimo Maliva Morio Baning Science	Sali AChimo			
Frenita Diong 9 <u>Chipting Joan</u> <u>Muzn Joan</u> <u>Alita Prode</u> <u>Matille Diode</u> <u>Matille Diode</u> <u>Duninha Achima</u> <u>Mating Manio</u>	Aita Amisse			
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Matille Madde Ancha sebenare Duninha Achima Maliva Mario	Aly a Pry to			
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SYRAH RESOURCES BALAMA GRAPHITE PROJECT FOCUS GROUP

VILLAGE	Pilip Woncer	
FACILITATORS	Mr Bosman	
DATE	// / 03 /2013	

ATTENDANCE REGISTER Focus group duration:

NAME	VILLAGE	Leadership position/role performed in the community [clan chief, elderly, youth etc.]	Contact details
Filorena Augusto			
Naurinda Uban			
Inabel lucas			
Albina Saibo			
Danoacirei Alzaul			
Circisting Ollice			
Alima Ali			
Juiza Tome			
- Wieta Aropo			
Justin celetin			
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SYRAH RESOURCES BALAMA GRAPHITE PROJECT

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Solia Prelize			
Tulieta Rachie)		
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VILLAGE	NHethe	Chief Meet	trup (Local ché	ek)
FACILITATORS	Mr Bosman	J		1)
DATE	02 1 03 12	013	,	

ATTENDANCE REGISTER Focus group duration:

NAME	VILLAGE	Leadership position/role performed in the community [clan chief, elderly, youth etc.]	Contact details
Larie Boune	6.05		
Davie Redolto	Geoide consultinio		
Afito Manio Amarce	·		
Genito A. Frazaño	Nfek		
Vaulo Francisco			
Mamerel Coringho	Ntoto		
Feleciaus Amilite	Marica		1 - WL.
SEbastins & Jacan	Naude		
ANTONIO MOATUKA	NTETE		
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SY	RAH RES	OUF	CES BALAMA GRAPHITE PROJECT FOCUS GROUP
VILLAGE	Naus	de	Anothe Gooyb.
FACILITATORS	Mr Bøsman	<u> </u>	
DATE	Obi	03	/ 2013

ATTENDANCE REGISTER Focus group duration:

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NAME	VILLAGE	Leadership position/role performed in the community [clan chief, elderly, youth etc.]	Contact details
Alfa Saug	a Neuide	Trawby DAMIÃO	Ncuipe
CARIMO Sude	n Cuidé	Nadaita Moluto	Naios
Munipo Daniel	Navide	MONTEIDO RAFAEL	Neuve
Pedao Ioaquin	Nuide	AMENCIO FATURES	Neuride
Abilio 308 Stancisc	· Naude	XLIFO ATAXI	/ CL-
Naugo locio	Mande	PRANCIO CONSILIO	NRIILE
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Achaciptons	time Min	6 RAMANNANE DAG	Cool New
Domin, Jo Julum	9 Neutl	Jonana UNEne	Nemide
Assono AWAcco	Meriol	Sulai Domais	Neujde
Arumali Afi	Carida	MARlana Venneio	Newida
Causebio selection	1601 CUP	ASOMANI CAISSI	Neuma
Modesto Juis	Neuide,	MALIPISIO MA	NUEL N'an-
Ho Justo Hims	Manell	Comuel PACHI	UNC-
Clomentino Augusto	Neude		
Demingos Franciska	Muide		
Sauti () Flari	NUIDE		

VILLAGE	Piri	ha	,	Youth		 	
FACILITATORS	Mr Bosm	ian					
DATE	R	1	03	/2013			

ATTENDANCE REGISTER Focus group duration:

NAME	VILLAGE	Leadership position/role performed in the community [clan chief, elderly, youth etc.]	Contact details
Arantario Mergaria			
Sonas Samigue			
Jaguim Numa	Piríza		
Albalida PERTIN	· · · · · · · · · · · · · · · · · · ·		
Mordino Pauline			
HOMACIO AMMANDE			
ARMAND TOAL MIN			
Prancel Omaj		ano	
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	2	
VILLAGE	Pirine Youth	
FACILITATORS	Mr Bosman	
DATE	12 1 03 12013	

ATTENDANCE REGISTER Focus group duration:

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NAME	VILLAGE .	Leadership position/role performed in the community [clan chief, elderly, youth etc.]	Contact details
anta Antavia Dura	VIDINA		
Jazi Suguli	- 	i i i i i i i i i i i i i i i i i i i	
Jose PRISCHTULE	· · · · · · · · · · · · · · · · · · ·		
Realizabo Penal			
Vilando Gimae			
LAAFO MAULANA			
Janacas Solaria	Virára		
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VILLAGE	Me	putu	Jorg #	Pespe	
FACILITATORS	Mr Bosman /		0 7		
DATE	121	03 / 2013			

ATTENDANCE REGISTER Focus group duration:

NAME	VILLAGE	Leadership position/role performed in the community (clan chief, elderly, youth etc.)	Contact details
CHARANG RACADYS	MAPOTO		
Siglo Mário	Nikhopilo		
AFT ANTONIO	MADTO		
LUHANISSI TERRAZ	MAPOTO		
SIAMENI M. MOMA	i Maputo		
Antrisa Sinssio	Maputo		
Puporto Minane	Mabuto		
EnmeLinDo Mahian	6 Maruto		
Demineo Manorel	Mapulo		
TUANA Ababacar	Marita		
RaJalo, Musterfa	eno pute		
Amisa Jose	Maputo		
Atriano Juma	Mazoto		
EDMineo manio.	Masufo		
Marcho Manio	Maruto		
Rigito Manosi	Mapule		
Saite Juse	Masolo		



ATTENDANCE REGISTER

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SYRAH RESOURCES BALAMA GRAPHITE PROJECT

1 Maputo South 2 Public Meeting (March 2013 (SIGNATURE NAME ADDRESS TELEPHONE

(TUTE		
Cassimo Redito		
Darny Cesairia		
lino Gildo		
Bentamin Saich		
Agrano Suali		
Turna Atombo		
Home Ker Tung		
Lacations Arriva		
Assame Agusto Amir		
SaideAugusto		
Amigse ,000		
Tadey Remigio		



ATTENDANCE REGISTER

SYRAH RESOURCES BALAMA GRAPHITE PROJECT

Public Meeting & March2013 (Maputo Village) Lath

NAME	ADDRESS	TELEPHONE	SIGNATURE
Staminant Manado			
Serrate Paulo			
Desquiphojal	4) 		
Squiti Obiba			
Add to Mirago			
Temps Celstina			
Aido Afrina			
Zito Azizo			
Pidelino Africa			
Raul Agestinha			
Valenie Affride			
Idelissene			
Lazaizia Hiberto	<u></u>	an a	

Syrah Resources Pty Ltd. and Twigg Exploration & Mining Lda.

APPENDIX 3: NOTIFICATION LETTERS FOR EPDA DISCLOSURE

COASTAL & ENVIRONMENTAL SERVICES MOZAMBIQUE LIMITADA

Gestão Ambiental e Avaliação de Impacto



Coastal & Evironmental Services Mozambique Lda. Rua da Frente de Libertação de Moçambique Nº 324 Maputo, Moçambique Telefone: (+258) 21 243500 Telemóvel: (+258) 82 3079739 Email: e.vicente@cesnet.co.za 1 de Agosto de 2013 N^a.Ref.161/2013/MOZ

Para: Administração do Distrito de Balama PROVÍNCIA DE CABO DELGADO

Assunto: Envio do Relatório do Estudo de Pré-Viabilidade Ambiental e Definição do Ámbito e Termos de Referência do Projecto da Mina de Grafite de Balama para Consulta

Exma Sra. Administradora,

A Coastal & Envionmental Services Mozambique Límitada (CES) em representação ao seu cliente, a Twigg Exploration and Mining Lda, subsidiária da Syrah Resources, vem mui respeitosamente submeter à V.Excia para consulta, 1 exemplar da versão impressa do rascunho do relatório do Estudo de Pré-viabilidade Ambiental e de Definição do Ambito (EPDA) e Termos de Referência para o Estudo de Impacto Ambiental e Social do **Projecto da Mina de Grafite de Balama.**

Com os melhores cumprimentos

Elisa Incuane Vicente

Dra. Elisa Inguane Vicente (MSc) (Consultora Ambiental Sénior)

Coastal & Environmental Services Mozambique, Lda Rua de Frente de Libertação de Moçambique nº 324 Maputo - Moçambique Tel:(+258) 2124 3500 . Fax: (+258) 2124 3550 Website.www.ceanet.co.za

Coastal & Environmental Services Mozambique Limitada, NUIT No. 400354642 Acionistas: Coastal & Environmental Services South Africa; Dr AM Avis (PhD Rhodes)

COASTAL & ENVIRONMENTAL SERVICES MOZAMBIQUE LIMITADA

Gestão Ambiental e Avaliação de Impacto

Coastal & Evironmental Services Mozam Rua da Frente de Libertação de Moçambique N 324 Maputo, Moçambique Telefone: (+258) 21 243500 Fax: (+258) 21 243500 Telemóvel: (+258) 82 3079739 Email: e.vicente@cesnet.co.za 31 de Julho de 2013

Na.Ref.164/2013/MOZ

Para: Direcção Nacional de Minas Praça 25 de Junho <u>M A P U T O</u>

Assunto: Envio do Relatório do Estudo de Pré-Viabilidade Ambiental e Definição do Âmbito e Termos de Referência do Projecto da Mina de Grafite de Balama para Consulta

Exmo Sr. Director,

A Coastal & Envionmental Services Mozambique Limitada (CES) em representação ao seu cliente, a Twigg Exploration and Mining Lda, subsidiária da Syrah Resources, vem mui respeitosamente submeter à V.Excia para consulta, 1 exemplar da versão impressa do rascunho do relatório do Estudo de Pré-viabilidade Ambiental e de Definição do Ambito (EPDA) e Termos de Referência para o Estudo de Impacto Ambiental e Social do **Projecto da Mina de Grafite de Balama.**

Com os melhores cumprimentos



Dra. Elisa Inguane Vicente (MSc) (Consultora Ambiental Sénior)



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Nª.Ref.163/2013/MOZ

Para:

Direcção Nacional de Avaliação de Impacto Ambiental Ministério para Coordenação da Acção Ambiental Av. Acordos de Lusaka

MAPUTO

Assunto: Envio do Relatório do Estudo de Pré-Viabilidade Ambiental e Definição do Âmbito e Termos de Referência do Projecto da Mina de Grafite de Balama para Consulta

Exma Senhora Directora

A Coastal & Envionmental Services Mozambique Limitada (CES) em representação ao seu cliente, a Twigg Exploration and Mining Lda, subsidiária da Syrah Resources, vem mui respeitosamente submeter à V.Excia para consulta, 1 exemplar da versão impressa do rascunho do relatório do Estudo de Pré-viabilidade Ambiental e de Definição do Ambito (EPDA) e Termos de Referência para o Estudo de Impacto Ambiental e Social do Projecto da Mina de Grafite de Balama.

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FINAL RESETTLEMENT ACTION PLAN

THE BALAMA GRAPHITE MINE CABO DELGADO PROVINCE IN THE DISTRICT OF BALAMA, MOZAMBIQUE

PART 6 OF THE ENVIRONMENTAL AND SOCIAL HEALTH IMPACT ASSESSMENT PROCESS

September 2014

Prepared for:
RESOURCES
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REPORT TRACK TABLE



EOH Coastal and Environmental Services

Project Name: The Balama Graphite Mine

Report Title: Final Resettlement Action Plan: The Balama Graphite Mine

Report Version: Part 6 of the Environmental, Social and Health Impact Assessment Process

File Name	Compiled By	Reviewed	Date
Draft RAP 1		Prof Chris de Wet	17/02/2014
Draft RAP 2	Jan Anton Hough (EOH CES)	Dr Ted Avis	03/03/2014
Draft RAP 3		Proponent	10/03/2014
Draft RAP 4		Government and Community Disclosure	05/06/2014
FINAL RAP		Proponent	09/19/2014

LIST OF ACRONYMS

AfDB	African Development Bank
CA	Conservation Agriculture
CES	Coastal & Environmental Services
DFI	Development Funding Institution
DINAPOT	National Directorate of Territorial Planning and Organisation
DPCA	Diretório Provincial Coordenação Ambiental*
DSEA	District Services of Economic Activities
DSPI	District Services of Planning and Infrastructure
EIA	Environmental Impact Assessment
EHS	Environmental Health and Safety
ESHIA	Environmental, Social and Health Impact Assessment
EUM	Eduardo Mondlane University
FDP	Farmers Development Programme
GN	Guidance Note
GO	Government Organisation
GoM	Government of Mozambique
HIA	Health Impact Assessment
HRSP	Human Resource Development Programme
ID	Identification
IFC	International Finance Corporation
ISFM	Integrated Soil Fertility Management
LHDP	Lesotho Highlands Development Project
LoF	Life of Mine
LRP	Livelihood Restoration Plan
MICOA	Ministério para a Coordenação da Acção Ambiental*
МоА	Ministry of Agriculture
NGO	Non-Governmental Organisation
OP	Operational Procedure
PAC	Project-Affected Community
PDEC	Provincial Directorate for Environmental Coordination
PS	Performance Standard
RAP	Resettlement Action Plan
SADC	Southern Africa Development Corporation
SED	Socio-Economic Development
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
SLP	Social and Labour Plan
SMME	Small, Medium and Micro Enterprise
TA	Traditional Authority
ТрА	Tons per Annum
TSF	Tailing Storage Facility
TWG	Technical Working Group

* Portuguese Term

GLOSSARY OF TERMS

Unless otherwise indicated in-text, the following meanings are assigned to these terms (not in alphabetical order):

Area of Influence (Aol)	Thisrefers to the demarcated boundary of the mine (Figure 1.2). Most landholding-owning farmersinside this AoI might be affected by economicdisplacement.
Secondary Structure	This refers to all structures that are usually more temporary in nature, and hence not part of a physical living house. The term covers a range of different structure types; from agriculture-related sheds, grain storage buildings, shading or temporary resting houses.
Primary Structure	This refers to a permanent living and/or recreational house lived in by household members for the most part of the week.
Census	The census is the household Socio-Economic Baseline Survey (SEBS),which was conducted ofa 30% sample of all theaffected landholding-owning householdsinside the mine"s AoI. The rationale for this survey was to extrapolate number of Project-Affected People/Person(PAP) and determine the living conditions of the household units affected by economic displacement.
Proponent	In this report, "the proponent"jointly refers to the directors or shareholders of Syrah Resources Ltd. and Twigg Exploration & Mining Lda.
Compensation	 In the context of this report, compensation refers either to: A payment offered (by means of an entitlement contract) to an affected landholding-owning farmer inside the mine's Aol for the disturbance and/or loss of crops, economic trees and/or secondary structures; or Any measure put in place by the mine's Social Department to ensure that an affected farmer and his/her household are better-off after economic displacement (this might include the provision of alternative land, transitional or agricultural support etc.).
Consultation	Consultation with stakeholders, Interested and Affected Parties (I&APs), as well as the PAPis of central importance to the economic displacement process. The term encapsulates particular actions which are undertaken, including timely dissemination of information, a free-flow of information exchange, as well as the opportunity for these parties to voice their concerns and have an actual input in the displacement process. Any consultation was conducted foremost in accordance with the Mozambique Regulations on the Resettlement Process resulting from Economic Activities (Decree 31 of 2012).
Cultural Property	 This includes the following: Archaeological sites; Site of religious or historical significance (sacred areas); Gravesites; Monuments/shrines; Places of worship; and Artefacts.
Cut-off Date	The Cut-off-Date represented the date on which those landholding-owning farmers inside the mine"s Aol were informed that any new farmland and/or secondary structure on such land would not be compensated by the proponent. The RAP"s social team informed farmers of this during several site visitsundertaken in order to conduct the SEBS and farmland assessments in 2013 and 2014.

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Economic Displacement	Economic displacement is defined as any, "[I]oss of income streams or means of livelihood resulting from land acquisition or obstructed access to resources" (IFC, 2002:p.ix). This term is used in the report to refer to the loss and/or disturbance of agricultural landholdings and secondary structures.
Ecosystem Service	This term describes the ways in which natural resources and processes supplied by the natural environment (or ecosystem) are used by people.
Entitlement Framework	This is a framework that categorises each affected landholding-owning farmer and the compensation that the farmer is entitled to. The framework covers and protects eligible farmersin terms of what they are entitled to receive as compensation for economic displacement.
Environmental, Social and Health Impact Assessment	This refers to a suite of reports which is prepared to identify and mitigate potential negative project-induced affects, as well as optimise positive ones.
Farmland Assessment	This term describes the inventory (identification and assessing) of all the landholdings inside the mine's AoI. This inventory included any structures, important features, cultural property and economic trees.
Grievance Mechanism	A Grievance Mechanism is a process used for PAPsto submit grievances to the mine. It also offers a way for mine management to process and address such grievances.
Household	In this report, the term "household" refers to a group of members who share a house, income, assets and/or resources at least once a week. This is thus the <i>de jure</i> population or, i.e., the population including temporary absent members.
Homestead	A homestead refers to an agricultural holding which is used by a particular household to live on. In this project's context, a homestead usually has on it a physical living house (primary structure), as well a small food garden. Homesteads are normally fenced.
Landholding	A landholding is defined as any piece of land that belongs to a household. Such a landholding might have on it a living house (primary structure) or small food garden, or might constitute only an agricultural farm.
Machamba	The term "machamba" is used in this report in replacement of the word "farm". In Mozambique, a machamba refers to a piece of land (whether this is family or individually owned) used for subsistence and/or commercial purposes.
Project	The project refers to the Balama Graphite Mine, and encapsulates all the processes involved therein.
Project-Affected Community	This refers to a community which is affected by the project. In this report, PACs refer to the town and villages of Balama, Ntete, Nquide, Pirira and Maputo.
Project-Affected Person	Generally used to refer to any person who is affected by the RAP. The International Finance Corporation (IFC) Handbook for Preparing a RAP (2002) defines PAPs as: "[a]ny person who, as a result of the implementation of a project, loses the right to own, use, or otherwise benefit from a built structure, land (residential, agricultural, or pasture), annual or perennial crops and trees, or any other fixed or moveable asset, either in full or in part, permanently or temporarily" (ibid.: x). A PAP can therefore also be an individual who is not part of a PAC.
Replacement Cost	This term refers to the cost for replacing an asset. The term equates to market cost plus transaction costs (which include any labour which will be used by the mine to replace such an asset).

Resettlement Assistance	Measures are proposed in this report for the proponent to ensure that economically displaced farmers are provided with assistance during the displacement process.
Socio-Economic Baseline Survey	This term refers to a census which was carried out in order to identify and obtain socio-economic data on the PAP. Data which was collected included household demographics, family structures (relationships, age, residential status and occupation etc.), household livelihoods and economic data (<i>inter alia</i>).
Stakeholders	Stakeholders are defined as all individuals, groups or organisations which/who have an interest in the project and who are (or should be) involved during the project's consultative process. For purposes of this report, such stakeholders generally refer to those farmers and households who are affected by economic displacement, as well as the relevant government authorities. Stakeholders also include thecurrent and future labour force.
Technical Working Group	The establishment of a working group that represents those who are affected is a central part of any economic displacement process. The role of such agroup is to be the central communication and decision-making mechanism on behalf of the PAP through the implementation phase of the RAP.
Transitional Support	The IFC uses this term as a means for projects to remunerate economically displaced persons for the time required to restore their income-earning capacity, farm production levels and standard of living (<i>cf.</i> IFC, 2012: p. 7). The World Bank's Operational Procedure (OP) on Involuntary Resettlement (OP 4.12) [World Bank, 2013(b)] also specifies that projects need to provide development assistance as part of compensation strategies. In the context of this project, the term encapsulates the provision of alternative farmland and initial support during the land acquisition process, to assist affected farmers to cultivate their ,new" fields.
Vulnerable Group	 The term "Vulnerable Group" is defined as any person who might suffer disproportionately or, "[] face the risk of being marginalized by the effects of resettlement" (Huggins and Lappeman, 2012). One role of an established group representing those who are affected would be to identify such vulnerable people/households who can prove to the mine that they are eligible for additional assistance through the compensation process. The World Bank [2013(a)] defines vulnerable people as belonging to any of the following groups: > Homeless children; > People with disabilities; > At-risk youth; and > Indigenous people. Vulnerable groups can also include (<i>cf.</i> Huggins and Lappeman, 2012): > Very poor people/households; > Ethnic minorities; > Infants and women; > Households without security of tenure (no legal title to land); and > Women-headed households.

TABLE OF CONTENTS

1.	INTRODUCTION	3
1.1	Project Overview	3
1.2	Project Site Location and Area of Influence	4
1.2	The Mining Process	6
1.3	Project Rationale and Objectives	6
1.4	Potential Impacts of the Project and Economic Displacement	7
1.4.1	Potential Project Impacts	7
1.4.2	Asset Inventory for Possible Economic Displacement	8
1.5	Resettlement Action Plan Objectives	11
1.0	Resettiement Action Plan Study Team	12
1.7 2		10
Z .		14
2.1	Introduction.	14
2.2	I ne Resettlement Action Plan Process in Mozambique	14
2.3 2.3.1	Constitution of the Republic of Mozambique of 2004	10
2.3.1	Regulations on the Resettlement Process resulting from Economic Activities	16
2.3.2	National Heritage Protection Law of 1988	17
2.0.0	Mining Act of 2002	17
2.3.5	Mining Law Regulations of 2003	17
2.3.6	The Land Act No 19/97 and Decree No 66/98	17
2.3.7	Land Law Regulations (2003)	19
2.4	International Guidelines	20
2.4.1	Overview	20
2.4.2	The World Bank's Operational Procedure 4.12 on Involuntary Resettlement	20
2.4.3	The International Finance Corporation	21
3.	RESETTLEMENT ACTION PLAN PRINCIPLES	22
3. 3.1	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22
3. 3.1 3.2	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement	22 22 22
3. 3.1 3.2 3.2.1	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 22
3. 3.1 3.2 3.2.1 3.2.2	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement Overview Resettlement Case Studies	22 22 22 22 23
3. 3.1 3.2 3.2.1 3.2.2 3.2.3	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts	22 22 22 23 23
3. 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 2.25	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 23 24
3. 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 2.2.6	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 23 24 24
3. 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 23 24 24 24 25
3. 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3 1	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 24 24 24 24 25 25
3. 3.1 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 23 24 24 24 25 25 27
3. 3.1 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4 .	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 24 24 24 25 25 27 27 28
3. 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4. 4.1	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 24 24 24 25 25 27 28 28
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4. 4.1 4.2 	RESETTLEMENT ACTION PLAN PRINCIPLES	22 22 22 23 23 24 24 24 25 25 27 28 28 28
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction. The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts Land and Food Security. Dependency on Community Development Initiatives Community Participation. Resettlement Action Plan Principles Guiding Principles. Measures to Avoid Involuntary Resettlement and the Impacts Thereof. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction. Requirements. Community Engagements	22 22 23 23 24 24 25 25 27 28 28 28 30
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3 	RESETTLEMENT ACTION PLAN PRINCIPLES	 22 22 22 23 23 24 24 25 27 28 28 30 30
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 	RESETTLEMENT ACTION PLAN PRINCIPLES	 22 22 23 23 24 24 25 27 28 28 30 31
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.3 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction. The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts. Land and Food Security. Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles. Measures to Avoid Involuntary Resettlement and the Impacts Thereof. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction. Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013)	22 222 23 23 24 24 24 25 27 28 28 30 31 31
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.3 4.3.4 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction. The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts. Land and Food Security. Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles Measures to Avoid Involuntary Resettlement and the Impacts Thereof. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013) Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report	22 222 23 23 24 24 25 25 27 28 28 30 30 31 31 32
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.1 4.3.2 4.3.3 4.3.4 4.3.5 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts Land and Food Security Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles Measures to Avoid Involuntary Resettlement and the Impacts Thereof STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013) Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report Resettlement Action Plan Site Visit 3 (November-December 2013)	22 222 23 23 24 24 25 27 28 28 30 31 31 32 32
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.3 4.3.4 4.3.5 4.3.6 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts Land and Food Security. Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles Measures to Avoid Involuntary Resettlement and the Impacts Thereof. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013) Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report Resettlement Action Plan Site Visit 3 (November-December 2013) Resettlement Action Plan Site Visit Four: First Disclosure of the RAP Report (May 2014)	22 222 23 23 24 24 25 27 28 28 30 31 31 32 33 31 32 33
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.1 4.3.2 4.3.3 4.3.4 4.3.5 4.3.6 4.4 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts Land and Food Security Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles Measures to Avoid Involuntary Resettlement and the Impacts Thereof STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013) Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report Resettlement Action Plan Site Visit 3 (November-December 2013) Resettlement Action Plan Site Visit 5 (Internet Plan Site Visit 7 (Internet Plan Site Visit	22 222 23 23 24 24 25 25 27 28 28 30 31 31 32 32 33 34
 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.3 4.3.4 4.3.5 4.3.6 4.4 4.4.1 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts Land and Food Security Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles Measures to Avoid Involuntary Resettlement and the Impacts Thereof STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013) Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report Resettlement Action Plan Site Visit 3 (November-December 2013) Resettlement Action Plan Site Visit 7 (November-December 2013) Resettlement Action Plan Site Visit Four: First Disclosure of the RAP Report (May 2014). Technical Working Group Objectives of the Technical Working Group	22 222 23 23 24 24 25 27 28 28 30 31 32 33 34 34
 3. 3.1 3.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.2.6 3.3 3.3.1 3.3.2 4.1 4.2 4.3 4.3.1 4.3.2 4.3.3 4.3.4 4.3.5 4.3.6 4.4 4.4.1 4.4.2 	RESETTLEMENT ACTION PLAN PRINCIPLES Introduction. The Challenge of Economic Displacement Overview Resettlement Case Studies Cumulative Mine Development Impacts. Land and Food Security. Dependency on Community Development Initiatives Community Participation Resettlement Action Plan Principles Guiding Principles. Measures to Avoid Involuntary Resettlement and the Impacts Thereof. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION Introduction. Requirements Community Engagements Overview Social Impact Assessment Site Visit Resettlement Action Plan Site Visit One and Two (July-August 2013) Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report Resettlement Action Plan Site Visit 3 (November-December 2013) Resettlement Action Plan Site Visit 7 four: First Disclosure of the RAP Report (May 2014). Technical Working Group Objectives of the Technical Working Group Establishing the Technical Working Group	22 222 23 23 24 24 25 27 28 28 30 31 32 33 34 36 31 32 33 34 36 36 36 36 36 36 36 36 36 36 36 36 36

4.4.3.1	1 Overview	37			
4.4.3.2	4.3.2 Introduction Meetings and Obtaining Permission for Farmland Surveys				
4.4.3.3	4.3.3 Disclosing the First Draft RAP Report and Discussing Compensation Measures				
4.5	.5 Provincial and District Government Engagements				
4.5.1	1.5.1 General Engagements				
4.5.2	District Resettiement Commission	40			
4.5.2.1	Disclosing the First Droft DAD Depart to the District Department Commission	40			
4.5.2.2	2 Disclosing the First Draft RAP Report to the District Resettlement Commission	41			
4.0	Grievance Mechanism	41			
4.6.1	Ubjectives	41			
4.0.2	The Grievance Mechanism Procedure.	43			
4.6.3	Operating the Grievance Mechanism	45			
5.	THE PROJECT'S SOCIO-ECONOMIC CONTEXT	46			
5.1	Overview	46			
5.2	Survey and Assessment Methodology	46			
5.2.1	Overview	46			
5.2.2	Landholding Asset Inventories and Socio-Economic Baseline Surveys	46			
5.2.3	Entitlement Sheets and Individual Cut-Off-Date Declarations	47			
5.2.4	Data Analysis and Reporting	48			
5.3	Socio-Economic Context	48			
5.3.1	Demographics of the Project-Affected People	48			
5.3.2	Household Dynamics	49			
5.3.2.1	l Overview	49			
5.3.2.2	2 Membership	49			
5.3.3	Socio-Economic Living Conditions	50			
5.3.3.1	I Education	50			
5.3.3.2	2 Health	50			
5.3.3.3	3 Water, Sanitation and Waste Disposal	51			
5.3.3.4	1 Energy	51			
5.3.3.5	5 Communication, Markets and Transport	52			
5.3.4	Household Livelihood Strategies	52			
5.3.4.1	I Occupation	52			
5.3.4.2	2 Income and Expenditure	53			
5.3.5	Natural Resource-Use and Ecosystem Services	54			
5.3.6	Agriculture	56			
5.3.6.1	I Machambas	56			
5.3.6.2	2 Agricultural Crops	56			
5.3.6.3	Agricultural Crop Seasons	57			
5.3.6.4	EconomicTrees	57			
5.3.7	Food Security	58			
6.	ENTITLEMENT FRAMEWORK AND LIVELIHOOD RESTORATION	59			
61	Overview	59			
6.2	Household Eligibility and Entitlement Matrix	59			
63	Compensation Valuation	60			
631	Compensation Valuation Methodology	60			
6.3.2		00			
Gover	Discussing the Compensation Valuation Methodology with the Affected Farmers and				
00/01	Discussing the Compensation Valuation Methodology with the Affected Farmers and	61			
633	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials	61 65			
6.3.3 6 3 3 1	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land	61 65 65			
6.3.3 6.3.3.1	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land Allocating Replacement Land	61 65 65 72			
6.3.3 6.3.3.1 6.3.3.2 6.3 4	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land 1 Allocating Replacement Land 2 Preparation of Replacement Land through a Farmers Development Programme	61 65 65 72 73			
6.3.3 6.3.3.1 6.3.3.2 6.3.4 6.3.5	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land Allocating Replacement Land Preparation of Replacement Land through a Farmers Development Programme Compensation of Annual Crops	61 65 65 72 73 74			
6.3.3 6.3.3.1 6.3.3.2 6.3.4 6.3.5 6.3.6	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land Allocating Replacement Land Preparation of Replacement Land through a Farmers Development Programme Compensation of Annual Crops Compensation and Replacement of Economic Trees	61 65 72 73 74 75			
6.3.3 6.3.3.1 6.3.3.2 6.3.4 6.3.5 6.3.6 6.3.7	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land Allocating Replacement Land Preparation of Replacement Land through a Farmers Development Programme Compensation of Annual Crops Compensation and Replacement of Economic Trees Compensation of Secondary Structures	61 65 72 73 74 75 75			
6.3.3 6.3.3.1 6.3.3.2 6.3.4 6.3.5 6.3.6 6.3.7 6.3.8	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land Allocating Replacement Land Preparation of Replacement Land through a Farmers Development Programme Compensation of Annual Crops Compensation and Replacement of Economic Trees Compensation of Secondary Structures Compensation of Communal Resources Costs Associated with Cultural Property	61 65 72 73 74 75 75 75			
6.3.3 6.3.3.1 6.3.3.2 6.3.4 6.3.5 6.3.6 6.3.7 6.3.8 7	Discussing the Compensation Valuation Methodology with the Affected Farmers and nment Officials Replacement of Land Allocating Replacement Land Preparation of Replacement Land through a Farmers Development Programme Compensation of Annual Crops Compensation and Replacement of Economic Trees Compensation of Secondary Structures Compensation of Communal Resources Costs Associated with Cultural Property	61 65 72 73 74 75 75 76			

7.1	Overview	. 78	
7.2	A Social Department7		
7.3	Entitlement Contracts		
7.4	Payment Procedure		
7.5	Implementation Activities and Assigned Responsibilities		
8.	MONITORING AND EVALUATION	. 84	
8.1	Overview	. 84	
8.2	Internal Monitoring and Evaluation	. 84	
8.2.1	Progress Monitoring	. 84	
8.2.2	Re-Validation Survey	. 84	
8.3	External Monitoring and Evaluation	. 85	
8.3.1	Conducting a Post-Economic Displacement Socio-Economic Baseline Survey	. 85	
8.3.2	An Independent Post-Economic Displacement Audit	. 86	
9.	COSTS AND BUDGETS	. 87	
10.	CONCLUSION	. 89	
11.	REFERENCES	. 90	
Appen	dix 1: previous mine lavout plans	.93	
append	dix 2: aps positions of grave and sacred sites and boreholes	.95	
Appen	dix 3: Community meeting minutes 1	. 97	
Appen	dix 4: Community meeting minutes 2	101	
Appen	dix 5: Community meeting minutes 3	105	
Appen	dix 6: Community meeting minutes 4	110	
Appen	dix 7: Community meeting minutes 5	114	
Appen	dix 8: Community meeting minutes 6	122	
Appen	dix 9: Community meeting minutes 7	132	
Appen	dix 10: Technical working group meeting 1	135	
Appen	dix 11: Technical working group meeting 2	138	
Appen	dix 12: Technical working group meeting 3	142	
Appen	dix 13: Technical working group meeting 4	146	
Appen	dix 14: Technical working group meeting 5	150	
Appen	dix 15: minutes of the community disclosure meetings of the resettlement action plan	154	
Appen	dix 16: Attendance register of the resettlement action plan disclosure meeting held in ntet	e	
on 14 i	may 2014	157	
Appen	dix 17: Attendance register of the resettlement action plan disclosure meeting held in Nqu		
01 15 I	may 2014	101	
Appen	aix 18: Attendance register of the resettlement action plan disclosure meeting held in	166	
Balama on 15 may 2014			
Appendix 19: Attendance register of the resettlement action plan disclosure meeting held in Maputo on 16 may 2014			
Appendix 20: Attendance register of the resettlement action plan disclosure meeting held in Pirira			
on 16	may 2014	۳ 174	
Appen	dix 21: Attendance register of the resettlement action plan disclosure meeting held in bala	1	
with th	e district resettlement comission on 8 may 2014	179	
Appen	Appendix 22: entitlement contracts		
APPENDIX 23: Progress report proofs of delivery			
APPE	APPENDIX 24: Technical Working Group mission document		
APPE	APPENDIX 25: Members of the District resettlement commission		

LIST OF FIGURES

Figure 1.1: The site location of the proposed Balama Graphite Mine [Map reference: CES, 2 Figure 1.2: Project infrastructural layout as at August 2014	013] 3 5
Figure 1.3: Assessed Machambas inside the Mine's Area of Influence (AoI)	9
Figure 1.4: Identified grave, borehole and sacred sites	10
Figure 2.1: The Resettlement Action Plan (RAP) process in Mozambique	15
Figure 5.1: Age breakdown of the Project-Affected People (PAP) (%)	49
Figure 5.2: Education status of the project-affected households (%; 18 years or above)	50
Figure 5.3: Energy access of the project-affected households (%)	51
Figure 5.4: Project-affected household incomes (%)	53
Figure 5.5: Project-affected households" natural resource-use (%)	55
Figure 5.6: Project-affected household food security (% of households)	58
Figure 6.1: a Possible affected landholdings with each owners" ID number	66
Figure 6.1: b_Possible affected landholdings with each owners" ID number	67
Figure 6.1: c_Possible affected landholdings with each owners" ID number	68
Figure 6.2: The Alternative Land (marked in light green and purple)	71
Figure 7.1: The Balama Graphite Mine Social Department Structure*	79

LIST OF TABLES

Table 1.1: Project Details	6
Table 1.2: Socio-economic impacts and issues identified during the Social Impact Assessment	
process	7
Table 1.3: Possible affected landholdings inside the mine's Area of Influence*	8
Table 1.4: Resettlement Action Plan (RAP) Study Team	. 11
Table 2.1: Legal Framework	. 14
Table 2.2: The World Bank's Operational Procedure 4.12 (2013 amendment)*	. 20
Table 2.3: International Finance Corporation Performance Standard Objectives	. 21
Table 3.1: Resettlement Action Plan Guiding Principles	. 25
Table 4.1: Site visits undertaken until the end of May 2014	. 29
Table 4.2: Resettlement Action Plan (RAP)-related public participation activities until August 201	430
Table 4.3: Balama Mine Technical Working Group Membership	. 36
Table 4.4: Technical Working Group (TWG) meetings held until the end of June 2014	. 37
Table 4.5: Members Sitting on the District Resettlement Commission	. 40
Table 4.6: District Resettlement Commission Meeting Attendance Register	. 41
Table 5.1: Villages where the project-affected households live	. 48
Table 5.2: The labour force of the Project-Affected People (PAP)	. 52
Table 5.3: Project-affected household incomes and expenditures	. 53
Table 5.4: Project-affected household average monthly income from different sources	. 54
Table 5.5: Agricultural crops planted on machambas inside the mine's Area of Influence (AoI)	. 56
Table 5.6: Agricultural crops seasons	. 57
Table 6.1: Eligibility Matrix	. 60
Table 6.2: Issues and Response Trail Concerning Discussions over Compensation Strategies	. 62
Table 6.3: Alternative Land	. 70
Table 6.4: Government of Mozambique crop rates (MZN)	. 73
Table 6.5: Government of Mozambique tree rates (MZN)*	. 74
Table 7.1: Implementation schedule for completing the draft RAP report and submitting it to the	
relevant government authorities for approval (2014)	. 82
Table 7.2: Implementation schedule for a proposed pilot phase RAP implementation of the access	SS
road (2014)	. 83
Table 9.1 Estimated budget for implementing the Resettlement Action Plan *	. 87
Table 9.2: Budget for economic tree compensation at established tree rates (Government rates)	88
Table 9.3: Draft budget for crop compensation at established rates*	. 88
Table 9.4: Draft budget for a structure	. 88
Table 9.5: Draft budget for a Farmers Development Programme	. 88

LIST OF PLATES

Plate 4.1: Initial public participation meeting with the community of Nquide (Left) and Pirira (Right Plate 4.2: Community meetings as part of the Resettlement Action Plan (RAP) (July-August 2013) Plate 4.3: Disclosing the Scoping Report (EPDA)	:)31)32 32
Plate 4.4: Engaging with the affected farm owners in May 2014 to discuss compensation	
packages during the disclosure of the RAP report	34
Plate 4.5: Establishing the Technical Working Group (TWG) on 10 August 2013	37
Plate 4.6: Engaging with the Technical Working Group (TWG) members on 29 November 2013.3	39
Plate 4.7: Left: EOH CES presenting a grievance form which he tailored for the mine's Social	
Department.	12
Plate 4.8: Establishing the Grievance Mechanism during each community meeting with a poster	
illustrating the steps involved	45
Plate 5.1: Transecting the study area and identifying cultivated landholdings, crops and structures	s
to be assessed	47
Plate 5.2: A household ID number issued to each farm-owning household	47
Plate 6.1: The one land parcel outside Maputo is being demarcated with a "land reservation" board	b
being erected	70
Plate 6.2: A typical hut or resting house structure constructed of wood poles/sticks, mud and thatch. 75	
Plate 6.3: Demarcation of Cultural Heritage Areas	76

1. INTRODUCTION

1.1 **Project Overview**

Syrah Resources Ltd.and the Mozambique-based company, Twigg Mining and Exploration Lda. (hereaftercollectively referred to as the "proponent") planto developthe Balama Graphite Mine in the Balama District of the Cabo Delgado Province of Mozambique (referred to as "the project"). The project is located approximately 265km west of Pemba and around 9km from the nearest town to the mine's west, Balama (refer to Figure 1.1 below). Graphite is currently the main resource of interest and although the proposed Life of Mine (LoM) is estimated at 50 years, the mine's layout plan suggests that the project might even run for the next 100 years.



Figure 1.1: The site location of the proposed Balama Graphite Mine [Map reference: CES, 2013]

The mining site is encircled by four villages, namely Nquide, Ntete, Maputo (formerly known as Mualia) and Pirira. Together with the town of Balama, these are referred to as the mine's direct Project-Affected Communities (PACs), although more villages and towns might benefit from the project in terms of employment and social development. To the east, the town of Montepuez is the area's main economic centre (around 45-50km from the mine). The road from Montepuez to the mine is a gravel road, which is being upgraded to tarmac road (Road 203), which is being maintained by the Government of Mozambique (GoM).

The mine is to be developed mostly on cultivated agricultural landholdings (hereon called "machambas", as these are commonly referred to in Mozambique), belonging to farmers living in the PACs who hold the land under a traditional land tenure system. In addition to economic trees (i.e. planted, productive trees), some of these machambas also have secondary structures on them. Such structures can be defined as structures that are usually more temporary in nature, covering a range of different structure types; from agriculture-related sheds, grain storage buildings, shading or temporary resting houses.None of the affected machamba owners or any of

their household members live on their farms, as they all live within villages. Thus there will be no physical resettlement of households.

Several grave sites and some self-constructed boreholes have also been identified on some of the landholdings. No communal livestock grazing areaswere identified, although some sacred sites were recorded on communal, uncultivated woodlots. However, there is the possibility that the project might affect future community access to natural resources and cultural heritage held under communal land.

Ten homestead landholdings (i.e. fenced living areas with primary structures used as living houses) have been recorded next to the main access road through Pirira. It is not anticipated for any of these households to be physically resettled, as the main access road through this village will bypass any homestead. However, in future, should some of these households (or any other households) need to be relocated as the road is widened, the proponent shall draft and implement a separate Entitlement Framework specifically for these households to be approved by the District Administrator prior to any resettlement or associate compensation payments.

Under the Mozambique Environmental Impact Assessment (EIA) process, regulated by Decree No. 45/2004 (as well as its amendment through the Decree 42/2008 of November 4), the project required an Environmental, Social and Health Impact Assessment (ESHIA). Such an ESHIA is currently being conducted by EOH Coastal & Environmental Services (CES). As the proponent will also apply international good practice for the environmental and social management aspects of the project, the ESHIA meets the standards of the International Finance Corporation (IFC).

Economic displacement is triggered by the project. This refers to any, "[I]oss of income streams or means of livelihood resulting from land acquisition or obstructed access to resources" (IFC, 2002:p.ix). For such displacement, a Resettlement Action Plan (RAP) had to be drafted as part of the ESHIA process under the Mozambique's Regulations on the Resettlement Process resulting from Economic Activities (Decree No 31/2012 of 8 August). A RAP is also required under Performance Standard (PS) 5 of the IFC - Land Acquisition and Involuntary Resettlement (IFC, 2012).

1.2 Project Site Location and Area of Influence

Several project infrastructural layout plans were drafted by the proponent during the course of the ESHIA and RAP processes in order to minimise the disturbance of land and economic displacement. Through the RAP process in particular, GPS positions of possible affected landholdings (mostly machambas), sacred and grave sites were continuously provided to the proponent during 2013/2014, after which new layout plans were drafted in order to minimise human disturbance as far as possible.

An updated mine infrastructural layout plan (as at August 2014) is provided in Figure 1.2. Illustrating how the layouts changed in order to minimise human disturbance, previous mine layout plans are attached to this report as Appendix 1. This entire mining site is hereafter referred to as the mine's Area of Influence (AoI). The mine will be constructed in several phases, with the first construction phase (Stage 1 Priority Area) anticipated to commence in late 2014 or 2015. The first construction area will possibly include the eastern pit, processing area, haul road, camp site and access road to the site through Pirira (this is elaborated upon under Section 5).



5

Figure 1.2: Project infrastructural layout as at August 2014

Based upon the position of the key project infrastructure, EOH CES demarcated a study area using an estimated 30m buffer zone around the proposed infrastructure and access road. Such a buffer area was deemed adequate in terms of accounting for damage that might be caused by the construction and operations of these facilities, as well as seen to be an adequate safety barrier. Most of the landholdings inside this boundary area (mostly machambas) have been assessed for possible economic displacement in 2013 and 2014. The term "most" is used as some machambas owners were not in the area during the survey periods. Machambas which have been missed during these periods will be identified and assessed during the RAP's implementation phase, as well as dealt with through the established Grievance Mechanism.

1.2 The Mining Process

The project's activities can be summarised in Table 1.1 below [for a detailed project overview, refer to the Environmental, Social and Health Impact Assessment (ESHIA) Report]:

Developer	Syrah Resources Limited and Twigg Exploration & Mining Lda.
Project Location	Cabo Delgado Province in the Balama District in northern Mozambique
Project Activities	 Conventional open pit mining will be used to extract the ore; Water for this process will be acquired from the Chipembe Dam; Ore will be delivered from the mine onto stockpiles at the processing plant using haul trucks; and Once the Graphite and possibly Vanadium concentrates have been produced, this will be transported by road to Pemba where a deep water port is located.
Proposed Project Infrastructure	 A pipeline from the Chipembe Dam to the project site; Pump houses at the dam and project site; Water reservoirs at the project site; Offices and accommodation at the project site to accommodate some workers (the number of workers still needs to be finalised); A diesel powered electricity generation plant (making provision for a grid-power connection as well); An ore processing plant; Additional infrastructure such as roads; and A Tailings Storage Facility (TSF) and a waste rock dump will be required.
Key Product	 Graphite and possibly Vanadium

Table 1.1: Project Details

Conventional open pit mining is planned for the operation in order to extract the graphite ore. To extract the graphite (and possibly vanadium as well), conventional flotation processing will be undertaken. The water for this process will be acquired from the Chipembe Dam, a process which will require a pipeline to this dam. The servitude line for this pipeline has not been covered by this RAP. A separate machamba asset inventory exercise and resulting Entitlement Framework should be conducted and drafted to be approved by the District Administrator prior to any economic displacement brought along by such a servitude line.

1.3 Project Rationale and Objectives

The project is aligned with the GoM's aims to develop the country's mining industry. To illustrate, the Government has granted more than 2.5 million ha of land to mining concession companies between 2004 and 2009 (CARE, 2013). In addition, the mining sector was also boosted in 2013 when the president of Mozambique entered into an agreement with Australia to develop the mining sector (Cambell, 2013). Through this agreement, the two countries are committed to increase mining-related trade and investment in Mozambique, which will include the development of much-
needed infrastructure for various regions such as Balama (*ibid*.). The mining sector is therefore expanding in the region and this is intended to provide a range of employment opportunities in the future.

Apart from boosting Mozambique's mining potential, one rationale of the project is also to support and improve the area's Socio-Economic Development (SED). This should mostly be realised through employment provision. According to the proponent, at full capacity, the mine should be able to provide full-time employment opportunities to around 180 plantworkers and approximately 50 general mining-related workers (some of whom will be employed on a temporary basis). Of the plant workers, there will be a number of specialist roles that will require qualified local personnel to be trained over time. During the construction phase of the mine, local labour will be used wherever possible. However, is should be noted that both the construction and operational phases of the project require skilled people who have prior knowledge with regard to mining operations. This reality cannot be avoided, as mine work is highly specialised and potentially dangerous as well. Therefore, proper training and apprenticeships will be created to ensure that, as far as reasonably possible, the local labour force can be trained to be skilled or semi-skilled in mining operations.

Some of the broader objectives of this project are as follows:

- > To build and add value to the country's mining industry;
- To diversify the income-earning opportunities of the local people who are currently predominantly dependant on agricultural production alone;
- To create socially, economically and environmentally sustainable development in these regions;
- > To provide basic social services; and
- > To create and promote opportunities for women to play an equal role in rural industries.

1.4 Potential Impacts of the Project and Economic Displacement

1.4.1 Potential Project Impacts

The Social Impact Assessment (SIA) conducted of the project (CES, 2013a) identified a range of socio-economic impacts. Some of the most important impacts that bear relevance to this RAP are presented in Table 1.2 below.

lssue nr	Issue	Impact	Addressed
	Land Acquisition	1.1 Reduced Access to Agricultural Land	These issues are addressed in this report
		1.2 Increased Food Insecurity	
1		1.3 Reduced Access to Natural Resources	
		1.4 Loss of Sites for Cultural	
		Practices	
		1.5 Loss of	
		Graveyards/Cemeteries	
2	Community Safety Risk		Addressed in the SIA (Issue 2) with recommendations, such as for the proponent to sign an agreement with a private security company to be used allowing for specific community safeguarding requirements as per the IFC PS 4.

Table 1.2: Socio-economic impacts and issues identified during the Social Impact Assessment process

lssue nr	Issue Impact		Addressed
3	Employment Opportunities and the Stimulation of Economic Growth 3.2 Temporary or Permanent In- Migration by Outsiders in Search of Job Opportunities		Addressed in the SIA (Issue 3) with sufficient requirements for Human Resources (HRs) policies to meet Mozambique regulations and the standards of the International Labour Organisation (ILO) Addressed in the SIA (Issue 3) by requiring the proponent to develop and implement a Labour Recruitment and Influx Management Plan.
4	Stakeholder Engagement		Addressed in the SIA (Issue 4) by referring to the Stakeholder Engagement Plan (SEP) which has already been drafted for the proponent by EOH CES

1.4.2 Asset Inventory for Possible Economic Displacement

The mine's Aol was assessed during five site visits undertaken in 2013/2014 (refer to Table 4.2). Table 1.3 below lists all the landholdings assessed up and until August 2014, mapped in Figure 1.3 andfigures6.1-6.3. Included in the table are the number of structures, number of grave, borehole and sacred sites identified (shown in Figure 1.4), as well as the number and different types of economic trees. Appendix 2 provides the GPS positions of the gravesites, boreholes and scared sites. Section 7 of the report interprets the table with an entitlement framework.

|--|

Item	Types		Number	Entitlement Framework
Landholdings	Homesteads		10 (total size: 2.41ha)	Refer to Section 6.3.3
(refer to Figure 1.3 and figures	Machambas		667 (total size: 1,086.31ha)	
6.1-6.3)	Affe	cted farmers	588	
		Storehouses	21	
	Secondary	Resting huts	18	Refer to section
Structures	structures	Temporary kitchen huts	4	7.3.5
		Sheds	163	
Number of identified grave sites (refer to Figure 1.4)			58	Refer to Section
Number boreholes (refer to Figure 1.4)		2	7.3.7	
Number of sacred sites (refer to Figure 1.4)		5		
	Banana		3886	Refer to Section 7.3.4
	Mango		3369	
	Cashew		1689	
	Orange		78	
E	Рарауа		61	
Economic trees	Moringa		12	
	Coconut		10	
	Lemon		10	
	Breadfruit		4	
	Alteira (type of tree to be verified)		2	

9



Figure 1.3: Assessed Machambas inside the Mine's Area of Influence (AoI)

EÓH				
EOH Coastal and Environmental Services				
Linvironinientai Services				
Drawn by: Justin Green				
Date: 16.09.2014				
CES Project Code: 178				
0 0.35 0.7 1.05 Kilometers				
TITLE:				
Machambas in the Project Area				
PROJECT:				
Syrah Balama Graphite Project RAP				
Legend				
Camp Site				
Waste Dump				
Stage 1				
Blast Exclusion Zone				
Balama East				
Balama West				
ROM PAD				
Plant Site				
Future Plant				
Raw Water Pond				
Plant Contamination Pool				
Conservation				
Homestead Resettlement				
Machambas				



Figure 1.4: Identified grave, borehole and sacred sites

		EQH		
7	E	EOH Coastal and Invironmental Services		
	Drawn by: Justin Green			
NY.	Date: 1	6.09.2014		
	CES Pr	oject Code: 178		
	0	0.35 0.7 1.05		
		TITLE:		
	Fir	nal Graves, Boreholes & Sacred Sites		
		PROJECT:		
PLATE A	G	Syrah Balama Graphite Project RAP		
	Lege	end		
		Lease Boundary		
		Camp Site		
		TSF		
		Waste Dump		
-		Stage 1		
1		Blast Exclusion Zone		
	(11)	Balama East		
		Balama West		
		ROM PAD		
		Plant Site		
		Future Plant		
		Raw Water Pond		
		Plant Contamination Pool		
		Conservation		
		Sacred Sites		
		Wells		
		Grave Sites		
「大学				
ちと				
03				

1.5 Resettlement Action Plan Objectives

Involuntary resettlement can be defined as any resettlement that occurs, "[...] without the informed consent of the displaced persons or if they give their consent without having the power to refuse resettlement" (IFC, 2002:p.ix). Encapsulated under the term "resettlement" is either physical household resettlement, or economic displacement. Physical household resettlement refers to physically moving households from one location to another. Economic displacement refers to a scenario where households and/or individuals lose access to assets such as land, trees or livestock which enabled them to derive an income from it. Economic displacement also refers to the loss of access to resources, such as land, water or forests (*inter alia*).

By reflecting upon past resettlement cases in Mozambique (refer to Chapter 3), this RAP equips the proponent with strategies to improve the livelihoods of the PACs and PAP in the following ways:

- I. To achieve compensation rates (as well as separate assistance allowances) that are agreed upon by all the parties (the PAP, the proponent and the relevant government authorities) involved in the process;
- II. In addition to compensation, to ensure that those affected receive alternative land of the same value, or with the same productive potential, with new fields that can be adequately prepared for beneficiary farmers by the proponent during the land acquisition period;
- III. To ensure that those affected can continue with their farming practices on their new land and at the previous level of cultivation;
- IV. To reduce the levels of social stress normally associated with any displacement process; stresses which can lead to morbidity (especially amongst the young and elderly) and psychological trauma;
- V. Warranting that access to natural resources is, as far as reasonably possible, not impeded; and
- VI. Above all, to ensure that no farmer and/or household to be affected suffers from food insecurity as a consequence of economic displacement.

1.6 Resettlement Action Plan Study Team

The following members comprised the social team for this RAP process:

Name	Position	Qualification and Experience
Mr Dinis Napido	Twigg Exploration & Mining Lda. Country Manager	Dinis has 25 years" experience in minerals and resources as an exploration geologist. He has worked specifically in gold, precious and base metals, as well as industrial mineral mining. Previous roles include leading exploration campaigns as project geologist and exploration management. Dinis has a strong foundation of knowledge regarding the mining industry in Mozambique, policies and regulations, and many connections within the local Mozambique community.
Mr Cabral Mutiquinhene	Twigg Exploration & Mining Lda. Senior Administration Manage.	Mr Mutiquinhene has a degree in Management and Program Development, whilst in the process of obtaining a degree in Human Resource Management. Currently, he is working for Twigg Exploration and Mining as a Senior Administration Manager. He has over 12 years of experience distributed in the program management and operation fields, including finance, human resources, payroll, logistics and procurement and community project development.
Mr Célio Panquene	Twigg Exploration & Mining Lda. Community	Mr Célio Panquene holds Bachelor degree from the Faculty of Arts and Social Sciences, Eduardo Mondlane University (UEM), Mozambique. He also holds Professional Master's Degree in Sustainable Development Practice from the Federal Rural University

Table 1.4: Resettlement Action Plan (RAP) Study Team

Name Position Qualification and Experience		Qualification and Experience
	Development Officer	of Rio de Janeiro (UFRRJ), Brazil. He lectured in various universities in Mozambique. He also carried out field work and researches on community development issues, both in Mozambique and in Brazil. Mr. Célio Panquene is currently Community Development Officer at Twigg Explorations & Mining Ltd.
Dr AM Ted Avis (CES Managing Director)	Study Leader	Dr Avis holds BSc, BSc (Hons) and PhD degrees in Botany from Rhodes University in South Africa. He has worked as a professional environmental and social consultant for more than 20 years, and is an internationally recognised expert in these fields. He has project managed numerous large-scale Environmental Impact Assessments (EIAs) to World Bank and IFC standards in African countries, and a number of Strategic Environmental Assessments (SEAs) for a range of government, parastatal and private clients in South Africa. He has been the principal environmental/lead consultant for several very large mineral mining developments in a number of African countries, including the Corridor Sands (Chibuto) and Moma projects in Mozambique, Toliara Sands in Madagascar, Tiomin Mineral Sands in Kenya, El Burullus in Egypt, and the Trident Copper Mine in Zambia. He has also managed integrated environmental studies of similar scope in Malawi and elsewhere in Africa. Moreover, Dr Avis provides professional courses in EIAs at Rhodes University, where he is also an honorary senior lecturer in the Environmental Science Programme. He has published extensively in the field of EIA, and has been a principal of CES and managing director since its inception.
Mr Jan Anton Hough (CES Social Scientist)	Project Manager & Principal Report Writer [Social Scientist]	Jan Anton Hough is a social scientist primarily involved in social baseline studies, SIAs, Social Management Plans, RAPs and social due diligence gap-analysis. His academic qualifications and accomplishments include an MA (Sociology) obtained from the University of Stellenbosch in South Africa, and two published ISI-listed academic publications in Social Dynamics and The South African Geographical Journal, followed by one forthcoming manuscript currently being reviewed in the South Africa Journal of Science. In CES, some of the projects which he has been involved in to date include a RAP for Equatorial Palm Oil in Liberia, an SIA for Samshi Africa Limited in Sierra Leone and social due diligence gap-analysis in accordance with the Performance Standards of the IFC. Prior to his work at CES he gained experience as a social scientist in the mining and community development sectors, but also the socio-environmental arena; in which latter connection he has published web-based articles on socio-environmental concern in Africa.
Mr Lungisa Bosman (CES Social Scientist)	Social Scientist &	Mr Bosman holds a Bachelor of Social Science (1993) from U.C.T, with majors in Public Administration & Sociology, and a Post Graduate Diploma in Organisation and Management. Over the past five years Lungisa has gained considerable experience in social facilitation and community education. He is currently working full-time as a consultant for Coastal & Environmental Services involved in a number of Impact Assessments, and particularly in the co-ordination and facilitation of the public participation process, and stakeholder engagement and management. Some of the projects where he has brought his facilitation skills to bear include the ADM and Chris Hani State of Environment studies, the Coffee Bay tourism development viability studies, and numerous EIAs and scoping studies. His mother tongue is isiXhosa.
Ms Carina Saranga (CES Administrative Assistance in Mozambique)	Social Scientist, Community Liaison & Translator	Ms Carina Saranga holds a B.Sc. Degree in Law with majors in Public Law (2011), obtained at St. Tomas University in Mozambique. She is currently finalising her B.Sc. Honours thesis studying the "Complexity of the Resettlement Process in Mozambique". Carina joined CES in 2013 where she is involved in the preparation and coordination of the public participation process, as well as in field survey and coordination of resettlement projects. Prior to that, she worked as a public participation assistant liaising with a variety of stakeholders.

1.7 Report Structure

The report was drafted to adhere strictly to Mozambique's Regulation on the Resettlement Process Resulting from Economic Activities (Decree 31 of 2012). According to these regulations, the following sections should be included in this report (GoM, 2012:p.14):

- I. An analysis of the socio-economic profile of the affected households;
- II. An evaluation and analysis of the tangible and intangible goods;
- III. A well-defined definition of the degree of displacement/resettlement and the methods employed to study the affected population;
- IV. Definition of the compensation criteria;
- V. A presentation of the solutions and technical alternatives to enable the improvement of households" current living standard of the affected households.

In addition, the IFC PS 5 on Land Acquisition and Involuntary Resettlement was used to supplement the report with resettlement good practice guidelines to enable the report to be a more comprehensive tool for implementation.

This report is structured as follows.

Chapter 1 highlighted the proposed project, followed by the project rationale. The RAP study team was also introduced.

Chapter 2 commences by outlining the displacement-related legislation, policies and guidelines that need to be assessed and followed by the proposed project.

Chapter 3 provides details on the stakeholder engagement that was conducted as part of this RAP. The chapter also elaborates upon the methodology that was employed to draft the report, as well as providesguidelines for the proponent to use throughout the implementation of the displacement process.

Chapter 4 includes the identification of project impacts and the affected population. Largely, this chapter provides the census data of the Socio-Economic Baseline Study (SEBS) and landholding assessments conducted inside the mine's Aol.

Chapter 5 draws upon the previous chapter to define the affected farmers and expected losses.

Chapter 6 contains measures for restoring and improving the livelihoods of the affected people.

Chapter 7 provides a compensation and entitlement framework by providing a method for valuing assets. Such assets include crops, trees, structures and/or communal resources (amongst others).

Chapter 8 elaborates upon Chapter 7 by providing a mechanism for the implementation of the RAP and the delivery of household entitlements.

Chapter 9 equips the proponent with strategies to monitor and evaluate the outcomes of this RAP process, such as to undertake future re-validation surveys, socio-economic surveys, a longitudinal (i.e. over a long period) nutritional study and external evaluation.

Chapter 10 provides an estimated budget for the implementation of the RAP.

Chapter 11 concludes the report.

2. LEGAL FRAMEWORK

2.1 Introduction

The following chapter provides an overview of the most relevant Mozambique legislation, as well as international standards, guidelines and frameworks that are deemed relevant to this RAP. The following legislation is discussed in this chapter:

Table 2.1: Legal Framework

Mozambique Legislation			
Legislation and Regulations	Date of Enactment (or amendment)		
Constitution of the Republic of Mozambique	Enacted in 2004		
Regulations on the Resettlement Process resulting from Economic Activities	Decree 31/2012		
National Heritage Protection Law of 1988	Decree 10/1988		
Mining Act	Law 13/2002		
Mining Law Regulations	Ministerial Decree 28/2003		
Land Act	Law 19/1997		
Land Act Regulations	Decree 1/2003		
International Frameworks and Guidelines			
Frameworks and Guidelines	Date of Enactment (or Amendment)		
World Bank's Operational Procedure 4.12 On Involuntary Resettlement	2013		
International Finance Corporation Performance Standards 5 and 8	2012		

It should be noted that only the legislation, frameworks and guidelines relevant to resettlement are considered in this chapter. The SIA considered a wider range of relevant policies, frameworks and guidelines that pertain to the overall social considerations of the project (*cf.* CES, 2013a).

2.2 The Resettlement Action Plan Process in Mozambique

According to Mozambique's Regulations on the Resettlement Process Resulting from Economic Activities (2012), the approval and implementation of a RAP precedes the issuance of an Environmental Permit from Mozambique's Ministry of Environmental Coordination (*Ministério para a Coordenação da Acção Ambiental*, or MICOA). Figure 2.1 below provides a diagram that illustrates where the RAP fits into the EIA process, according to Mozambique's Mining Act of 2002 and Mining Law Regulations (2003).



Figure 2.1: The Resettlement Action Plan (RAP) process in Mozambique

As explained in Figure 2.1 above, the RAP process is normally conducted in parallel with the EIA. However, the RAP report is submitted and approved at the District Government-level, whereas the EIA is approved by MICOA at provincial-level. Therefore a final RAP report (in Portuguese) is delivered to MICOA as an annexure of the EIA study, whilst four copies of the report should also be delivered to the National Directorate of Territorial Planning and Organisation (DINAPOT), a division of MICOA.

2.3 Mozambican Legislation

2.3.1

Constitution of the Republic of Mozambique of 2004

The first piece of legislation in Mozambique that deals with the rights of each Mozambican is the country's constitution of 2004.

The Constitution of Mozambique embodies the new democratic rule of the country, and recognises its independence as well as the challenges it faces after the civil war. It lays down the structural parameters for the country's growth and modernisation, and reaffirms the participation of organisations to ensure and respect the fundamental rights and liberties of the country's citizens. Of particular importance to this RAP are Mozambicans' fundamental rights, duties and freedoms. Here, each citizen's rights are promoted, as well as the rights of communities, and especially children. The freedom of expression is also enshrined, which basically means that every person affected by the project has the right to express their opposition to the development, and to voice

his/her concern. This is especially relevant during the RAP process, as it means that all the PAPs need to be able to express their issues and/or concern with the project.

The Constitution also formulates principles of fair compensation if land is expropriated. On Economic, Social and Cultural Rights and Duties (Chapter V), the Constitution clearly elucidates that:

"The State shall recognise and guarantee the right of ownership of property", and "Expropriation may take place only for reasons of public necessity, utility, or interest, as defined in the terms of the law, and subject to payment of fair compensation"

(GoM, 2004: p.26)

Under Article 90 of Chapter V, the importance of protecting the environment and the rational use of natural resources are also highlighted. Alongside this clause is also the constitution's emphasis on the agricultural sector, which the GoM sees as the basis for the country's national development. In support of this, Article 106 of Chapter V also recognises the contribution of small-scale production to the national economy, which the country promotes and supports in order to develop its citizens.

2.3.2 Regulations on the Resettlement Process resulting from Economic Activities

Mozambique's Regulations on the Resettlement Process resulting from Economic Activities were passed in 2012. The regulations consist of 28 articles which basically formulate the procedures for any resettlement in Mozambique, and especially articulate the assistance required from government during a resettlement process. This legislation was the basis upon which this RAP and the community engagement procedures were built and structured. These regulations were also used by the social team to inform the PACs of their rights with regard to economic displacement, as outlined under articles 10 and 14. Although all the regulations are highly relevant to the project at hand, the following articles were used to structure most of the RAP procedures at community level:

> Articles 6 and 7: A Technical Committee

Any resettlement project in Mozambique needs to be enacted and driven through an establishedtechnical resettlement committee/commission which comprises of various representatives from a selection of government bodies and local representatives. Specific functions are assigned to this committee/commission, all of which allowthe government, through this committee, to be at the centre of the resettlement project and decisions which have to be made. This commission has already been established in the Balama District, referred to as the District Resettlement Commission.

Articles 8

The following stakeholders should participate in the resettlement process (for which purposes the Balama Technical Working Group, or TWG, was established):

- Five representatives of the affected population;
- One representative of Civil Society;
- Three community leaders; and
- Two representatives of the private sector.
- > Articles 10 and 14: The Rights of the Affected Population and Right of Information

In EOH CES" experience, it is of pivotal importance for a resettlement project to articulate the constitutional rights of those affected, through the medium of public meetings. Having knowledge of one"s own rights is vital, as this enables PAP to voice their concerns and/or issues during the process (as they then know how to do so). Article 10 lays down some basic, fundamental human

rights as these pertain specifically to resettlement. These rights are elaborated upon under Article 14. Some of the most important rights include people's rights to:

- "Have re-established their income level, to equal or higher than that before the resettlement;
- Have restored their living standard to equal or higher than before the resettlement;
- Have space to perform their subsistence activities; and
- Give opinion in the whole resettlement process" (2012:p.5).
- > Article 12: Responsibilities of Central and Local Levels of Government

Article 12 delineates the responsibilities of central and local government. Some of these responsibilities include the Land-Use Planning Sector's responsibility to provide technical assistance to the implementation in matters related to land-use planning, as well as to monitor the resettlement process.

> Articles 13 and 22: Public Participation and Consultation

Public participation is central to the success of a resettlement project. Both these articles articulate specific requirements which this RAP should adhere to in this regard.

2.3.3 National Heritage Protection Law of 1988

The project might affect and/or disturb areas of cultural significance, such as some grave sites. Therefore, the National Heritage Law of 1988 is applicable. Furthermore, in terms of cultural heritage, the Regulations on the Protection of Archaeological Heritage Property (1994) state that the Ministry must be consulted in the event where archaeological material is found in the project"s Aol. No archaeological material was found inside the mine"s Aol.

2.3.4 Mining Act of 2002

The Mining Act of 2002 exercises rights and obligations with regard to the use of the country's minerals resources. The Act takes into account the environment in such a way as to see to its rational utilisation for benefiting the national economy. Underwritten by the Act are principles that govern safe mining practices, regulatory frameworks for monitoring environmental quality, as well as measures to enhance sustainable development in the long-term, in light of exploring Mozambique's natural resources. Of particular importance is Article 18, under the Title Holder Obligations, which states that the project developer will compensate land users for "[...] any damage caused to the land and property as a result of the mining operations" (GoM, 2002: p.10).

In addition, the Act provides authority for the Land Act No 19/97 to govern all land-use and occupancy matters as related to the mining activity.

2.3.5 Mining Law Regulations of 2003

The Mining Law Regulations of 2003 were established to regulate any mining activity that falls under the Mining Act of 2002. The regulations consider the granting of mining titles and permits and the demarcation of mining areas. Of importance to this RAP is the fact that the regulations also make allowance for any party to lay a claim against the mining development.

2.3.6 The Land Act No 19/97 and Decree No 66/98

The project will affect customary land, meaning that the Land Act of 1997 is applicable. The law provides the legal framework for land ownership, as well as the control of land and natural resources in Mozambique. The process of determining land rights is also explained by this law.

The law was created with the intention of encouraging the use and benefit of land, such that it contributes to the development of the national economy. The law establishes the terms under which all activities - relating to the right of land-use and benefits - operate (Article 2). It provides the basis for defining people's land-use rights, and gives details on these rights based upon customary claims and the procedures for the acquisition of title for use and benefits by communities and individuals. The law recommends a consultation-based process that recognises customary rights as the means for identifying the claims of communities and individual members of communities without title.

Article 24 identifies that, in rural areas, local communities need to participate in:

- a) The management of natural resources;
- b) The resolution of conflicts;
- c) The process of obtaining title as established in No. 3, of Article 13 of the Land Law; and
- d) The identification and definition of the boundaries of the land they occupy.

In the first two activities (a and b), local communities rely on, among others, customary practices.

The Land Law also defines that the right to use land may be acquired through occupation by Mozambican individuals who have been using the land in good faith for at least ten years. The law therefore recognises and protects the rights of individuals to land acquired through inheritance or occupation (customary tenure), except in legally defined reserves or areas where land has been legally transferred to another person or body. All citizens have equal rights and duties according to the law.

Existing rights to use land may be terminated through revocation of such rights for reasons of public interest, after the payment of fair compensation, in which case the non-removable improvements will revert to the state.

Foreign individuals or corporate persons may be holders of a right to land-use and benefit, provided they have an investment project that is approved under the investment legislation and they are established or registered under the GoM (Article 11). Total and partial protection zones are part of the public domain, and no right of land-use or benefit can be obtained in these areas (Articles 7 and 9). Total protection zones include those areas specifically intended for conservation or preservation activities, whilst access to partial protection zones requires special licenses, which may be issued for specified activities.

For the purposes of economic activities, the right of land-use and benefit is subject to a maximum period of 50 years, which can be renewed for an additional 50 years (Article 17). The approval of an application for the right of land-use and benefit for economic activities does not preclude the need for licensing and authorisation required by:

- a) The legislation relevant to the intended economic activity (e.g. tourism); and
- b) Directives of land-use plans (Article 20).

Right to land-use and benefit applications are authorised by provincial governors for areas up to 1,000ha, by the Minister of Agriculture and Rural Development for areas between 1,000 to 10,000ha, and by the Council of Ministers for areas exceeding 10,000ha (Article 22).

Provisional authorisation is granted after the submission of an application for land-use and benefit. This provisional authorisation is valid for a maximum of five years in the case of nationals, and two years in the case of foreigners (Article 25). Upon fulfilment of the exploitation plan within the provisional period, final authorisation will be given and the relevant title issued (Article 26).

2.3.7 Land Law Regulations (2003)

The Land Law Regulations (Decree 66/1998) apply to all areas outside of municipal jurisdiction. According to the regulations, the construction of any type of structure within the partial protection zone shall be licensed by the entities responsible for the management of inland and maritime waters (Article 8).

In accordance with Article 18, the right of land-use and benefit obtained for the fulfilment of an investment project shall have a maximum term of 50 years, renewable in accordance with the provisions of the Land Law and the terms of renewal of the authorisation. A titleholder is required to apply for renewal 12 months before the end of the term fixed in the title, demonstrating that the economic activity which the title was applied for is still being carried out.

Relevant aspects of the regulations include:

- a) Where there is joint title, such title belongs to all the titleholders equally. When one of the titleholders dies, the other holders continue as the rightful titleholders;
- b) Consultations between the applicants for land and the local community are mandatory before a decision to grant title use is made by the provincial governor or higher authority;
- c) Good faith occupiers and local communities may apply for demarcation and title; and
- d) Titleholders are required to pay a tax for authorisation of the right to use land, plus an annual tax. Family businesses and local communities are exempt from such taxes.

Article 24 states that, in order to acquire a right of land-use and benefit, an application under authorisation must be submitted including the following information:

- a) Articles of association (in the case of a corporate person);
- b) A sketch of the location of the land;
- c) The descriptive report of the project;
- d) An approximation of the nature and size (footprint) of the development the applicant proposes to undertake;
- e) The opinion of the district administrator, after consultation with the local community;
- f) A public notice, and verification that such a notice has been displayed in the headquarters of the relevant district and at the location itself, for a period of 30 days; and
- g) A receipt of proof of payment of the provisional authorisation fee.

Additionally, where land is intended for economic activity, the application must also contain an exploitation plan and technical opinion thereof. In the case of private investment projects, the land is subject to prior identification, which must involve (*inter alia*) the local administrative authorities, and the local community, and must be documented in the sketch and descriptive report (Article 25).

According to Article 28, in cases where the governor of the province is the competent authority, once the application process is complete, the Cadastre Services will submit the proposal to the governor of the province for a decision. In all other cases the application form will be sent to the central Cadastre Services after review by the governor of the province, who will submit it to the competent authority for decision. The authorisation granted here will be temporary, valid for five years in the case of Mozambican nationals, and two years in the case of foreigners.

Once the term of the provisional authorisation has expired, or at the request of the applicant, an inspection will be conducted to ascertain whether the proposed activity is in agreement with the approved schedule. Once this has been established, a definitive authorisation and accompanying title of the use and benefit of land will be issued (Article 31).

Lastly, Article 3 of the Technical Annex to the Land Law Regulations states that the delineation of areas occupied by local communities will not prevent economic or other activities from being conducted, provided that consent is obtained from the communities. It is essential that the local

community be actively involved and consulted in the demarcation process. The Technical Annex also provides forms to be completed and submitted as part of this participatory demarcation process.

2.4 International Guidelines

2.4.1 Overview

The proponent wishes for this report to following and be guided by international good industry practice standards. In so-doing, the report has been guided by the World Bank's Operational Procedure 4.12 on Involuntary Resettlement (2013), and the IFC PS 5 on Land Acquisition and Involuntary Resettlement (2012).

2.4.2 The World Bank's Operational Procedure 4.12 on Involuntary Resettlement

The World Bank is an international funding organisation, which lends money to governments. As the first international agency to develop resettlement guidelines, its guidelines have been enormously influential on those subsequently developed by other agencies, such as the IFC (an arm of the World Bank group) and the African Development Bank. – both of whom are relevant to this project. The World Bank's Operational Procedure (OP) 4.12 on Involuntary Resettlement was revised in April 2013 (*cf.* World Bank, 2013b). The guidelines contained therein are deemed highly important to this project, such as the Bank's emphasis on developing those affected communities, as opposed to simply mitigating negative project-induced and resettlement-related impacts: "Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs" (*ibid.*: p.1).

Although all the guidelines are applicable, those deemed most relevant to this project are fleshedout in Table 2.2below.

Applicable Principles	Key Objectives
	Involuntary resettlement should be avoided where feasible, or minimised, exploring all viable alternative project designs
	Where it is not feasible to avoid resettlement, resettlement activities should
Aveiding Depottlement	be conceived and executed as sustainable development programs,
Avoiding Resettlement	providing sufficient investment resources to enable the persons displaced
	by the project to share in project benefits.
	Displaced persons should be assisted in their effort to improve their
	livelihoods and standards of living, or at least to restore these
	The resettlement project should include measures aimed at informing
Information and Consultation	those affected about their options and rights pertaining to resettlement.
	Those affected should also be offered choices among, and provided with
	technical and economically feasible resettlement alternatives.
	The resettlement project shall ensure that those affected are provided with
	assistance with agricultural sites for which a combination of productive
Assistance with Relocation	potential, locational advantages and other factors are at least equivalent to
(Transitional Support)	the advantages of the old farms which they have lost.
(· · · · · · · · · · · · · · · · · · ·	Support shall be offered after displacement, and development assistance
	provided in addition to compensation measures. This might include land
	preparation, credit facilities, training or job opportunities.
	Where the borrower has explored all viable alternative project designs to
	avoid physical displacement, preference should be given to land-based
	resettlement strategies that are compatible with PACs" cultural
Land-Based Strategies	preterences.
	Alternative land should:
	Contain a combination of productive potential and location
	advantages; and

 Table 2.2: The World Bank's Operational Procedure 4.12 (2013 amendment)*

Applicable Principles	Key Objectives
	Be at least equivalent to the advantages of the land which has been lost.
Compensation before Project Development	The implementation of resettlement activities should be linked to the implementation of the investment component of the project to ensure that displacement or restriction of access does not occur before necessary measures for resettlement, including that compensation has been paid, are in place.

* Table information: de Wet, 2013: pp. 27-36.

2.4.3 The International Finance Corporation

As a member of the World Bank group, the IFC seeks to promote development in "developing" countries by making funding available through the private sector. The IFC published its PS on Environmental and Social Sustainability in April 2006, and published comprehensive Guidance Notes (GNs) in July 2007. The PS and GNs have been revised in 2012 (*cf.* IFC, 2012). These PS are as follows:

- PS 1: Assessment and management of environmental and social risks and impacts (1-36)
- PS 2: Labour and Working Conditions (1-29)
- PS 3: Resource efficiency and pollution prevention (1-17)
- PS 4: Community Health, Safety and Security (1-14)
- PS 5: Land Acquisition and Involuntary Resettlement (1-32)
- PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (1-30)
- PS 7: Indigenous Peoples (1-22)
- PS 8: Cultural Heritage (1-16)

Although most of these PS are indeed highly applicable to this RAP, PS 5 and 8 bear the most relevance. Table 2.3 below outlines the guidelines under each:

Table 2.3: Interna	ational Finance Corr	poration Performance	Standard Objectives
TUDIC L.C. Interna			

Performance Standard	Main Objectives
PS 5: Land Acquisition and Involuntary Resettlement	 Avoid or at least minimise involuntary resettlement wherever feasible by exploring alternative project designs and layouts; Mitigate adverse social and economic impacts from land requisition or restrictions on affected persons" use of land by: (i) Providing compensation for loss of assets at replacement cost; and (ii) Ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected; Improve or at least restore the livelihoods and standards of living of displaced persons; Improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites; and Where livelihoods of those who will be displaced are land-based, the proponent will offer land-based compensation, where feasible.
PS 8: Cultural Heritage	 Protect cultural heritage from adverse impacts of project activities and support its preservation; and Promote the equitable sharing of benefits from the use of cultural beritage in business activities

3. RESETTLEMENT ACTION PLAN PRINCIPLES

3.1 Introduction

Development ultimately presents a dilemma, as development should theoreticallyenhance people's access to resources and their quality of life (de Wet, 2013). Yet, involuntary resettlement is often necessary for any development project; the act of which can not only socially uproot settlements and households, but also their access to resources and quality of life. This is not to argue that a project should not be developed, but emphasises the point that appropriate mitigation measures and economic development initiatives are needed if resettlement is required. Therefore, designing a RAP process for implementation needs to be based upon theoretical parameters and principles. Such principles should provide the basic foundations of any resettlement programme, feeding into the objectives of the report and, ultimately, the desired outcomes post-resettlement.

A useful way to frame such principles is to reflect upon past resettlement cases closer to the project at hand. Unfortunately, it is no secret that many past resettlement projects, specifically in northern Mozambique, have been critiqued by some academics and Non-Governmental Organisations (NGOs), based upon concerns expressed by the resettled households.

The following chapter aims to provide the guiding principles which this RAP will adhere to. By reflecting on past resettlement cases and well-documented post-resettlement impoverishment risks, with specific references to poor resettlement planning, the chapter is able to correctly focus the Syrah RAP.

3.2 The Challenge of Economic Displacement

3.2.1 Overview

Any type of project-induced displacement is not a simple task, as it involves changing or altering the socio-spatial characteristics of settlements, households and individuals. This means that, by economically displacing households or impacting on assets, existing inter-household relationships and dependencies are radically altered by new spatial changes (such as a new settlement or new allocated farmland in a new area).

In the past many involuntary resettlement cases in rural African areas have been devastating on the livelihoods of those affected, and have contributed to impoverishment amongst many of them. Case studies of such past resettlement failures are well-document [*cf.* Van Wicklin and Rice (2002), Cernea (2002; 2004) and Human Rights Watch (2013)].

For the most part, many failures can be attributed to what academics such as Cernea (2000) label as the "eight impoverishment risks":

- Landlessness;
- ➤ Joblessness;
- > Homelessness;
- \succ Marginalisation;
- \succ Food insecurity;
- Increased morbidity;
- > Loss of access to common property resources; and
- Community disarticulation.

The purpose of this report is to assist the proponent to manage these risks by providing guidelines on how to implement the report.

3.2.2 Resettlement Case Studies

The eight impoverishment risks mentioned above are based upon previous resettlement case studies from around the world. Some of the largest economic and physical resettlement projects have been implemented as a result of mining, but also large dam projects. Some of these include the Shuikou Dam in China (*cf.* de Wet, 2013), the China-Gezhouba Dam (Cernea, 2000), the Brazil-Tucurui Dam (*ibid.*), andthe Lesotho Highlands Development Project (LHDP) in Lesotho (*cf.* Mashinini, 2010). The latter project, for example, resettled thousands of households in more than 120 villages within the inundation areas of the Katse and "Muela dams, constructed between 1987 to 1997. Apart from numerous dam-related case studies, many renowned development projects such as India's Rengali Project or Kenya's Kiambere Hydropower Project resulted in post-resettlement landlessness where, after relocation, households had limited landholdings and much lowercrop yieldsmanage, thus compromising their food security (*cf.* Cernea, 2000).

However, closer to the project at hand, it is past resettlement in the Tete Province of Mozambique which in fact encouraged the GoM to draft its new resettlement regulations (Human Rights Watch, 2013). Mining projects have mushroomed totake advantage of the country's rich natural resources. However, the social and economic rights of the rural communities who live there havesometimes been neglected. The following section briefly reflects primarily on two resettlement case studies in the Tete Province, namely the Moatize and Benga mines. The Moatize Mine began construction in 2008, which resulted in the involuntary resettlement of more than 1,000 households (Human Rights Watch, 2013). The BengaMine resettled around 679 households with compensation packages which included new houses, land as well as additional socio-economic development projects. Both projects have been criticised by the Human Rights Watch on the basis of poor resettlement planning and concerns expressed from those resettled predominantly related to food security and landlessness (*ibid.*).

Based upon this overview, the following project-induced impacts can be avoided in the Balama region with appropriate planning measures:

- Landlessness and food insecurity;
- > Dependency on community development initiatives; and
- > Poor community engagement.

It should be noted, however, that this project will not result in any physical relocation of households. Much is being done in terms of ensuring future food security, which is detailed in this report.

3.2.3 Cumulative Mine Development Impacts

One of the central pillars upon which the IFC guidelines rest is to identify the risks and impacts of a project in order to mitigate for any cumulative impacts. The IFC defines cumulative impacts as: "[impacts that] result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted" (IFC, 2012: p.4). Although, to CES" knowledge, no other mine is being planned in close proximity to the project at hand, future mine developments could add cumulative impacts to this project, such as more economic displacement or even physical household resettlement.

Cumulative impacts are especially applicable to the mining industry, as such operations are known for air and water pollution, carbon emissions, land alterations and social impacts. Identifying such impacts and mitigating these is fairly straightforward for a single mine. However, these impacts tend to accumulate when mines are developed in close proximity to each other. This not only accelerates environmental impacts, but can also heighten social impacts. One associated problem is that little management or planning is done for such cumulative impacts, a concern which was raised by some in Tete Province following an increase in the number of concession areas granted to mining companies (Human Rights Watch, 2013). Above all, unrecorded cumulative impacts add

problems to resettlement, as those who need to be resettled now have to compete with other projects" PACs in terms of water, food and land (which competition often leads to conflicts over claims to land and resources).

This RAP report attempted to account for such cumulative development by consulting the district administrator with regard to future projects in the area (especially mines). No other mines or related large projects that might acquire large piece of land have been identified.

3.2.4 Land and Food Security

One of the biggest concerns with the development of mining projects is that land might become restricted for rural households" agriculture. This impact has been reported in both case studies. Some of the reasons for post-resettlement land issues and food insecurity can be attributed to the following factors:

- Delays in allocation of alternative land (sometimes even subsequent to farms having been lost);
- > Alternative farmland not being prepared prior to the acquisition of farmers" land;
- > Unproductive farmland being provided, which is unsuitable for planting crops;
- > New land which is unable to support second harvests;
- Difficulties in finding alternative land as other concession areas have limited land availability;
- Erratic water supply on newly allocated farms and insufficient provision of water points or irrigation; and
- A struggle with the transition from having both cash income and farming plots, to relying solely on earning money.

Factors such as these (amongst many) can lead to the reduction in food production, as well as the number of livestock kept by households. As was the case in both these case studies, those who had been resettled expressed concern that alternative land was often easily claimed by other settlers, resulting in land insecurity and, eventually, the loss of land.

3.2.5 Dependency on Community Development Initiatives

Both these case studies included several community development initiatives aimed at restoring the livelihoods of those resettled. However, from past experience, such projects can take years to come to fruition.

In both case studies, subsequent to being resettled, many households, "[...] experienced a deterioration of their livelihoods and independence, going from farmers able to produce food for much of the year to communities reliant on outside aid and food-for-work programmes" (Humans Rights Watch, 2013: p. 50). In addition, some households appear to have been very frustrated with their loss of self-sufficiency, arguing that the project rendered them dependent on aid, employment or community development initiatives. Clearly, although community development initiatives are essential, PACs need to be assisted to regain their independence in food production, especially since a mine's life is not permanent. In order to do this, dependence should be defined and assessed more carefully. For example, such dependency can be the result of many factors, and not just community development initiatives or resettlement.

3.2.6 Community Participation

Community participation is stressed by the IFC and World Bank. By reflecting upon some of the past resettlement cases in Mozambique, community participation is essential in every step of the resettlement process. Although community participation in itself cannot ensure good resettlement outcomes, it is a vital ingredient in any project. Such participation goes beyond engagement with

those affected. It involves educating PAPs in their rights in the resettlement process and how they can form part of the decision-making process"[...]" communities affected by large projects need to be aware of their legal rights and should be able to participate meaningfully in decision-making at all stages of resettlement. Integrated planning to coordinate the cumulative economic, social and environmental impacts of the natural resource boom and national poverty-alleviation efforts remains weak" (Human Rights Watch, 2013: p.23).

3.3 Resettlement Action Plan Principles

3.3.1 Guiding Principles

A central guiding principle of a resettlement project is to ensure that no PAP is worse off after resettlement. Although the strict definition of "worse off" remains to be debated, proper baseline data on the PAP" current livelihoods can be compared with their post-resettlement livelihoods in order to ensure that livelihood standards have not dropped in any way. By internalising these well-documented project risks and reflecting on the IFC guidelines, this RAP adheres to several guiding principles (quoted from de Wet, 2013 and Huggins and Lappeman, 2012). These principles were discussed during a workshop held by the RAP social team with an established group representing those affected (refer to Chapter 4).

Guiding Principle	Actions
Principle 1: Resettlement must be avoided or minimised and alternative project designs must be explored	By complying with this principle, several alternative mine infrastructure layout plans have been discussed with the client. Household resettlement has been avoided as a result of alternative layout and design.Economic displacement of farms, structures and graves could not be avoided.
Principle 2 : Genuine consultation and participation must take place	 Of importance is to ensure that those affected are not only consulted throughout the RAP project, but that their rights and responsibilities are clearly communicated to them. Although it was decided that an established group would be the most suitable means for consultation, the following actions have been undertaken: Apart from group meetings and workshops, community meetings were also held; The project boundaries and site infrastructure plans were discussed with the established TWG and village chiefs, obtaining their assistance to engage with the farmers and households affected; and Individual PAPs have been interviewed and consulted, during which the RAP process was explained and their rights during this process clearly communicated.
Principle 3: A pre-displacement data baseline will be established	 The reason for this baseline data is primarily to ensure that those farmers and/or households affected are not worse off after the resettlement. Particular aspects which have been included in this baseline data included agricultural production levels (food security), and maize and cotton production. The following actions have been undertaken: A farmland asset and associated structures inventory; A household socio-economic baseline survey (census) of those affected, detailing household composition and demography (inter alia); and A food production assessment of all those

Table 3.1: Resettlement Action Plan Guiding Principles

Guiding Principle	Actions
	PAPs affected.
	The inventories have been used to establish entitlements, whilst the census data will be used as a monitoring tool for households" and/or farmers" re- establishment post-resettlement.
Principle 4: A fair and equitable set of compensation options must be negotiated	Compensation rates for crop or homestead losses were determined by the Mozambique Ministry of Agriculture, and will be discussed with each affected farmer and household. No farmer will be economicallydisplaced until full and fair compensation has been delivered.
Principle 5: Alternative farmland will be provided to those affected farmers and their households, and such beneficiaries shall be assisted to prepare their new fields during the land acquisition process	In order to mitigate for past resettlement, the proponent will assist the affected farmers to prepare their new fields during the land acquisition process. Under the IFC guidelines, this is referred to as "Transitional Support": "Transitional support should be provided as necessary to all economically displaced persons, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living" (IFC, 2012: p.7).
Principle 6: Displacement must take place in accordance with legal requirements	This RAP was compiled and will be implemented according to the Regulations on Resettlement Process resulting from Economic Activities, as per the Decree Nr 31/2012.
Principle 7 : Vulnerable social groups must be provided for	 Particular vulnerable groups do not have the social flexibility to withstand the stressed\s of the resettlement process. Although this is very case-specific, the following members (particularly farmers in this project) could be considered as vulnerable groups: Farmers who are disabled; Female farmers; Farmers who are old and weak; and Household family members who might also be dependent on the farm, such as children, the ill and the elderly. Such parties need to be identified through the TWG and each case should be investigated for being eligible for additional support throughout the
Principle 8: Displacement must be seen as an "upfront" project cost	economic displacement and compensation process. The proponent will ensure that the compensation to be offered and assistance provided will be built into the overall project budget and must be clearly defined as such. Resettlement expenses are often seen as external to a project, which is to the detriment of this process.
Principle 9: An independent monitoring programme must be in place	I ne entire resettlement process should be monitored by a qualified social team, using the baseline socio- economic data to measure post-resettlement against. The results of this post-resettlement monitoring programme should be disclosed to relevant stakeholders (especially those who have undergone displacement, and government ministries.
Principle 10: A Grievance Mechanism will be in place	A Grievance Mechanism has been established and discussed during the TWG, and community meetings, but also with the individual farmers.

Guiding Principle	Actions
Principle 11: The affected people should become direct beneficiaries of the development project	The households that will be the most directly impacted by the mine are those whose farms will have to be displaced. International good practice advocates that they should become the direct beneficiaries of the development which they, effectively, have enabled. In order to achieve this, the client's proposed SED initiatives need to be discussed with the PAPs through the TWG. These initiatives are discussed in Chapter 6.

The report draws upon international good practice which implies that affected farmers will be compensated for any loss of livelihood at replacement costs. In addition, they need to be provided with project benefits, and to be assisted in restoring and improving their livelihood post economic displacement. A paramount purpose of this report is therefore to provide the proponent with an implementation tool to ensure that livelihood strategies and income-earning capacity of the PAP are improved after economic resettlement.

3.3.2 Measures to Avoid Involuntary Resettlement and the Impacts Thereof

One of the most important principles of this RAP process has been to assist the proponent with designing alternative mine infrastructural layout plans in order to avoid the involuntary resettlement of households. As explained, several mine infrastructural layout plans were drafted by the proponent aimed at reducing any socio-economic impact. The gradual layout changes throughout 2013/2014 are illustrated in Appendix 1.

In summary, the only village that did potentiallyrequire physical household resettlement was Pirira Village. Although the road through Pirira will be upgraded, the layout plan aims to avoid any involuntary resettlement, reduce economic displacement and the disturbance of gravesites and cultural significant sites as far as possible in the following ways:

- The village of Pirira is centrally located at the entrance of the mine and in close proximity to one of the graphite pits. Hence, utilising and upgrading the existing road that runs through Pirira as the mine's main access road is a practical layout option. A large area of the village which could potentially be affected by this upgrade was buffered and surveyed for potential resettlement-induced impacts (households along the road were measured and additional structures, trees and/or crops were recorded). It is not anticipated for any physical household resettlement, although a Grievance Mechanism has been established for any potential issues and/or physical resettlement in future; and
- Subsequent to several site visits by EOH CES and assessments by the mine through the District Resettlement Commission, the locations of grave and sacred sites were marked and provided to the proponent. The GPS positions of these sites are provided in Appendix 2.

4. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION

4.1 Introduction

Public participation is a central ingredient in any RAP, and is stressed by Mozambique legislation, such as the Regulations on the Resettlement Process Resulting from Economic Activities (2012), as well as the EIA Regulations (2008). Moreover, the need for public participation is also emphasised by the World Bank and IFC, in particular the need to disclose project information to those affected:

"Disclosure of relevant information and participation of Affected Communities and persons will continue during the planning, implementation, monitoring, and evaluation of compensation payments, livelihood restoration activities, and resettlement to achieve outcomes that are consistent with the objectives of this Performance Standard".

(IFC PS 5, 2012: p. 3)

As with the rest of this report, this chapter describes the stakeholder engagement and public participation activities undertaken during the drafting process of this RAP report (up and until the end of August 2014). Further engagements as part of the report's implementation phase will be detailed in subsequent RAP progress reports.

4.2 Requirements

In terms of legislative requirements, the aforementioned Mozambique legislation requires any resettlement or economic displacement project to have at least four public consultations with the affected communities, each to be publicised in the main mass communication media. In addition, to this requirement, the list below presents the main requirements (as per the Mozambique regulations, but also the IFC and World Bank) in terms stakeholder engagements and public participation pertaining to the resettlement or economic displacement process:

- > Community and or individual household level engagements to introduce the RAP;
- Community, individual household level and Government official engagements to discuss compensation strategies; and
- Disclosure of the RAP and the entitlement frameworks (Chapter 7) at community, individual household and Government official levels.

All of these requirements have been met by this report, activities which have been sub-divided into the following categories:

- Community Engagements;
- TWG Engagements; and
- Government Authority Level Engagements.

Up and until the end of July 2014, five site visits were undertaken by EOH CES for the RAP. These visits are presented in Table 4.1 below.

Site Visit Nr	Date	Main Purposes
1	July 2013	To introduce the RAP study team to each village and to establish a TWG for the RAP process by electing two representatives from each village
2	August 2013	Surveying and assessing all the households and machambas within the mine [®] s Aol
3	Nov–Dec 2013	Subsequent to amendments of the mine's infrastructural layout plan, new machambas were surveyed
4	May 2014	 Do disclose the RAP report to the District Administrator and the affected communities in accordance with the Mozambique Regulations on the Resettlement Process Resulting from Economic Activities (2012); To meet with and disclose the report to the District Resettlement Commission; To discuss compensation packages with those affected farmers through the TWG; and To assess some more machambas.
5	August 2014	 To survey some more machambas inside the mine's Aol possibly to be affected; Discuss the RAP report with the Country Manager (Mr Dinis Napid0) and make required amendments; Discuss the establishment of a Social Department (for the mine to implement the RAP report) with Mr Napido and develop a way forward action plan for this department; Meet with the District Resettlement Commission to ascertain how the commission interprets the Government's crop and tree rates and how these should be applied to the RAP's compensation plan; Discuss the Farmers Development Programme (FDP) with Mr Napido and the commission through which the mine will meet its RAP obligations with regard to providing and supporting farmers with their new fields after compensation has been paid; and Assess the alternative land which the commission has identified as

Table 4.1: Site visits undertaken until the end of May 2014

The following chapter provides a synopsis of all the public participation activities undertaken to date as part of this RAP. As the RAP was introduced during several community meetings held as part of the SIA conducted in March 2013, these meetings have also been included.

4.3 Community Engagements

4.3.1 **Overview**

Table 4.2 summarises all the RAP-related public participation engagements undertaken up and until the end of August 2014.

Minutes for all the RAP-related meetings have been drafted and are attached to this report as appendices 3-14. Most meetings were chaired by Ms Saranga (EOH CES) in Portuguese, and translated into Macua (the local language) by attending community representatives.

Table 4.2 below elaborateson each meeting held. This table excludes internal meetings held with mine management throughout the RAP process.

Village	Date	Nr of Attendees	Objective/s		
	Social Impact Assessment (March 2013)				
Nquide	04/03/2013	150	To obtain permission from the villagers to conduct		
Ntete	04/03/2013	100	a survey for the SIA, as well as to introduce the		
Maputo	05/03/2013	80	RAP and explain that some machambas might be		
Pirira	05/03/2013	40	affected and/or lost by the development		
	Resettlement	Action Plan Site Visit O	ne and Two (July-August 2013)		
Ntete	08/07/2013	23			
Nquide	09/07/2013	25	To introduce the RAP social team and to establish a TWC by electing two representatives		
Maputo	09/07/2013	41	from each village		
Pirira	10/07/2013	102	5		
Nquide		44	➤To explain the farmland assessment process		
Maputo		30	and introduce the CES recruited fieldworkers to		
Pirira		102	➤ To read to the villagers their resettlement-		
Ntete	06/08/2013	52	 related rights according to the Constitution of Mozambique and resettlement guidelines; ➤ To introduce the TWG members and explain the functioning of this group; and ➤ Establishing a Grievance Mechanism. 		
Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report					
Ntete	19/08/2013	198			
Nquide	19/08/2013	104	To disclose the econing report of the ESUIA		
Pirira	20/08/2013	83	process (EPDA), but also to discuss the RAP		
Maputo	20/08/2013	191			
Ntete	19/08/2013	198			
	Resettlement A	ction Plan Site Visit Th	ree (November-December 2013)		
All village leaders	28/11/2013	14	To inform them of the third site visit's purpose, i.e. to assess more machambas, but also to survey some machambas which were missed during the previous survey period in August 2013.		
Re	settlement Action	Plan Site Visit Four: Dis	sclosure of the RAP Report(May 2014)		
Ntete	14/05/2014	14	\succ To explain the purpose of the site visit, which		
Nquide	15/05/2014	45	was to disclose the RAP report to the TWG		
Balama Town	15/05/2014	26	input;		
Pirira	16/05/2014	25	\succ To assess the remaining machambas that		
Maputo	16/05/2014	38	 might possibly be affected by the mine; ➤ To discuss compensation packages with the TWG members and affected farmers; and ➤ To Disclose the Draft RAP report to the District 		

Table 4.2: Resettlement Action Plan (RAP)-related public participation activitiesuntil August 2014

Final Resettlement Action Plan of the Balama Graphite Mine – September 2014

Village	Date	Nr of Attendees	Objective/s
			Resettlement Commission in Balama.
Resettle	ment Action Plan S	Site Visit Five: Final Am	endments to the RAP Report (August 2014)
Balama Town	21/08/2014	8	Aimed at notifying the commission of the RAP process, as well as to discuss how the Government's crop compensation rates should be applied to the project

4.3.2

Social Impact Assessment Site Visit

As illustrated in Table 4.2, the RAP was firstly introduced to all the four affected villages during March 2013 as part of the SIA. A meeting was held in each communityto elaborate upon the ESHIA process and explain the purpose of the SIA. In addition, villagers were also informed that some machambas would be affected and/or lost, for which purposes more engagements would follow. The meetings were well-attended and planned more than a week in advance.



Plate 4.1: Initial public participation meeting with the community of Nquide (Left) and Pirira (Right)

As part of the RAP, five site visits were undertaken by the RAP's social team up and until the end of June 2014.

4.3.3 Resettlement Action Plan Site Visit One and Two (July-August 2013)

The first visit (July 2013) aimed to introduce the social team to each village and to establish a TWG by electing two representatives from each village (the establishment of this TWG is explained shortly). Village members were asked to elect these representatives themselves, after the purpose of the TWG in the displacement process had been explained to all. The RAP team's independence from the mine was also explained, as well as the RAP's purpose to ultimately safeguard the interests of the villagers in order for the mine not to affect the villagers' livelihood negatively.

A second RAP site visit was undertaken in August 2013 with the aim of surveying and assessing all the households and machambas within the mining's AoI. A community meeting was held in each village in order to explain the household survey and farmland assessment process, and also to introduce the EOH CES recruited fieldworkers and TWG members. Moreover, a Grievance Mechanism was also established in each village (explained shortly). During these meetings, the mine's progressive development was also explained, i.e., it was stressed that the entire mine site would not be developed overnight. In this way, villagers were reassured that only a certain number of farms would actually be lost and/or affected, and that not all the households to be studied should therefore expect to lose their landholdings.

A distinction was also drawn between the loss of land and the loss of crops/structures on such land. It was explained that, as per legislation, the Government would assist those farmers who will lose land to find alternative land, whilst the proponent would be responsible for compensating the loss and/or disturbance of crops, trees and/or associated structures.



Plate 4.2: Community meetings as part of the Resettlement Action Plan (RAP) (July-August 2013)

4.3.4 Disclosure of the Environmental, Social and Health Impact Assessment's Scoping Report

As part of the ESHIA process, community meetings were held on 19 and 20 August 2013 in each affected village in order to disclose the Scoping Report (or EPDA). Representatives at these meetings included delegates from the mine, the Ministry of Mineral Resources, as well as from MICOA. Although these meetings were aimed at disclosing the ESHIA process, the RAP social team was also present, as several issues regarding the loss of machambas and compensation were raised. For example, many village members were still uncertain as to whether they could continue with their current farming now that the surveys had commenced.In response, the conditions relating to the individual farmer entitlement sheets signed by each studied farmer were explained. These conditions state that farmers can continue with their farming, however that no new machambas or structures will be compensated by the proponent subsequent to these surveys and assessments having been completed.



Plate 4.3: Disclosing the Scoping Report (EPDA)

4.3.5 Resettlement Action Plan Site Visit 3 (November-December 2013)

During the third site visit in November and December 2013, a meeting was held with the four PAC leaders on 28 November 2013. During this meeting, they were informed of the site visit's purpose, which was to assess additional machambas, but also some machambas which were missed during the previous survey period in August 2013. Permission was granted to proceed.

4.3.6 Resettlement Action Plan Site Visit Four: First Disclosure of the RAP Report (May 2014)

A fourth site visit was held from 8-16 May 2014. The site visit was undertaken by Mr Bosman, Ms Saranga and Ms Buque (EOH CES). The purpose of this visit was to:

- Asses more machambas inside the TSF;
- Disclose the first draft RAP Report to the District Resettlement Commission (which already existed in the Balama District) and affected communities and obtain any feedback. This Commission satisfies the requirements of articles 6 and 7 of the Mozambique Regulation on the Resettlement Process Resulting from Economic Activities (2012); established as a supervisory body of the RAP process in Mozambique; and
- > To discuss compensation packages with the TWG members and all the affected farmers.

The District Administrator was requested to convene all the meetings that were held during this visit. Article 23 of the above-mentioned legislation requires that at least four public consultation meetings should be held as part of the disclosure of the RAP report. In fulfilment of this requirement, a disclosure meeting was arranged by the Administrator in the villages of Pirira, Ntete, Nquide, Maputo and Balama. The proceedings of each meeting are briefly elaborated upon below.

The TWG members were presented with a list of all the affected machamba owners whose machambas are located inside the mine's AoI. From this list, each community representative sitting on the TWG was asked to invite those farmers in their respective villages to attend these RAP disclosure meetings. Each meeting was advertised in the villages by the TWG members (minutes and attendance registers of these meetings are attached as appendices 3-14.

The following members were present during each community meeting:

- Proponent representatives:
 - Ms Laura Redolfo; and
 - Mr Celio Panguene.
- EOH CES Representatives:
 - Ms Carina Saranga; and
 - Mr Lungisa Bosman.
- Government Representatives
 - Ms Laura António (DSEA);
 - Mr Octávio Sozinho (District Administrator Representative); and
 - Mr Júlio Mabote (DSPI).
- > Affected farmers and TWG members.

Each meeting commenced with Ms Saranga disclosing the RAP report, drawing specifically on the compensation strategies as proposed in this report. After this disclosure, the floor was open for discussion. Most discussions centred on compensation issues and particular strategies proposed (as per Section 6). Therefore, an Issues and Response Trail has been included under Section 7.3 that documents all these issues and concerns raised.



Plate 4.4: Engaging with the affected farm owners in May 2014 to discuss compensation packages during the disclosure of the RAP report

4.4 Technical Working Group

4.4.1 Objectives of the Technical Working Group

Article 8 of Mozambique's Regulations on the Resettlement Process Resulting from Economic Activities (2012) requires representatives of the affected population to participate in the process. In order to fulfil this requirement, the Balama TWG was established, which includes district-level government representatives. This group is to be initially tasked to manage the RAP implementation process, and therefore it's most important objectives are to:

Be part of the mine's planning process, especially with regard to the mine's infrastructural layout plan, in order to avoid areas that are culturally significant or regarded as sacred to the villagers;

- Identify those households and/or farmers who might be in danger of becoming economically displaced;
- > Discuss matters related to the possible removal of graves and reburial arrangements;
- > Discuss compensation mechanisms (using this report as a baseline indicator);
- Agree upon alternative land to be offered in replacement of land that might be acquired by the project; and
- Manage the established Grievance Mechanism for any issues, concerns and/or complaints with regard to the economic displacement process.

In addition, the TWG will play a central role in the identification of vulnerable people, defined as people who may be more adversely affected by displacement. Such people might include female-headed households/farmers, homeless children, the disabled or youth (*cf. W*orld Bank, 2013a). In this way, each acting member of the TWG shall:

- Assist with organising focus groups with all the affected farmers to finalise entitlement contracts;
- To assist the mine and District Resettlement Commission with the identification of alternative agricultural fields (or sites for relocation, should this become necessary in the future if households wish to relocate in order to be closer to their new replacement land);
- Assist with disclosing the RAP report and discuss the compensation framework with the affected farmers, PACs and local authority leaders, in order to reach a decision on the frameworks proposed;
- Assist the mine with the possible exhumation and reburial of graves identified during the mine's construction period;
- Assist the mine with implementing the RAP and call upon those farmers who will be entitled to receive compensation, as well as arrange for them to discuss their compensation package with the mine and to receive it;
- Determine the vulnerable households and/or farmers who qualify for additional assistance from the mine, should their machambas and/or structures be displaced;
- > Advertise the qualifications for vulnerable groups;
- Provide notice to the PAPs of the mine's intentions to provide appropriate assistance for vulnerable people should machambas and/or structures be displaced; and
- Review each case through an interview between the identified vulnerable person, a member of the TWG and a representative of the mine.

Furthermore, the TWG will act as a continuous communication mechanism for the project, which should thus not necessarily be limited to this RAP process. For this, the group will be tasked with the following objectives:

- > To represent the voices and convey the issues and/or concerns of all the PAP; and
- To represent members from relevant government ministries/agenciesand provide a platform for the latter to engage with the PAP and the mine regularly.

The TWG shall continue for the entire duration of the RAP process and continue to function for as long as it is needed. Powers to terminate the committee will be vested in the Administrator. Lastly, it was agreed by the mine's Country Manager for the TWG members to be compensated by the mine as their assistance is needed. This will be an internal arrangement.

4.4.2 Establishing the Technical Working Group

The District Administrator was consulted on 8 July 2013 in order to obtain her authorisation to establish the Balama Graphite Mine TWG. With her assistance, the relevant district-level government representatives were invited to sit on the TWG. In response to this request, the District Services of Economic Activities (DSEA) and the District Services of Planning and Infrastructure (DSPI) were invited to sit on the TWG. These members constitute the following officials:

- Mr Júlio Mabote (DSPI);
- > Mr Celso Nhumaio (DSEA); and
- > Mr Lucio Nazário (District Administration Representative).

The TWG was formally established on 10 July 2013 during a short meeting where each of the two elected village representatives (eight in total) met with the RAP social study team in Ntete Village. Table 4.3 lists the members who sit on the TWG.

Name	Company/Village	Position
Célio Panquene	Twigg Exploration & Mining Ltd.	Community Development Officer
Ms Carina Saranga	EOH CES	Social Administrative Assistant (meeting chairperson)
Mr Lunguisa Bosman	EOH CES	Social Scientist
Ms Laura Rodolfo	Twigg Exploration & Mining Ltd.	Community Liaisons Officer (CLO)
Mr Júlio Mabote	DSPI	Government Ministry Representative
Mr Celso Nhumaio	DSEA	
Mr Lucio Nazário	District Administration Representative	Government
Constantino Arlindo	Ntete	Chairperson
Jarifo Raimundo	Ntete	Committee members
Bachir Euse"bio	Pirira	Committee members
Jorge Chiquira	Pirira	Committee members
Adelino Sadique	Maputo	Committee members
Chabane Elisa	Maputo	Committee members
Useno Buana João	Nquide	Committee members
Lowrenço Gimo	Nquide	Committee members

Table 4.3: Balama Mine Technical Working Group Membership

The team was asked to elect a chairperson to act as the group's representative through whom meetings would be organised and important messages communicated to the group. Apart from acknowledging and confirming their responsibility for representing their respective villages during the RAP process, the objectives of the TWG were outlined in Macua. In addition, these objectives and the functioning of the group were provided to the chairperson in the form of a TWG Mission Document, which also included each member's name, contact details and thumbprint; the latter serving as each member's declaration and affiliation to the group. A hard copy of this document was also provided to the District Administrator for her own records. Refer to Appendix 24.



Plate 4.5: Establishing the Technical Working Group (TWG) on 10 August 2013

4.4.3 Meetings Held with the Technical Working Group

4.4.3.1 Overview

Table 4.4 below outlines all the TWG meetings held up and until the end of June2014.

Village	Date	Nr of attendees	Objective/s
	10/07/2013	12	To establish the TWG, to elect a chairperson and to outline the objectives of the group
	07/08/2013	19	 To introduce the relevant government officials to the TWG; To show the mine's current infrastructural layout plans and where farms and/or households might be loss/affected; To explain the farmland assessment process & the work schedule; and To introduce the four EOH CES recruited fieldworkers
Ntete	23/08/2013	14	 A closure meeting to finish off the farmland and household assessment process; To reiterate the conditions of the moratoriums declared with each studied farmer/household and to encourage the villagers to continue with their farming practices in the interim; To establish a procedure for any village claims regarding farmland within the mining area to be lodged within the next four weeks (until the end of September 2013) with the TWG members and Laura Redolfo (CLO); and To plan for the RAP team's next site visit in November.
Ntete	28/11/2013	14	 Explain to the village chiefs the purpose of the RAP social team's site visit, which was to continue to work with the owners of the farms located within the mine's area of influence; To introduce the fieldworkers to the chiefs; To show the mine's current mine layout plan and where farms and/or households might be lost/affected and the changes made on the layout; Reiterate the procedures of the established Grievance Mechanisms; and Request authorisation to commence with the surveys.
	29/11/2013	18	To show the mine's current mine layout plan and

 Table 4.4: Technical Working Group (TWG) meetings held until the end of June 2014

Village	Date	Nr of attendees	Objective/s
			 where farms and/or households might be lost/affected and the changes made to the layout; To introduce the four EOH CES recruited fieldworkers; To reiterate the functioning of the Grievance Mechanism; and To explain the farmland assessment process and site visit work schedule.
Ntete	12/05/2014	27	 To explain the purpose of the site visit, which was to disclose the RAP report to the TWG members and obtain their input; To assess the remaining machambas that might possibly be affected by the mine; and To discuss compensation packages with the TWG members.

4.4.3.2 Introduction Meetings and Obtaining Permission for Farmland Surveys

As illustrated in Table 4.4, six TWG meetings were held until the end of June 2014. All the meetings have been minuted. Minutes are attached as appendices 3-14. All the meetings were held in Ntete Village, ensuring that there is always at least one representative from the mine. Representatives from the District Administrator, DSEA and DSPI were able to attend most of the meetings.

The meetings were primarily aimed at establishing the group's purpose and assigning roles and responsibilities to each member. Moreover, the second meeting intended to obtain the support of the TWG members in the household survey and farmland assessment process. The latter process was explained by drawing upon the need for the mine to know who the current machambas belong to in order to avoid opportunists making machambas with the intention of being compensated. It was made clear that people should not simply establish new machambas in order to receive compensation, and that new machambas would not be compensated.

The meeting on 23 August 2013 was organised as a site visit closure meeting to end the first survey and farmland assessment process. Although formally invited, the government representatives could not be present. During this meeting, a procedure was also established to manage any further farmland claims, as some farms might have been overlooked by the assessments, whilst farmers who have already lost land to the mine have the right to make compensation claims.

Another meeting was held on 29 November 2013 with the TWG community and government representatives to inform the group of the third site visit and surveysto be undertaken. A map showing the new project boundary areas to be surveyed was presented, and the survey procedure was explained. The same meeting was used to hear and respond to any grievances and problems that had been lodged with the Community Liaison Officer (CLO) since the last visit. In addition, the TWG members were reminded about the cut-off-date for compensation, and that any new machambas and/or structures inside the previous and current study area would not be compensated by the mine subsequent to this last survey period. The members confirmed that these conditions had recently been discussed between the PACs and the Administrator, where members were had been informed not to make new mashambas in the mine"s AoI.



Plate 4.6: Engaging with the Technical Working Group (TWG) members on 29 November 2013

4.4.3.3 Disclosing the First Draft RAP Report and Discussing Compensation Measures

A meeting was held with the TWG to disclosure the draft RAP report, as well as to discuss the proposed compensation measures (Section 6). This meeting was held on 12 May 2014, and was attended by the following members (refer to Appendix 15 for the minutes of the disclosure meetings, as well as appendices 16-21 for the attendance registers of all the meetings held):

- Syrah representatives:
 - Ms Laura Redolfo; and
 - Mr Celio Panguene.
- > Coastal & Environmental Services Representatives:
 - Ms Carina Saranga; and
 - Mr Lungisa Bosman.
- Government Representatives
 - Ms Laura António (DSEA);
 - Mr Octávio Sozinho (District Administrator Representative); and
 - Mr Júlio Mabote (DSPI).
- > All community representatives sitting on the TWG.

The meeting was chaired by Ms Saranga (EOH CES). She initiated the meeting by introducing all present, where after particular sections of the draft report were highlighted; in particular the compensation strategies for crops, structures, fruit trees and alternative land provision. The meeting elicited much discussion, which centred on compensation queries, issues and concerns. Such discussions have been recorded in the form of an Issues and Response Trial under Section 7.3 that deals with compensation strategies.

4.5 **Provincial and District GovernmentEngagements**

4.5.1 General Engagements

In addition to a formal meeting with the District Administrator on 8 July 2013 to obtain authorisation for the RAP and establishment of the TWG, several informal meetings were held with the DSEA and DSPIduring August 2013. Both these district-level ministries have played a central role in providing assistance to EOH CES in the RAP process, providing guidance especially with regard to crop compensation and alternative land provision. A meeting was also held on 22 August 2013 with the Head of the Department of Territorial Planning in MICOA in order to obtain more clarity regarding the role of the Provincial Government in the RAP process.

As part of the third site visit (Nov/Dec 2013), one meeting was held with the District Government officials. The purpose of the meeting was to notify the officials of the survey to be conducted, but

also to reiterate the cut-off-date for new machambas. The meeting was held on 29 November 2013 in Ntete Village. Present at the meeting were representatives from the DSEA, DSPI, as well as the Administrator. Furthermore, EOH CESclarified that some machambas were not surveyed during the last site visit, as the farmers concerned were not in the area at the time. In order to survey these farms, those farmers were requested to register their machambas with the CLO at the mine camp. The government officials were informed that several farmers did register, and that these farms would be surveyed during this site visit as well. Although all efforts weremade to register and survey all the affected farmers, those who had not registered by that time will have the opportunity to do so through the Grievance Mechanism.

Lastly,after a discussion with the Head of the Department of Territorial Planning of MICOA (Pemba), EOH CES was notified that regular progress reports need to be submitted to MICOA at provincial-level. Keeping to this requirement, two hard copy progress reports (August and December 2013) were delivered to the DPCA in Pemba (refer to Appendix 23 for proof of delivery), which represents MICOA at provincial level. Both reports outlined the surveys and assessments undertaken for the RAP, as well as all the public participation and stakeholder activities.

4.5.2

District Resettlement Commission

4.5.2.1 Objectives

Articles 6 and 7 of Mozambique's Regulations for the Resettlement process Resulting from Economic Activities (2012) require the establishment of a commission to monitor and supervise the resettlement process. After liaison with MICOA and the proponent's Country Manager, EOH CES was told that such a commission already exists; referred to as the District Resettlement Commission. According to Article 6 of the regulations, the following representatives should sit on this commission:

- > Two members of the Territorial Planning Sector;
- > One member of the Local Administration Sector;
- One member of the Public Works and Housing Sector;
- > One member of the Agricultural Sector;
- > One member of the related area;
- > One member of the Provincial Government; and
- > One member of the District Government.

The immediate roles of the committee during the RAP disclosure period are to:

- Receive a presentation on the RAP report and current RAP status;
- > To agree upon the proposed compensation packages in the RAP report;
- > To elaborate upon Mozambique's crop compensation rates;
- > To explain how these rates should be applied to the RAP;
- > To discuss issues around alternative land provision; and to
- Discuss the way forward

In August 2014, the members who sat on this commission were as follows:

Table 4.5: Members Sitting on the District Resettlement Commission	Table	4.5: Members	s Sittina on the	District Reset	tlement Commission
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Position/Representative	Name
DBCA (MICOA) in Rombo	Latifa Antonio
DPCA (MICOA) III Pelliba	Claudio Alfeu
Administrator Depresentative of Palama	Issa Rachide
Administrator Representative of Balama	Lucio Nazario
DSPI in Balama	Julio Mabote
Director of the DSEA	Rita de Jesus
Syrah Representative	Dinis Napido

Position/Representative	Name	
	Celio Panquene	
	Laura Redolfo	
CES Representative	Carina Saranga	
	Lungisa Bosman	

4.5.2.2 Disclosing the First Draft RAP Report to the District Resettlement Commission

The first meeting with this commission was held on 8 May 2014 at the Balama District Administrator Office. The purpose of the meeting was to disclose the first Draft RAP Report, as well as to allow the government officials with an opportunity to provide input into the economic displacementprocess. The meeting elicited much discussion, which centred on compensation queries, issues and concerns. Such discussions have been recorded in the form of an Issues and Response Trial under Section 7.3 that deals with compensation strategies.

On 21 August 2014, a second meeting was held with the commission at the Administrator Building in Balama. Table 4.6 below provides a list of all the attendees:

Name	Position	Contact Nr
Anton Hough	EOH CES Social Scientist	(+21) 079 514 76 11
Fred Snow	Stratoimagery (RAP specialist)	(+27) 082 662 1522
Celso Nhumaio	District Services of Economic	822831840
Laura Redolfo	Balama Mine Assistant Communications Officer	826901653
Paulo Feliciano	District Services of Economic	861427633
Issa Rachide	Balama Permanent Secretary Coordinator	825277123
Julio Mabote Zacarias	District Services of Planning and Infrastructure	872905288
Carina Saranga	EOH CES Social Assistant	824136038

Table 4.6: District Resettlement Commission Meeting Attendance Register

The meeting was aimed at notifying the commission of the RAP process, as well as to discuss how the Government's crop compensation rates should be applied to the project. It was agreed for the maximum productive value of each affected machamba to form the basis of compensation. This value was confirmed to be that of Sesame.

The commission was informed regarding the establishment of a Social Department at the mine to implement the RAP (refer to Section 8.2). In addition, the social team planned a site visit (22 August) to alternative farmland which has been identified by this commission as replacement land. The meeting was concluded by briefly discussing the Farmers Development programme (FDP). The commission noted this, and requested that such programme be implemented with the assistance of a Government Agriculturalist (staying in Balama) working in the district.

4.6 Grievance Mechanism

4.6.1 Objectives

In accordance with PS 5 of the IFC, a central function of any RAP process should be to operate a grievance mechanism for any future complaints and/or claims. Some of the most important objectives of such a mechanism are as follows:

To provide the PACs with an accessible and prompt mechanism through which to lodge a complaint and/or resolve any dispute that may arise in connection with the project;

- To facilitate appropriate and mutually acceptable corrective actions, and to address complaints efficiently;
- To ensure that complainants are satisfied with the outcomes of any corrective actions undertaken by the client; and
- > Avoid/minimise the need to resort to judicial proceedings.

Using the guidelines from the IFC, a Grievance Mechanism has been established under the mine's Social Department (Section 8.2). This mechanism is illustrated in Figure 4.1.

The mine's Community Development Officer, Mr Mutiquinhene, shall be responsible for managing this mechanism. This will include recording grievances in a hard copy and database log (the log database has been provided to the mine's Social Department; refer to Plate 4.7 which shows a training session on this database. As part of the Social Department, Mr Mutiquinhene will be responsible for dealing with grievances during the RAP process, but also as part of the department's general obligations to respond to any community issue/s.



Plate 4.7: Left: EOH CES presenting a grievance form which he tailored for the mine's Social Department.

Using this mechanism, the grievance officer (Mr Mutiquinhene) will keep track of any problems put forward by the communities. He shall keep a vigilant eye on site to prevent future grievances.
4.6.2 The Grievance Mechanism Procedure

The Grievance Mechanism involves the following steps (explained below):



Figure 4.1: The Grievance Mechanism (Strato Imagery, 2014)

Figure 4.1 above is briefly elaborated upon below.

Steps 1-2: Grievance Recorded and Referred to Social Department

Community members are allowed to make a formal statement of dispute or claim (verbally or written) to any of the selected village-level representatives sitting on the TWG, to their chiefs, or directly to the mine. The mine's CLO ultimately receives all complaints, and is tasked with completing a grievance statement form.

The complainant (*via*the TWG representative or chief) is registered by the CLO with an assigned number which should be provided to the complainant. Those members who had been surveyed by the RAP team will use the number provided to them. Those without numbers will be issued with numbers. Complaints will be registered by the CLO with an assigned number to be provided for each complaint. The grievance statement form to be completed by the CLO includes the date, description of the grievance, as well as the details of the complaint and person who lodged it (full names and village). All entries are in Portuguese. The person who submits this claim (be that an individual, chief or a village representative acting on the TWG) signs this completed form, and receives a receipt of this complaint by the CLO upon submission. The form also indicates the date on which the grievance will be addressed by the mine and when feedback will be received.

It will be the mine's responsibility (the CLO) to receive complaints and to enter these in the register (an electronic register should also be kept). Three copies are made of the form: one copy to be provided to the person submitting the complaint (to be provided to the claimant), one to be used to implement the corrective action and for document control, and one copy to remain in the grievance file to be kept and maintained by the CLO. The comment/complaint is then to be entered into a database created for this purpose.

Step 3: Grievance Recorded and Documented

Upon completion of the grievance statement form, the CLO shall ensure that the mine management (or someone equivalent in position) receives a copy of the form within 48 hours of submission. An electronic database will also be kept of each grievance. The grievance statement form shall be managed and maintained by the CLO who will bear the responsibility for ensuring that all records are up-to-date and accurate.

Step 4-7: Grievance Investigated by Social Department

Through the CLO, the mine shall assess the grievance/comment in terms of its capacity to resolve it locally amongst project staff. Should this not be possible, the grievance/comment will be communicated to the TWG, District Administrator or a similar body to formulate preliminary recommendations. The CLO shall provide his/her recommendations to the mine management in a timely manner that does not exceed 4 working days.

Depending on the circumstances of the complaint, various units or departments may need to get involved, including senior management, if their direction and decisions are required. To begin this process, the nature of the grievance will be established to determine the measures needed for review and investigation. All grievances will need to undergo some degree of review and investigation, depending on the type of grievance and clarity of circumstances.

Step 8: Decision on Evidence Made by Grievance Team

The mine management or HRM shall draft a written response within 15 days of the date on which the grievance form was lodged and recorded in the grievance statement form. In this response, the rationale for addressing the issue in a particular manner needs to be outlined, and the recommendations from the CLO need to be taken into consideration. Formal feedback in the form of a response letter or minuted meeting with the complainant needs to be submitted by the mine

management to the complainant in person. If necessary, the letter needs to be verbally communicated to the complainant. Should the complainant accept the verdict of the mine (HRM) in resolving the complaint, this decision shall be documented with the complainant"s signature (or thumbprint) on the grievance response letter. Thereafter, the response letter shall be returned to the CLO for recording into the grievance statement form (to be attached to it).

Should the complainant reject the response, the merits of the rejection shall be investigated internally by the mine or other avenues such as with the District Administrator or other stakeholders. In this situation, the complainant shall have the right to consult the District Administrator, after which a formal meeting must be arranged between the District Administrator, the mine, the complainant and any other stakeholder groups or government authorities that need to be involved (as per the recommendation of the District Administrator). Formal meeting minutes shall be drafted of this meeting and will be issued and signed by the Administrator.

The outcomes of the meeting shall be recorded, and if an agreement is reached, such an agreement will be captured in the grievance statement form with the signature (or thumbprint) of the complainant.

Step 9A-12B: Closure

Once the investigation has been completed and necessary measures taken, the results will be communicated to the complainant and entered in the grievance statement form and electronic database, as explained. Regardless of the outcome, a response should be provided to all complainants. The Grievance Mechanism set-out in this report shall be periodically reviewed by the mine for its adequacy and appropriateness to the lifecycle of the project.

4.6.3 Operating the Grievance Mechanism

The procedures of which were disclosed during each community meeting (refer to Table 4.2). The steps involved in this mechanism were meticulously explained with a poster, not only during each community meeting, but also during the TWG workshops and individual household and/or farmer interviews. For example, community members were notified that they could lodge any economic displacement-related complaints with one of the TWG members, the village chiefs or the District Administrator. The latter party is responsible for lodging such complaints with a representative from the mine (Mr Cabral Mutiquinhene), who shall be tasked with registering each complaint in a book using a receipt book and appropriate resolution procedures as per the IFC guidelines.



Plate 4.8: Establishing the Grievance Mechanism during each community meeting with a poster illustrating the steps involved

5. THE PROJECT'S SOCIO-ECONOMIC CONTEXT

5.1 Overview

The following chapter provides the socio-economic context of the mine's PAP. In this chapter, the term PAP refers to the affected farmers and their household membersinside the mine's Aol. Therefore, the unit of analysis of this chapter is the household unit, herewith defined as members who sleep together in the same house at least in the week, sharing the same resources (food and income, for example). It should be noted that much of this data was gathered during several site visits in 2013/2014. It is therefore to be expected that particular socio-economic trends, especially such as employments, might have changed since gathering this data.

The chapter commences with a description of the methodology employed. This is followed by a detailed data analysis section. The SIA should be referred to for a more comprehensive socioeconomic overview of Mozambique and of Cabo Delgado Province (CES, 2013a). This chapter is not intended to replicate data provided in the SIA, and is intended only to provide a contextual and strategic framework for the eligibility criteria and theevaluation and compensation process.

5.2 Survey and Assessment Methodology

5.2.1 Overview

Five site visits were undertaken in order to conduct landholding assessment inventories of all the possible affected landholdings (recording farmer details, land size, crops, structures, features and economic trees), but also a Socio-Economic Baseline Study (SEBS) of a 30% sample of affected farmer households. Such a sample is deemed appropriate by international standards (such as the IFC) considering the size of the affected population: "Where the population exceeds a size suitable for an individual household survey, a surveyof a sample of the population may suffice" (IFC, 2012: p.21). These inventories and surveys were conducted from 9 to 25 August, 30 November to 4 December 2013, 12 - 16 May 2014 and 18 August - 5 September 2014.

In total, asset inventories were conducted of 677 landholdings inside the mine's AoI (Figure 1.2). Ten of these landholdings are homesteads, whilst the rest comprise machambas. Note that the project will avoid physical resettlement. These landholdings belong to 588 farmers (and 588 separate households), as some farmers have more than one machamba inside the AoI. It should be noted that there might be more machambas inside the mine's AoI, as some farmers could not be reached during the survey periods.Such machambas will be recorded as part of Grievance Mechanism during the RAP's implementation phase.

The next section elaborates upon the methodology employed for both the SEBS and farmland assessment.

5.2.2 Landholding Asset Inventories and Socio-Economic Baseline Surveys

Between four and eight local fieldworkers from Balama and Montepuez (Balama District) were recruited by EOH CES during each of the five survey periods. During the first survey period, the fieldworkers received extensive training in administering the SEBS questionnaire (attached as Appendix 26), as well as conducting the landholding asset inventories using an Android tablet device. Subsequent to this training, several pilot inventories and surveys were conducted with some households and farmers in Pirira Village on 7 August 2013. The findings from these pilotswere analysed and used as part of practical training workshops with the fieldworkers.

The first step in the inventory and survey process was to walk the entire mine's AoI (initially as per an infrastructural layout plan provided in 2013), around which a buffer zone of around 30m was drawn in order to define the study area and farms which might be affected therein. The same buffer area was continuously used to demarcate the AoI as some infrastructural layout changes were made by the proponent.

For logistical purposes, the walking footprint area was subdivided into different sections. Each section was assigned to one fieldworker and a TWG member who ground-truthed and walked each section on 8 and 9 August 2013 in order to identify the affected farmers to be surveyed and landholdings to be assessed (Plate 5.1). Prior to this, a representative from the DSEA placed a radio advertisement (in Portuguese and Macua) to inform and sensitise the surrounding villages to this process.



Plate 5.1: Transecting the study area and identifying cultivated landholdings, crops and structures to be assessed

A second notification was broadcasted daily over the radio (in Balama) for a week to inform all the landholding owners around the mine area to be on their machambas, or to send a household representative to their machambas during the survey periods. A household identification (ID) number was issued to each landholding owners (Plate 5.2). The same work procedure was employed for the follow-up survey and assessments periods.



Plate 5.2: A household ID number issued to each farm-owning household

The process went relatively smoothly as farmers seemed content to show their farms in the hope of receiving compensation for what they might possibly lose. This was illustrated by the fact that farmers literally waited in their fields every day to be surveyed.

5.2.3 Entitlement Sheets and Individual Cut-Off-Date Declarations

The Mozambique Mining Law of 2002 entitles the Mozambican Council of Ministries to establish a mining moratorium. However, as a matter of practicability, individual project compensation cut-off dates were established with each interviewed landholding owner. The cut-off-dates were incorporated into the entitlement sheets which were completed subsequent to each interview.

Prior to conducting the surveys and assessments, the DSEA and DSPI were consulted for guidance. The ministries agreed to witness the survey and assessment process on one occasion,

where after they would sign each landholding owner entitlement sheet as an act of endorsement and government approval. An example of such an entitlement sheet is attached as Appendix 22. Each sheet detailed the landholding owner, the size of the machamba landholding[s], the crops, trees and/or structures on the land, and assigned a household ID number. As each sheet was signed by a representative from the mine, the landholding owner and the abovementioned ministries, these sheets acted as individual declarations through which each owner was notified that any new machamba and/or structure will not be compensated by the mine after this survey.

The specifications on these sheets were also stated and clarified during most of the community meetings and TWG workshops. Theseincluded that nocompensation would be provided to any new machambas or structures. In this way, farmers were cautioned that any new machamba cultivated or structure erectedafter this survey period was vulnerable to being lost to the mine without compensation. However, as explained during the TWG and community meetings, farmers were encouraged continue with their normal livelihood practices (including farming and making normal alterations/improvements to their existing structures), as the time of land acquisition was still uncertain at that stage.

Copies of these signed individual entitlement sheets were provided to the Balama District Administrator. The original signed documents were filed by the mine and will form part of each affected household's compensation contract (refer to Chapter 7).

5.2.4 Data Analysis and Reporting

The data gathered by the surveys was captured into a Microsoft Access database. Using this database, a preliminary economic displacement budget could be calculated by producing a report of each farmer's household entitlement (refer to Chapter 8, Table 8.2).

5.3 Socio-Economic Context

5.3.1 Demographics of the Project-Affected People

Table 5.1 below presents the villages where the affected landholding households hail from.

Village	% of affected households from this village		
Maputo	29.8		
Nquide	23.1		
Pirira	21.2		
Balama	15.4		
Ntete	10.6		
TOTAL	100.0		

Table 5.1: Villages where the project-affected households live

As illustrated by Table 5.1, the largest percentage group of the households live in Maputo (29.8%), followed by Nquide (23.1). The least number of households affected are from Ntete (10.6%).

The average household size comprises approximately 4.5 members. This means that the total*de facto* population (i.e. current residents only) of the affected households comprise around 2,646 people who can be considered to be the PAP. This is the case since the project will not only affect landholding owners, but also their household members. However, it should be stressed that potentially more people might be dependent on these landholdings, as households generally have absent members who might come back to their households several months a year or only on weekends. The latter population is referred to as the *de jure* population, which accounts for all the people living in an area, including temporarily absent member.

Considering the gender ratio, it is apparent that females out-number males slightly, with 51.2% of the *de facto* population being female. The male-to-female ratio can be calculated at around 1:1.05.

Of all the affected residents, few seem to be physically disabled (only 1.6%). However, the mortality rate is very high. Although progress has been made in the provision of clinics and health services, the under-five infant mortality rate in Mozambique has remained constant at a high 138 per 1,000 live births in 2008 (World Bank, 2011). Concerning the studied population, this ratio is higher at 285.7 per 1,000 live births. The data indicates that the reason for this high mortality rate can largely be attributed to malaria and cholera-related diseases such as diarrhoea.

In terms of an age breakdown of this population, Figure 5.1below provides the different age categories:



Figure 5.1: Age breakdown of the Project-Affected People (PAP) (%)

As can be deduced from Figure5.1 above, the largest section of the population is 18 years or below (58.4%). This is more than half of those studied, and suggests a very young affected population. This data makes sense, as the district's populace is very young according to the Mozambique Census of 2007 (54.7% for the same category) (Republic of Mozambique, 2007). About 34.6% of the population are of school-going age (between seven and eighteen years), whilst very few people seem to be above 65 years of age (1.4%). It should be noted that the ages of 3.9% of household members were unknown; however this only accounts for an insignificant proportion of the population.

All the villagers appear to be affiliated to the Macua Tribe, with Macua as their first language. Only about 20% of the households confirmed that some members in their household can speak Portuguese. In terms of religion, most households (84%) identified themselves as belonging to the Islamic faith. About 16% belong to the Christian faith.

5.3.2 Household Dynamics

5.3.2.1 Overview

Although not every household member will be directly affected by the economic displacement of landholdings (mostly machambas), it is still vital to understand the dynamics of all the affected households as machambas contribute to the livelihood and food security of an entire family and not just a farmer.

5.3.2.2 Membership

The average household size is around 4.5 members (*de facto* population). This figure concurs with the Mozambique Census data of 2007, indicating that around 50% of the households in the district have between four and six members. The great majority of the households are male-headed (around 89%); a figure which is significantly higher thanthat gathered during the afore-mentioned census, which estimated that the district has around 69% male-headed households.

The majority of the study population appears to be closely related family members consisting of parents and children within households. This is indicative of nuclear families. Approximately 12% of the population consist of extended family members, such as nephews or nieces, brothers-or sisters-in-law, or adopted children.

5.3.3 Socio-Economic Living Conditions

5.3.3.1 Education

A primary school is located in each of the four affected villages. The educational status of those members 18 years or above is illustrated in Figure 5.2 below:



Figure 5.2: Education status of the project-affected households (%; 18 years or above)

As can be deduced from Figure 5.2 above, a significantly high 55% of those members who are 18 years orolderdo not have any education. Only some 3% completed primary school, whilst 5% completed some secondary school. Of those members who are of the school-going age of between six and 18 years (817), only 442 (i.e.54.1%) are currently attending school. Of these school-attending members, a nearly similar percentage is enrolled in primary and secondary schooling.

In summary, the data indicates that very few children are sentto school. This finding makes sense by reflecting upon the 2007 census data, which points out that around 28% of children in the district between six and 18 years do not attend school. Although the percentage obtained by this RAP's survey is higher than the data for the district, the subsistence agricultural lifestyle of these households might motivate parents not to send their children to school so they can assist on the machambas, or herding cattle and goats. This finding cannot be substantiated by primary data, but from observations, children are frequently seen doing chores around households such as looking after babies or herding goats.

Of those children who are attending school, most aresend to Balama for secondary education, whereas one household confirmed that their children attend a school in Montepuez.Yet, few households have money for public transport to send their children to Balama's secondary school, whilst there is no public transportation service.

5.3.3.2 Health

A separate Health Impact Assessment (HIA) was conducted in (Digby Wells, 2013). In summary, the assessment identified several health challenges in the communities concerned. Some of these include foremost Malaria as a major issue, whereas HIV/AIDS has also been identified as a prevailing problem in the area. The HIV/AIDS prevalence rate amongst the studied communities is

estimated to be around 6-8%. There is a concern that this might increase, especially related to a possible increase in sexworkers. Poor access to drinking water, compounded by poor sanitation facilities contribute to poor living and health conditions. In addition, malnutrition and micronutrient deficiencies have also been identified as key challenges in the area. The latter are generally linked to food shortages and poor feeding practices.

5.3.3.3 Water, Sanitation and Waste Disposal

Wells with hand pumps have been constructed in all the villages, many provided by the proponent. In addition, all villages have several boreholes without hand pumps (*cf.* CES, 2013a). It is therefore not unexpected that most households (98.8%) indicated that they obtain water from a well. No well has been identified inside the mine's AoI. Four households indicated that they have a tank from which they obtain water. Although some (9.2%) described the water as sometimes dirty, water seems to be drinkable and sufficient. However, the SIA highlighted a concern amongst some villagers regarding future water availability and the quality thereof. Many villagers request the developer to construct more wells, as some claim that water access is unreliable during the dry season.

Lastly, in terms of sanitation and waste disposal, the bulk of the households use their own selfconstructed pit latrines (94.7%), whereas nearly all bury and burn their waste. Some also feed some of their waste to their livestock.

5.3.3.4 Energy

As there is still a limited supply of government electricity in the area, the predominant form of electricity is from generators or solar panels, lanterns, wood or charcoal. Access to energy sources is indicated in Figure 5.3below.



Figure 5.3: Energy access of the project-affected households (%)

Most households use wood as their main source of energy. The dependence of wood for household energy sources is substantial, and confirms villagers" dependence on natural resourceuse. Some of the local trees harvested for wood include the locally named *Mpari* and *Mphacala* trees. The rate at which locally occurring trees have been reduced in the area is noteworthy, mostly from eye-witness accounts. The area"s flora and forests have largely been stripped by local resource-use, leaving only isolated remnants in inaccessible landscapes. Yet, some trees are not felled as they either have cultural significance, or have been introduced in the area for economic purposes (such as the Cashew).

Approximately 1% of households seem to have access to electricitythrough generators and batteries.

5.3.3.5 Communication, Markets and Transport

Households were asked to elaborate upon the means used to receive or convey important information or news. The radio is predominantly used for this means, whilst the elders and/or chiefs are important information bearers. The local radio station is called Mpharama, with broadcasts in Portuguese, Emakwua and Makonde.

In terms of markets, most villages have their own shops. Items sold or bartered vary from food items and agricultural produce to charcoal, medicine and general equipment. For a wider range of bulk grocery items, most of those households studied (75.8%) frequently travel to Balama, usually on a monthly basis. A number of households also visit the local trading outlets in Maputo (16.5%), whereas 2.4% seem to use Nquide's markets. Men and women share this duty of going to markets, although women are primarily responsible for obtaining food-related items. Most households (55.7%) spend less than 500MZN (\$16.8) on groceries, around 38.9% between 500-3000MZN (\$16.8-\$101.2), with very few (5.4%) spending more than 3000MZN per month.

The primary mode of transport is bicycles (51.0% of households use bicycles), whilst walking is still the predominant means of mobility. Some also use local taxi services, although this is an expense few can afford. Approximately 5% of households also indicated the use of motorbikes for transport. Even though regularly graded, the gravel roads, such as the main R242 and smaller village-feeder roads, are frequently in a deplorable state, especially after heavy rains during the wet season (December-March).

5.3.4 Household Livelihood Strategies

5.3.4.1 Occupation

Apart from government and community service employment opportunities in Balama, no formal employment opportunities exist in the area. Most households live off subsistence farming and local, informal trade.

Using the data from the RAP survey as a baseline, the strict unemployment rate can be calculated. This rate is expressed as a percentage of those members who are unemployed within the labour force. The labour force constitutes village members in the working-age group (internationally accepted as between the ages of 15 and 65) who are capable of working. The labour force excludes home-keepers and disabled members, but includes informal workers such as self-employed members (on-farm workers not earning a formal salary, for example).

Occupation	N	% (of total <i>n</i>)
Own farming/fishing	302	87.3
Job-seekers (unemployed)	35	10.1
Formally employed	7	2.0
Informal trading	2	0.6
TOTAL	346	100.0

		<i></i>		
Table 5.2:	The labour force	of the Project	-Affected People	(PAP)

The unemployment rate of the PAP can be calculated at 10.1%. The reason for this rate is the fact that around 87.3% of the labour force are involved in own farming or fishing, which constitutes informal employment. The SIA estimated the area's unemployment rate at 21.7%, which means that slightly more people directly affected by the project are involved in own household farming. The unemployment rate of Mozambique was calculated in 2012 at around 27%, with most employed people living in urban areas (Macauhub, 2012).

Of those seven members who are formally employed, two seem to be employed by Syrah, whilst the rest are employed in Balama in government services. It should be stressed that this data largely reports upon data gathered in 2013, and that slight changes to occupations and formal employment numbers are expected.

5.3.4.2 Income and Expenditure

During the survey, respondents were asked to indicate how much income their households receive from a variety of sources. Table5.3 below provides the types of income received against the number of household members who indicated each type of income source.

Table 5.3: Project-affected household incomes and expenditures

Household Incomes	% (of total households)
Farming income	71.7%
Livestock sales	30.3%
Farm labour income	14.5%
Selling productive tree fruit	14.5%
Selling charcoal	12.1%
Remittances	7.5%
Informal piece-jobs	5.6%
Local trading	4.4%
Formal employment	2.0%
Rent	1.5%

As illustrated in Table 5.3 above, the majority of the affected population (71.7%) seem to receive some income from on-farm self-employment, selling their produce and harvests. This is followed by almost a third of households (30.3%) that obtain an income from livestock sales, whilst a similar number of households appear to receive money from farm labour (working on someone else's farm for money) or local trading (14.5% each). Few households obtain money from selling charcoal (12.1%), whereas even less receive money from remittances, formal or informal employment, local trading or renting. These findings are also depicted in Figure 5.4.



Figure 5.4: Project-affected household incomes (%)

Most households (67.1%) affirmed that they share or "pull" income or money within their households. This suggests that employing one member in a household will have a significant positive socio-economic impact on a household's ability to economically sustain itself and be resilient to economic shocks.

Table 5.4 below provides the average monthly income from various income-earning sources.

Income Categories	Average Monthly Income (MZN)	Average Income (US\$)
Formal employment	4 096.70	\$137.9
Farming income	2 393.1	\$76.3
Informal piece-jobs (informal employment)	2 005.00	\$67.5
Remittances	1456.3	\$49.0
Selling charcoal	1123.1	\$35.8
Livestock sales	866.4	\$27.6
Rent	766.7	\$25.8
Farm labour income	525.4	\$16.8
Selling productive tree fruit	311.8	\$1.0
Local trading	300	\$9.6

In terms of the income or money received on a monthly basis, what is noteworthy is that the largest income source is derivedfrom formal employment. Most of those who are formally employed receive around 4,096.7MZN per month (\$137.9). This is followed by farming income, calculated at an average 2,393.1MZN (\$76.3) on a monthly basis for those households who do receive such income. Most of such income is from selling harvests alongside the streets or roads (taking advantage of people commuting between towns), although many also send their produce to larger areas such as Balama or Montepuez. The importance of selling charcoal is also highlighted by the fact that income from charcoal is the fifth largest income source, brining in approximately 1,123.1MZN per month (\$35.8). Livestock sales (predominantly chickens and goats) contribute approximately 866.4MZN (\$27.6) on a monthly basis to those households who receive this income. Lastly, informal street vendors or shops account for around 300MZN per month (\$9.6%). Such trading also involves selling logs, bamboo poles or wood products ranging from chairs to beds etc.

In many rural areas, money is not the only form of trading and exchange. Rather, the use of livestock or agricultural products for such purposes is well-documented in rural areas, relying on informal inter- and intra-household relationships of trust and cooperation. When asked what form of currency households normally use for buying purposes, 52.3% indicated that their households also use their farming produce and, sometimes, livestock (mostly chickens) as a form of exchange and trade.

Lastly, in terms of expenditure, food, clothes and household materials account for most of the households" monthly expenditures. However, expenses related to traditional ceremonial practices and funerals are also significant.

5.3.5 Natural Resource-Use and Ecosystem Services

The term "ecosystem services" is used to distinguish between an array of resources and processes supplied by the natural environment (or ecosystem) that is used by people, and refers to the following:

- The use of natural water from rivers and boreholes;
- Using and planting fertile lands for agricultural production (through shifting and rotational crop cultivation practices);
- Natural resource-use, such as plants (for cultural, subsistence, commercial and/or medicinal purposes) and wood (for energy or selling, such as to make charcoal); and
- Culturally significant sites (refer to Figure 1.2) that are normally associated with particular forested areas, hills or naturally occurring trees and plants.

Figure 5.5below collates all the natural resource-use activities which the villagers are engaged in.



Figure 5.5: Project-affected households "*natural resource-use (%)*

What can be inferred from Figure 5.8above is that most households are engaged in collecting firewood (95.6%), gathering grasses and reeds for house roofs (94.6%), collecting and using sand and clay (65.4%) and using medicinal plants from the surrounding woodland forests (53.5%). The dependence on wood and/or bamboo poles is also significant, as nearly half of the households (45.0%) use this either for their own household- and/or farm-related structures, or for selling. Apart from this, slightly fewer households (40.7%) are engaged in making charcoal, which is normally sold at local shops or next to the roads.

Certain trees which are used for their timber include the local *Chanfuta, Umbila, Jambire* and *Moco* tree species. The local *Mphacala* tree is apparently a very good wood for charcoal-making, whilst some trees are specifically harvested for their firewood potential, such as the *Mphacala, Mpari, Chanfuta* and *Jambire* tree species. With the mining development, access to wood will certainly become further restricted, as the low-lying areas of the Graphite inselbergs to be mined are extensively utilised for wood gathering.Lastly, what should be noted is that very few households are engaged in hunting (only 2.2%), and few use the area for grazing their livestock (3.4%). This makes sense, as only around 4% of households that practice animal husbandry have cattle or sheep that require large open areas for grazing. Most households that have livestock have chickens, ducks and goats that usually graze around the residential areas.

In terms of gender roles, the bulk of the natural resource-use activities listed above are performed by men. However, particular tasks are practiced by women, and particularly girls, such as fishing and shrimping, collecting grasses and reeds for thatch, as well as gathering wood.Agriculturalrelated work (brushing, ploughing and planting, for example) is largely shared between all household members, although onerous tasks, such as tree felling, tend to be performed by men. Men are also largely involved in farm work, looking after livestock and shelter-building.

5.3.6 Agriculture

5.3.6.1 Machambas

The combined area of all the machambalandholdings is around 1,086.31ha, with an average machamba size of 1.6ha.The largest machamba recorded was 7.6ha, whereas the smallest field was 0.04ha.

5.3.6.2 Agricultural Crops

All the households practice rain-fed, rotational crop agriculture. Few households practice shifting cultivation, which entails the clearing of new fields every five to 15 years as soil quality reduces. It seems that water is not used from the Chipembe Dam or local rivers, such as the Namiticu River, for this purpose. This form of agriculture is practiced in those areas where ample land is still available.

Fields are intercropped with a number of traditional crops, with the predominant agricultural activity in the region revolving around maize and cotton production. Maize and cotton are planted at different times of the year, either on different machambas or the same ones, after these have been cleared post-harvest. Cotton production is labour-intensive, and harvests are dependent on the locally available labour supply at the time. Seeds for maize and cotton are frequently distributed by the government through the Ministry of Agriculture (MoA), but also by local companies such as cotton producers (Plexus Cotton Ltd.; refer to CES, 2013a).

At the time of survey, approximately 26.0% were not planted with any crops, as lands have recently been cleared or harvested. Of those remaining machambas that were under a cropping regime, most were intercropped with cassava and peas,predominantly for subsistence purposes. Table5.5belowdepicts the crops planted as a percentage of those productive machambas under a cropping regime:

Crop Planted	% (of ProductiveMachambas)
Cassava	83.1
Peas	81.8
Maize	27.9
Beans	22.1
Mapira	8.4
Millet	7.1
Ground nuts	5.8
Sesame	3.9
Tomatoes	3.2
Cotton	1.9
Corn	1.3
Peanuts	1.3
Cabbage	0.6

Table 5.5:Agricultural crops planted on machambas inside the mine's Area of Influence (AoI)

Clearly noticeable from Table 5.5above is the fact that, at the time of study,cassava, peas, maize and beans were the primary crops being planted and harvested.

The cultivation of cassava is significant, and illustrates the degree to which households are reliant on this crop in times when fields have been harvested and/or cleared. Cassava is a versatile and attractive crop to plant in rural areas, as it tends to assist households with overcoming periods of food insecurity, especially during the hunger season (normally the wet season). In this way, producing cassava is a way to supplement or even replace other food sources (*cf.* Prudencio and Ai-Hassan, 1994). A very small number of machambas also had intercropped supplementary crops such as spices, okra, onions and peanuts.

Harvests also serve an important function in terms of informal exchanges and bartering. For example, the consultant observed cassava, beans, maize and vegetables being used for informal exchange between households. This practice is widely adopted in many rural areas where people are accustomed to barter with agricultural produce *in lieu* of money. The reason for this is that, in remote and rural areas, money may have more limited functions in the absence of large markets and informal trading centres. Agricultural produce and livestock, alternatively, can fulfil a range of functions, as food, for sale, or for cultural purposes. It therefore makes sense that many householdsmake use of agricultural products as a means of informal exchange.

5.3.6.3 Agricultural Crop Seasons

Different crops are planted and harvested during different time intervals throughout the year. These activities seem to be performed by both men and women. Table 5.6below roughly identifies the different planting and harvest seasons for the most common crops planted:

Сгор	Start of Planting Season	Start of Harvest Season
Cotton	November/December	July
Maize	November	April
Beans	December	March
Cassava	December	July-August
Sesame	January	June

 Table 5.6: Agricultural crops seasons

It should be noted that most crops are actually harvested on an *ad hoc* basis throughout a particular period of the year. For example, although the estimated harvest season for maize is said to be around April, entire maize fields are not harvested all at once. Cassava is another point in case, as this crop is actually harvested throughout the year.

Information on this "agricultural calendar" is important in order to understand how the mining project will affect the villages during particular periods of the year.

Although it is very difficult to generalise, it seems that November to January/Februaryis the crop planting season, which coincides with the rainy months. For the most part, the majority of rural households in the area plant their maize in November and harvest it from April. The dry months are normally associated with harvesting and selling produce. In terms of gender roles, men are normally responsible for heavy duty work, such as clearing land for cultivation. Women, on the other hand, are often more involved in hoeing and weeding.

5.3.6.4 EconomicTrees

Apart from agricultural produce, households are also reliant on economic trees. Economic trees were identified on about 436 of the 677 landholdings (hence on 64.4% of the machambas). Saplings were also counted as mature trees. Table 1.3 provided an inventory of these trees. As shown, the numbers of Banana, Mango and Cashew trees are substantial (3,886, 3,369 and 1,689 respectively). Income from these trees can be significant, and a major economic contributor during poverty cycles and hunger months (Table 5.3 indicated that 14.5% of households obtain an income from productive trees in general).

5.3.7 Food Security

In rural areas, food security can be a challenge. Although most households have farmlands, selling agricultural produce is always an attractive and often tempting means to obtain needed income. This has the unintentional consequence of food insecurity; a situation which is obviously worsened by erratic weather conditions, droughts or floods which reduce harvests. Added to this is the issue of land loss which might worsen food security for the majority of the people if the mine does not assist those affected by identifying alternative land and providing agricultural support (also refer to CES, 2013a). Sufficient measures are proposed in this report, however, in order for the affected farmers rather to benefit from a food security perspective.

One means to quantitatively assess food security is to measure a households" food and product consumption. Respondents were asked to recall and list all the food types which they had consumed in the last week. This data is presented in Figure 5.6below.



Figure 5.6: Project-affected household food security (% of households)

What can be deduced from Figure 5.6above, is that more than two thirds of the households (66.8%) seem to consume Nshima (a cornmealstaple food) or Nshima mash on a weekly basis, whereas nearly half (47.5%) eat peas. A smaller, yet also significant percentage of households regularly consume beans and rice (26.6% and 24% in this order). Fewer household members (yet nearly equal quantities of households) appear to have eaten cassava, fish and chicken (12.6%, 12.3% and 12.1%). It should be noted that this data is highly dependent on the time of survey. For example, during the assessment period, most machambas have been harvested and burnt, making corn and peas (which farmers tend to leave to dry on the plant stems) some of the only harvests available for subsistence purposes.

Lastly, it would appear that most households (87.9%) share their harvests and food with other households. This suggests strong inter-household social relations and food support patterns. Sharing food might also reinforce implicit moral contracts between households, which refer to social "obligations" between households, which many rely upon as a livelihood coping response in times of stress or, in this case, food insecurity.

Households were asked to list the months which bear the highest potential for food insecurity. To this question, most indicated the months from January to March, which are the wettest months, just before the dry period sets in. This finding makes sense, since few households are able to harvest during the wet season as crops are probably not yet mature. Many respondents also referred to floods which were experienced in the last few years; intense rainfall which affects harvests significantly. In this view, many stressed that they are, in fact, food insecure, as families struggle to obtain sufficient harvests to sustain their households.

6. ENTITLEMENT FRAMEWORK AND LIVELIHOOD RESTORATION

6.1 Overview

Under PS 5 of the IFC, appropriate compensation packages should be offered to those affected at full replacement cost. Aguiding principle is to allow beneficiaries to restore or improve their standard of living or livelihoods. Compensation measures should be transparent and need to be applied consistently to all those affected. Moreover, land-based livelihoods should be compensated with land-based compensation packages. This means that, apart from affected and/or lost crops, trees and associated structures, machamba land needs to be replaced with alternative and equivalent land by the GoM. Although this is the responsibility of the Government, for international funding purposes, the proponent is expected to intervene since the Government's capacity to deal with land replacement is very limited. Therefore, the proponent's commitment to ensure that alternative land has been provided and prepared will be measured against the IFC standards: "[...] where government capacity is limited, the proponent will play an active role during resettlement planning, implementation, and monitoring" (IFC, 2012:p.7).

This chapter provides a mechanism for designing and disclosing compensation packages to all farmers that might be affected as the mine develops, and needs to be adopted by the client.

The chapter is divided into the following sections:

- Household Eligibility and Entitlement Matrix;
- Compensation Valuation Methodology;
- Replacement and Compensation of Agricultural Land;
- Preparation of Replacement Land;
- Compensation of Annual Crops;
- Replacement and Compensation of Perennial Trees;
- Compensation for Communal Resources;
- Payment of Compensation; and
- ➢ Re-burials of Graves.

The chapterhas been drafted to mitigate the negative consequences of recent resettlement projects in Mozambique, as reported on by NGOs. It is largely based upon CES's field-based experience with similar projects in Mozambique.

6.2 Household Eligibility and Entitlement Matrix

Household eligibility refers to the conditions which a household needs to meet in order to be eligible for compensation. Several criteria would need to be met in order for households tobe entitled to compensation by the mine. Eligibility basically stipulates who is entitled to what forms of compensation; and how such entitlements will be delivered.

The following eligibility framework has largely been established based upon the household surveys and farmland assessments conducted in 2013, and meetings held with the PAPsthrough the established TWG. Moreover, it adheres to the legal framework of Mozambique regarding compensation (GoM, 2012), as well as the standards of the IFC and World Bank. The chapter should be used as a framework to be amended and finalised during the implementation phase of the RAP, during which more consultations with the PAPswill need to take place.

The households that will be economically displaced canbe roughly divided into six eligibility criteria categories. These six categories are provided in Table 6.1 below, together with the appropriate compensation packages that should be offered under each category. These compensation packages should be stipulated in each affected household's entitlement contract (*cf.* Chapter 8).

Note that a single household could fall into more than one category. It should also be noted that the packages will still be discussed with the TWG during a next site trip.

Eligibility Criteria Categories	Definition	Compensation
Category 1	Those farmerswholive outside the mine's AoI, which will be losing machambasinside the mine's AoI	 Crop compensation (including grains); Replacement land; and At least 8 months enrolment in the mine"s Farmers Development Programme consisting of agricultural assistance to establish new field(s)during the land acquisitionprocess (see Section 7.3.2.2 below). This will include assistance to establish their new fields.
Category 2	Those farmerswho live outside the mine's Aol,but losing associated structures inside the mine's Aol	An option will be provided to each beneficiary between either a cash payment, or for the mine to rebuild their structure at a suitable location
Category 3	Households affected by the loss of graves	Grave re-burial must be provided in accordance with Mozambique regulations, as well as compassionate allowances, which might either include a fixed sum of cash, or animals for slaughtering, or sponsoring a re-internment ceremony etc. The process to be adopted for such entitlements will be finalised at the time of implementation.
Category 4	Those farmers who live outside the mine's Aol,but losing economic trees inside the mine's Aol	Entitled to payment for treesas per the Government rates. All trees are counted as mature trees.
Category 5	Those households who live outside the mine's AoI or additional areas who will lose access to natural resources for either livelihood or cultural considerations	The conservation areas proposed in the Vegetation and Floristic Specialist Study (2014) will be managed by the mine and communities in a sustainable manner
Category 6	Any farmer who can prove to the mine"s Social Department that they/she/he is a member of a vulnerable group	 Apart from the above-mentioned compensation, vulnerable groups should be entitled to full support from the mine in order to prepare their new land. This includes, but is not limited to: Assigning someone to assist the household/farmer to prepare the new land; Transportation assistance and costs as needed; and Monitoring and evaluation; and Additional/extra measures will apply to such people, to be discussed during the implementation phase.

6.3 Compensation Valuation

6.3.1

Compensation Valuation Methodology

The following section is a methodology for evaluating impacted resources and for developing compensation packages. Several RAP international good practice principles are being applied below, such as the following:

- The proponent will offer economically displaced persons compensation for the loss of assets (including crops, economic trees and secondary structures) at full replacement cost (which is defined as the market value and asset transaction costs), as well as other assistance necessary to help them improve their standards of living or livelihoods;
- Alternative machamba land of the same or better value will be offered by the GoM for eachimpacted machamba to the respective farmer. The proponent, however, shall play an active role in assisting the Government to assess and allocate such alternative land;
- No landholding shall be acquired/disturbed by the project prior to the allocation of alternative land for each affected farmer by the mine through the District Resettlement Commission;

- No land will be acquired/disturbed prior to a notification period informing the affected farmers of land acquisition (this will form part of a sensitisation campaign during the payment procedures); and
- No structure/economic tree shall be affected/demolished prior to the provision of compensation.

The methodology that was used to evaluate the loss due to displacement in economic terms has been guided by the current methods of compensation strategies being used by the GoM and the District of Balama. In addition, other methods used in recent resettlement exercises undertaken by EOH CES in Mozambique have also been applied, whilst guidelines from the IFC have also been consulted.

As part of the farmland assessment process, most of the landholdings have been identified and linked to anID number. During this process, each landholding size was calculated, whereas all the secondary structures and features (such as grave sites, boreholes etc.) on the landholdings were marked. This assessment methodology was described Section 5.2.

Mozambique MoA's standard rates for crops and trees were applied in the valuation of compensation for crops and trees. In terms of crop compensation, amaximum production value method was applied in calculating entitlements. This will be explained in this chapter.

6.3.2 Discussing the Compensation Valuation Methodology with the Affected Farmers and Government Officials

The compensation valuation methodology was disclosed in May 2014 to the District Resettlement Commission, the TWG members, as well as to all the affected farmers (refer to Section 4). These meetings prompted much discussion regarding the proposed compensations strategies, which is presented in Table 6.2 below as an Issues and Response Trail. After the firstly disclosure period in May 2014, the compensation methodology discussed in the following sections has been amended in response to these issues and responses.

Issue Raised By	Meeting and Date	Issue Raised	Response Provided
Ms Laura Anthony (DSEA)	TWG Meeting 5 - 12 May 2014 (refer to Appendix K)	Requested to know how the mine would compensate a farmer if, by the time of compensation, a particular farmer has nothing planted on his/her machamba.	Ms Saranga explained that the compensation would be based upon the individual entitlement sheets which have been signed during the machamba assessment period. Moreover, compensation is based upon the maximum productive value of the land. This calculation does not dependent on whether the farmer had any crops on his/her machamba at the time of survey.
Regulus Mualia (Community representative of Maputo)	-	Requested to know how the mine would compensate a farmer if, by the time of compensation, a particular farmer has no fruit trees planted on his/her machamba.	Mr Celia Panquene (Syrah) explained that all the affected farmers would benefit by means of some seeds and fruit seedlings.
Antomane Majerica	RAP Disclosure Meeting in Pirira - 16 May 2014 (refer to Appendix M)	Requested that the mine compensates them for all the manual labour that they have invested in their machambas.	Ms Saranga clarified that the mine would not be paying for land, as alterative land would be provided to ensure that the communities can continue with their subsistence agriculture.
Rajabu Mussa		Inquired whether he would receive any compensation if he has no fruit trees.	Ms Saranga assured that the mine would assist all the affected farmers with some seeds.
Virgílio Antunes Nagera		Expressed a concern that the mine erected some structures on his machamba, for which he was never consulted.	Mr Célio Panquene (Syrah) assured him that the mine would inspect his machamba and resolve the issue.
Assamo Calmane		Inquired how farmers would be compensated if, at the time of compensation, no crops have been planted on their machambas.	Mr Célio Panquene (Syrah) assured the farmers that all those affected would be assisted with seeds.
Eugénio Augusto	RAP Disclosure Meeting in Ntete - 14 May 2014 (refer to Appendix M)	Required about the issuing of ID numbers. He was issued with an ID number, but his name was not called for the meeting.	Ms Saranga clarified that only those farmers whose machambas are located inside the mine's Area of Influence were called for the meeting, as only these farmers are affected. Therefore, Eugénio Augusto's farm does not

Issue Raised By	Meeting and Date	Issue Raised	Response Provided
			fall within the mine's footprint area. She
			informed him to save his number, as more
	-		machambas might have to be surveyed.
Julião Kaue		Noted that there is no alternative land around Ntete, and inquired where their new farms would be.	Ms Saranga noted that the government representatives are still in the process of assessing alternative land. She noted that this is a complex process, and that no definite answer can be provided at this stage.
Issa Abude		Noted that he has an alternative piece of land, however that this land is smaller than his current land. Inquired what the mine would do in such a case.	Mr Celio Panquene noted that the mine would assist farmers to have the same or improved living standard after land acquisition. Should a farmer have alternative land, the mine will assist the farmer to expand his/her farm. He further noted that the mine would assist all the affected farmers with seeds and seedlings, whilst those who require preferential treatment, would receive additional support. The mine will be responsible for arranging an assistant to help the farmer with his/her new land.
		Noted that alternative land might not be available.	Ms Saranga stated that, although the provision of alternative land is the responsibility of the government, the mine would assist in this process. She then asked the farmers to help in this process by searching for alternative pieces of land, which the mine would assist them with in terms of clearing the land etc.
Lourenço Gimo	RAP Disclosure Meeting in Nquide -	Inquired whether they could continue to work on their machambas if they received an ID number during the farmland survey process.	Ms Saranga assured all the farmers that they could continue to work on their machambas, and that no farmer should stop to work on his/her land. However, new structures should not be erected in their fields.
Nicula-Martins	Nicula-Martins		Mr Celio Panquene stressed that the mine would record such cases and provide additional assistance as needed. Such assistance might include hiring more people to assist such farmers with their fields etc.

Final Resettlement Action Plan of the Balama Graphite Mine – September 2014

Issue Raised By	Meeting and Date	Issue Raised	Response Provided	
Sueti Nicula		Inquired how farmers are supposed to proceed with their machambas and whether they could continue to work on their fields.	Ms Saranga explained that the mining development will be gradual and that no farmers should stop farming. She assured all the farmers that they can continue to farm as usual.	
Jacinto Agostinho	RAP Disclosure Meeting in Balama -	Noted that he has land in Ntete which he would like to start cultivating and whether he is allowed to do this.	Ms Saranga assured him that he is allowed to continue to work on his new land. A degree of caution was just raised with regard to erecting new structures, especially for those who have received an ID number (those whose land is thus affected).	
Calisto Bartolomeu José Lopes	15 May 2014 (refer to Appendix M)	Inquired how the mine compensated farmers for the erection of some electrical power posts near the current camp site, and how those farmers are supposed to find alternative land.	Ms Antonio (DSEA) noted that the Ministry of Agriculture is in the process of determining how the mine should compensate for such crop losses.	
Amida Ante	RAP Disclosure Meeting in Maputo	Complained that his machamba was disturbed by the mine without him	Mr Celio Panquene recorded the farmer's name and invited him to approach the mine in order to ascertain the degree of disturbance to her field and to take this forward.	
	16 May 2014 (refer to Appendix M)		Grievance Mechanism and that they should use this for formalising complaints with the mine.	
Augusto Amir	Augusto Amir		that they can continue to work on and cultivate their machambas.	

Draft Resettlement Action Plan of the Balama Graphite Mine – August 2014

6.3.3 Replacement of Land

6.3.3.1 Allocating Replacement Land

Applicable to eligible categories 2 and 5 (Table 6.1). Table 1.3 indicated that around 667 machambas might need to be economically displaced, with a combined size of 1,086.31ha. These farms are shown in Figure 1.3, whereas figures 6.1-6.3 map each landholding with each owner's assigned ID number. As the maps indicate, 10 landholdings comprise homesteads which should not need to be involuntary resettled.



Figure 6.1: a_Possible affected landholdings with each owners" ID number



Figure 6.1: b_Possible affected landholdings with each owners" ID number

67



Figure 6.1: c_Possible affected landholdings with each owners" ID number

It should be stressed that more machambas might be identified during the implementation phase of the RAP, whilst some of the identified ones might not be affected by any development.

The term "replacement costs" for land is defined by the World Bank's OP 4.12 as:

"[...] the pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes" (World Bank, 2011: Footnote 1).

In Mozambique, all land is vested in the state, although customary land is also recognised under the Land Act No 19 of 1997 and Decree No 66 of 1998. As the findings indicate, most of the land affected by the project is held under customary law by the Macua Tribe. The land market in Mozambique is therefore weak in rural areas where no or minimal market value is attached to land, despite the productive potential of the land. Discussions with the DSEA brought out the fact that the GoM is responsible for finding and allocating alternative farmland for those households whose land has been acquired or damaged by projects. Therefore, no replacement value has been assigned to affected landholdings since cash payment will not be provided for acquired land. One of the objectives of the farmland assessment process was to measure each affected machamba in order to provide beneficiaries with at least the same alternative land size with a similar or better production value and locational advantage. Alternatively, ways of improving productive potential, through various interventions, is a further option so that smaller parcels of land (but producing the same amount of crops) can be identified.

The mine will apply the following principles to this process:

- Replacement land should be provided to each affected farmer following compensation payment, and needs to be an interactive process between the mine, the affected farmers and communities. Each affected farmer should agree on the location of the new land, the quality of the land (soil composition etc.), as well as the distance of the new land to the respective household's physical house and social networks. This should form part of an individual discussion with each affected farm owner, who shall sign a document in which he/she expresses satisfaction with the new land;
- Prior to any land clearing that affects a farmer's machamba or any secondary structure thereon, replacement land should have been provided through the mine's Social Department and the District Resettlement Commission. Replacement land should be a consultative process, during which each affected farmer should state his/her preference of the land to be provided;
- Throughout this process, the Grievance Mechanism will be used for any farmer to lodge complaints/issues and/or concerns; and
- New land will not be registered under a farmer, as the land is collectively held under the Macua Tribe.

Should affected farmers have alternative land, the following procedures will be adopted by the mine's Social Department:

- The Social Department should identify and assess the alternative land, ensuring that the land exists and meets particular requirements of the farmer (such as being suitably located from his/her household and market access etc.); and
- The field should be recorded primarily to ensure that it can be used by the affected farmer without any other claim to the land; and
- Each new area for each farmer should be demarcate and assigned accordingly during the compensation payment period.

Affected farmers who do not have alternative land will be provided with farming areas. Ideally, the total machamba land to be acquired should be equal to the total replacement land to ensure that all effected people get the correct amount of land elsewhere (this will limited future grievances). At the time of finalising this report, two areas with a combined total of 247.71ha have been selected by the District Resettlement Commission (refer to Plate 6.1 below and Figure 6.2). Although more land might possibly need to be identified by the commission, it is also expected for many farmers to have their own alternative land.

On 22 August, a site visit was undertaken by Ms Saranga, Mr Snow and Mr Julio Maboti (from the DSPI) to these two areas around Ntete and Maputo.



Plate 6.1: The one land parcel outside Maputo is being demarcated with a "land reservation" board being erected

Currently, neither sites fall in any ecological or socially significant areas. The parcels of land were found not to be subject to any significant environmental impacts, such as soil erosion or capable of being flooded. Table 6.3below shows the average time to get to each site from the villages currently assigned to each field. The FDP sites should be as close as possible to the villages.

Tete	FDP Site	Size	Distance (km)	Walking time	Bicycle time	Vehicle time
Maputo	Maputo	138.67ha	5.67	1:08:02	0:27:13	0:05:40
Pirira			8.96	1:47:31	0:43:00	0:08:58
Ntete	Ntete	109.04ha	5.78	1:09:22	0:27:45	0:05:47
Nquide			12.26	2:27:07	0:58:51	0:12:16

Table 6.3: Alternative Land

During the RAP's implementation phase, all the machambas inside these two pieces of land will be surveyed in order to make sure that there are no existing farms. Should there be any possible conflict over land-use or rights, this should be resolved through the mine's Social Department and the District Resettlement Commission. Thereafter, prior to preparing the land, the areas will be demarcated with 50m intervals and painted pegs.

Final Resettlement Action Plan of the Balama Graphite Mine – September 2014



Figure 6.2: The Alternative Land (marked in light green and purple)

71

	EÓH			
EOH Coastal and Environmental Services				
awn by: Justin Green				
te: 1	8.09.2014			
S Pro	oject Code: 178			
	TITLE:			
	FDP Land			
	PROJECT:			
G	Syrah Balama iraphite Project RAP			
ege	end			
Ð	Balama			
•	Ntete Village			
•	Nquide			
•	Pirira Village			
Ð	Maputo Village			
	Site Access Road			
-	FDP Land - Maputo			
-	FDP Land - Ntete			
-	Lease Boundary			
	Camp Site			
	TSF			
	Waste Dump			
	Stage 1			
17	Balama East			
	Balama West			
	ROM PAD			
	Plant Site			
	Future Plant			
	Raw Water Pond			
	Plant Contamination Pool			
	Conservation			
	1 2 3			

6.3.3.2 Preparation of Replacement Land through a Farmers Development Programme

The IFC advocates that livelihood improvement measures need to be in place for any economic displacement project, in order for the PAPs to improve, or at least restore, their income-earning capacity. In addition, Mozambique's Regulation on the Resettlement Process Resulting from Economic Activities (2012) bestows the responsibility of land-use planning on the district government to provide technical assistance, such as to reserve areas for alternative land-use.

Access to alternative land has been identified as a possible limitation, requiring alternative means of compensating for land-loss. Although many affected farmers did indicate to have their own alternative land for agriculture, many need to be provided with alternative land by the District Resettlement Commission in accordance with the afore-mentioned regulations. As part of the proponent's obligations under the RAP to provide transitional support through the new land allocation process, a Farmers Development Programme (FDP) will be implemented and managed by the proponent. At the time of finalising this report, the programme was still being finalised. Any further updates to this programme will be detailed in subsequent progress reports detailing the implementation phase of the RAP.

The objectives of this programme will be:

- > Through the Social Department, to allocate alternative land to each affected farmer;
- > To deliver entitlement (seeds/structures); and
- > To provide agricultural transitional support:
 - Ensure that those households who received alternative land actually utilise this land;
 - Assist the economically displaced during the land acquisition period with preparing their replacement land in order for the beneficiaries to be able to harvest their first crops.
 - Ensure that the new land is harnessed for generations without having to move to new land for making machambas;

The following activities will be implemented by the proponent as part of this programme:

- The proponent will ensure that each farmer has adequate access to his/her new farm. Should new access routes need to be constructed, the mine shall be responsible therefor;
- The proponentwillundertake the first clearing and rippingof the areas of land allocated to each farmer in order to assist farmers with initial field preparation (fire guards around fields etc.):
 - Hand bush clearing by employing local community members;
 - Inputs (seeds, fertilisers, chemicals, transport etc.). The mine will provide replacement seeds for each farmer. The seeds to be provided will be a discussion between the mine and the District Resettlement Commission;
 - Machinery hire/site establishment;
 - Mechanised tillage and planting. Equipment should be made available and managed correctly. The programme will strive to achieve a transfer of productive farming over to the local farmers, so that they can improve their own yields;
 - Management/supervision; and
 - Monitoring and Evaluation (pre- and post-monitoring).
- Unless an affected farmer can prove to the mine's Social Department that he/she qualifies as a vulnerable farmer and is in need of additional support, the farmer shall take

responsibility for seeding the land, tending to the crops and any future required maintenance of the fields;

- The mine shall assign local agricultural workers to assist and monitor the farmers with preparing their new fields for at least one full agricultural season (as locally defined);
- The Social Department can decide on whether food packages will be supplied to particular farmers who might be identified as vulnerable. Such provisions should be case-bound, and need to be handled very sensitively to reduce any possible future dependency on the mine or community expectations in this regard; and
- > The Social Department will investigate vulnerable farmers who are entitled to additional transitional support. Such additional measures will be dealt with on a case-by-case basis.

6.3.4 Compensation of Annual Crops

Table 6.4 below provides the established GoM crop rates for 2013 (Column A) and 2014 (Column B with an estimated 5% inflation rate).

		Column A	Column B	
Сгор		Brico/m ²	Price/m ²	
Local Name	English Name	FICe/III	i nce/m	
Milho	Maize	6.40	6.72	
Mapira	Sorghum	1.28	1.34	
Mexoeira	Millet	1.20	1.26	
Cana de Açucar	Sugarcane	12.00	12.60	
Mandioca	Cassava	15.00	15.75	
Batata Reno	Potatoes	80.00	84.00	
Batata Doce	Sweet potatoes	50.00	52.50	
Feijão Vulgar	Vulgar Beans	6.00	6.30	
Feijão Nhemba	Cowpeas	3.00	3.15	
Girassol	Sunflower	1.80	1.89	
Soja	Soy Bean	3.60	3.78	
Gergelim	Sesame	6.00	6.30	
Amendoim	Peanuts	7.50	7.88	
Algodão	Cotton	3.00	3.15	
Alface	Lettuce	30.00	31.50	
Repolho	Cabbage	42.00	44.10	

Table 6.4: Government of Mozambique crop rates (MZN)

* Rates obtained from the Provincial Directorate for Environmental Planning (Diretório Provincial Coordenação Ambiental, or DPCA). Rates are in Meticais.

During the Draft RAP Report disclosure meeting, these rates were presented to the Government Officials, TWG members and all the affected farmers.

The following principles apply to the valuation of annual crop compensation.

- The District Resettlement Commission agreed for the proponent to pay each farmer for his/her land"s maximum productive value. This value was agreed to be that of Sesame. Therefore, a value of 6.30MZN (Table 7.2) will be offered per m². As part of the payment procedures, this compensation calculations will be explained to each affected farmer;
- During the RAP's implementation phase ,machamba sizes will be verified prior to finalising entitlement frameworks and contracts for each affected households;

- Cash compensation shall be provided to each affected farmer individually; the procedures of which are provided under Section 7.4;
- The nearest banks will be identified and contacted in order to arrange the payments to be made at the mine site;
- In addition to crop compensation, the mine will also provide initial seeds each farmer through the FDP. The type of seeds to be purchased and offered will be discussed with the District Resettlement Commission;
- The mine should allow sufficient time for each farmer to harvest his/her crops prior to land acquisition,), the timing of which shall be discussed and agreed upon between the mine's Social Department and the respective farmer (a signed agreement notice shall be recorded by the mine);
- Affected farmers and/or households should be allowed to lodge any grievance during this period through the Grievance Mechanism and TWG (Social Department). Corrective actions shall be taken by the mine as outlined by the Grievance Mechanism procedures; and

6.3.5 Compensation and Replacement of Economic Trees

Table 1.3 indicated that 9,121 economic trees might need to be compensated. Compensation for perennial trees shall be paid in accordance with the established rates set by the GoM.

Tree Compensation:

Table 6.5below provides the established GoM tree rates for 2013 (only for the trees recorded in the study area). The 2014 rates have been calculated based upon a projected 5% inflation rate.

Tree		Prices of New Trees		Prices for Established Trees	
Local Name	English Name	2013	2014	2013	2014
Coqueiro	Coconut	670.00	703.50	1210.00	1270.50
Cajueiro	Cashew	650.00	682.50	1140.00	1197.00
Mangueira	Mango	420.00	441.00	840.00	882.00
Citrinos	Citrus (Lemon and Orange)	450.00	472.50	980.00	1029.00
Goiabeira	Guava	220.00	231.00	528.14	554.55
Papaeira	Papaya	291.00	305.55	528.14	554.55
Cola	Kola	Not known	703.50	Not known	Not known
Bananeira	Banana	182.51/m ²	191.64/m ²	182.51/m ²	191.64/m ²

 Table 6.5: Government of Mozambique tree rates (MZN)*

* Rates obtained from the Provincial Directorate for Environmental Planning (Diretório Provincial Coordenação Ambiental, or DPCA). Rates are in Meticais.

The following criteria will apply:

- The farmer entitlement contracts (Appendix 22) will be used by the mine's Social Department to calculate the compensation for the loss of trees; and
- Only cash compensation will be offered; the procedures of which are provided under Section 7.4.

The following principles will be applied to the cash compensations:

> Established (mature) tree prices will be offered;

- Compensation rates will be submitted to the TWG and the District Resettlement Commission for discussion prior to finalising and discussing entitlement frameworks and contracts for each affected household; and
- The proponent will acquire the needed land only after compensation payment has been made and agreed upon through the entitlement contracts.

6.3.6 Compensation of Secondary Structures

As indicated in Table 1.3, around 206 structures might need to be compensated. Secondary structures are defined in this report as all structures that are usually more temporary in nature, and hence not part of a physical living house. The term covers a range of different structure types; from agriculture-related sheds, grain storage buildings, shading or temporary resting houses. There are no established compensation rates for structures in Mozambique. Therefore, the proponent will offer each affected farmer an option either for the mine to reconstruct a similar structure for the farmer at his/her desired location, or to offer cash payment (refer to Section 7.4). A payment of 3,060.02MZN (US\$100) will be offered for a typical structure, as shown below.



Plate 6.2: A typical hut or resting house structure constructed of wood poles/sticks, mud and thatch.

6.3.7 Compensation of Communal Resources

Section 5.3.6 highlighted the importance of communal resources and the villagers" extensive utilisation thereof. Some of the most important natural resources utilised include, but are not limited to:

- > Wood for building purposes and furniture;
- Firewood and charcoal-making;
- > Grasses, reeds, sand and clay for houses and associates structures; and
- > Fruits and plants for consumption and medicinal purposes.

As also noted in the SIA, this means that the loss of large sections of the inselbergs to be affected by the mining development will certainly reduce villagers" current access to communal resources (most noticeably access to wood and grasses).

In order to comply with these guidelines, two conservation areas have been created around Mount. Nassilala, which should be unaffected by the mining activity (refer to Figure 1.2). These areas have been established based on the Vegetation and Floristic Specialist Report proposed two conservation corridors in order to be conserved and managed by the mine for future communal use. Such ecological corridors are considered as "No-Go" areas, which mean that the mine should set such corridors aside within the project site to facilitate and accommodate the natural movement of faunal species. Appropriate mine management interventions have been proposed in the aforementioned specialist report to avoid community exploitation of the area to be set-aside for conservation. In order to manage these corridors, a Conservation Monitoring Plan has been proposed.

The following safeguarding measures will be implemented by the mine to ensure future access to communal natural resources and cultural heritage:

- The conservation corridors will be dually managed by the mine and the PACs through the Traditional Authority to ensure continued communal access to these resources for cultural and/or spiritual reasons; and
- > The wood from any trees that are cut for mine infrastructure will either be provided to the community members, or left for them to collect themselves.

6.3.8 Costs Associated with Cultural Property

Cultural property is defined in this report as any of the following sites:

- Archaeological sites;
- > Site of religious or historical significance (sacred areas);
- Burial grounds;
- Monuments/shrines;
- > Places of worship; and/or
- > Artefacts.

As shown in Figure 1.4, 58 grave sites have been identified inside the mine's AoI. All the cultural heritage sites have been demarcated with a fence by the mine's Social Department and the community members themselves (as shown in Plate 6.3 below).



Plate 6.3: Demarcation of Cultural Heritage Areas

It is anticipated for some of these sites to be affected, although the extend of such disturbance should still be calculated. The budget in this report (Table 10.1) therefore excludes allowances associated with cultural property, as this still need to be discussed with the District Resettlement Commission.

The following principles will apply to the possible disturbance of any cultural heritage or artefacts:

- The relevant district-level authorities will be involved in the process;
- Any possible relocation/exhumation/reburial can only occur after a consultation process with the affected communities, the District Resettlement Commission and ritual practitioners;

- Covering-over and exhumation and reburial shall only take place once the necessary consultation, field-work and legal processes have been completed;
- An contractor shall be appointed to perform the necessary work, and the terms of reference shall include liaison with custodians for necessary religions/traditional ceremonies to be performed;
- The timing and arrangements for thepossible relocation and re-burial of the deceased shall be negotiated with the affected family and the results of this negotiation shall be recorded;
- > The affected family should allocate an alternative piece of land for the re-burial;
- > The mine shall bear the costs for:
 - Exhumation; transport and re-burial of the deceased;
 - A necessary "spiritual kit" or "compassionate allowance" to satisfy the reburial requirements (this is unknown at this stage, and will have to be discussed through the TWG);
 - All the work associated with the burial; and
 - The coffin and cloth liner, a replacement tombstone (if this existed at the site exhumed). Should there be no tombstone, the mine shall pay for an inscribed wooden tablet in a shape that meets the religious beliefs of the deceased and family members. (remove the excess detail here – just provide the basics etc. arrangements will be made with the families of the deceased).
- > The affected family shall be responsible for:
 - Stating their preference for exhumation and re-burial, or whether only a ceremony is needed;
 - If needed, making the necessary exhumation and re-burial arrangements with the local authorities and notify the mine; and
 - Organising the ceremonial processes in accordance with their religious beliefs and/or customs.

Lastly, the mine will draft a Cultural Resources Management Plan for any cultural heritage resources that might be found or discovered during land preparation for the mining development. The plan should include a Chance Find Procedure to be followed when cultural resources are encountered. The IFC PS 8 defines cultural heritage as:

- "[...] tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values;
- [U]nique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and
- [C]ertain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles" (IFC, 2012: p.1).

7. IMPLEMENTATION AND DELIVERY OF ENTITLEMENTS

7.1 Overview

ASocial Department has been established that will be responsible for implementing this RAP. The proponent shall be responsible for mobilising the resources necessary for the RAP, which includes drafting a budget (using this RAP's estimated budget in Section 8.4) and coordinating the resources as necessary.

The RAP's implementation phase will involve the following broad steps (make the role of the Social Department clearer under this section etc.):

- Confirmation of individual entitlements;
- Designing entitlement contracts;
- > Allocation of alternative land (through the FDP etc.); and
- > Delivery of entitlements.

7.2 A Social Department

A Balama Graphite Mine Social Department has been established by the mine and will be coordinated by a staff member to be appointed by the proponent and to act as the manager of the department. This manager shall be assisted by the CLO, and both shall receive adequate training in the duties to be performed. The main focus of this unit would be to:

- Plan, mobilise and allocate resources for the implementation of the RAP (i.e. manage the RAP's finances);
- > Draw up and discuss the final entitlement contracts for each affected farmer and households;
- > Be responsible for the finances and deliver of entitlement payments;
- > Play a central role in the allocation of alternative farmland;
- Managing the FDP through which transitional support will be provided;
- Recruiting agricultural staff, buying equipment (tractors) and obtaining (building) storage areas for transitional support material, such as seeds and structure material (as per the farmer entitlement sheets);
- Appointing a community liaison person to manage the area's natural resource-use and sensitising the communities on the mine's intention to establish two ecological areas for sustainable conservation (refer to the RAP report); and
- > Procedures to be followed by grave exhumation and reburial.
- Liaise with local government on the implementation of the RAP;
- Coordinate the elaboration of the RAP;
- > Address grievances through the established Grievance Mechanism;
- Providing regular feedback to the District and Provincial Government on the progress of the RAP (District Resettlement Commission);
- > Attend regular meetings and continuously engaging with the TWG; and
- Internal monitoring (of key function of which is to regularly engage with the established TWG and to have feedback and disclosure meetings with its members on a regular basis).

Figure 7.1 below outlines the composition of such a department.

Subsequent to a meeting held with the proponent"s Country Manager, Mr Napido, a Social Department structure was designed. This structure will be used as the basis during the on-going implementation phase, during which training will be provided and responsibilities assigned.


Figure7.1: The Balama Graphite Mine Social Department Structure*

* Stratoimagery Ltd.

The full responsibility of the Social Department will be handled by the Resettlement Manager. This person will be responsible for ensuring that the department is managed correctly. The Manager will deal mainly with any Government entities. A Social Coordinator will be in place in the form of an external consultant (EOH CES): this will allow for an external specialist to assist in guiding the mine and its social department to conform to Mozambique legislation and IFC PSs.

There will be several positions below the Resettlement Manager, responsible for:

- ➤ The FDP;
- Making compensation payments;
- Grievances; and
- > Community sensitisation (for example, before land is acquired).

7.3 Entitlement Contracts

Subsequent to final confirmation with regard to the individual entitlement sheets and the allocation of alternative farmland, an entitlement contract shall be prepared for each affected household. This contract should consist of three forms (refer to Appendix 22):

I. An Entitlement Contract Summary Page

This is the main summary contract which should include the name of the household head who received the compensation, the household ID number, as well as the location where the compensation was received. In addition, the page should summarise the total amount which was paid to the household head.

II. Form 1: Household Landholding Entitlement Sheet

This form must provide the name of the farmer and his/her household ID number, record the size of the landholding to be lost (m²), and the crops, trees and structures on the landholding at the time of survey should be documented. Each type of tree and/or crop needs to be recorded, as well as the specific type of structure and what it was made of. Lastly, the form should record any important feature on the land, such as a grave or well (*inter alia*). The form needs to be signed by the recipient, a representative of the mine, as well as a representative of the District Government.

This form has already been completed subsequent to the assessment of each landholding, and signed by a representative of the mine, the DSEA and/or DSPI.

Additional photographic information can be used to supplement the information, but all photographs must be stored on an electronic database, clearly numbered or named, and cross-referenced to this form.

III. Form 2: Household Landholding Compensation Offer and Confirmation of Acceptance: Crop/Tree Compensation

This form verifies the compensation offered for the loss of crops and/or trees. It needs to be signed by the recipient, the respective village leader, a representative of the mine (as part of the resettlement unit), as well as a representative of the District Government.

IV. Form 3: Household Landholding Compensation Offer and Confirmation of Acceptance: Structure Compensation

This form verifies the compensation offered for the loss of structures. It should be signed by the recipient, the respective village leader, a representative of the mine (as part of the resettlement unit), as well as a representative of the District Government.

Monetary compensation should be paid in cash (none have – the Social Department will have to decide here), as few households studied have bank accounts. Syrah should investigate the possible to open bank accounts for the beneficiaries, however. The original signed contract shall be filed by the mine, whereas a copy of the same contract shall be provided to the affected household head.

7.4 Payment Procedure

The Social Department's Compensation Officer shall be responsible for making compensation payments. The following actions will be adopted by the mine's Social Department in preparation of compensation payments:

Step 1: Contact banks (in Montepuez) that are willing to mobilise the funds needed for compensation (as per the RAP's budget) and to help conduct the payment in each village. At the same time, conduct simple financial sensitisation with villages, this should be done several times before compensation is conducted.

- **Step 2:** Finalise the payment method with villages, either:
 - a. Setting up bank accounts for the beneficiaries (this might obviously not be possible, as there are no banks in Balama); or
 - b. Payment in cash to beneficiaries. The possible concern with this method is that each person may not be able to keep a large sum of money secure. If people get their compensation money stolen, they may blame the mine for it. This can leave to added grievances, which could better be avoided by implementing bank accounts for each person to be compensated.

Step 3: Finalise payment date and documentation. The payment should be made in a secure place to avoid security risks and/or fraud. A Non-Government Organisation (NGO)should be present during this time to view payments, as this adds transparency to the payment method and shows that the mine is conducting the process openly.

Step 4: Conduct payment. All payments will be made once off at the mine site through appropriate protocols under the Social Department. Those who are eligible for compensation will be given advance notice of the date, time and place of payment via appropriate announcements. The process should be well-document including signatures from both the village chiefs and the beneficiaries. A photo of the beneficiary (farmer) should be taken on payment. The information on the payment should be stored in a database and backed-up. A copy of the documents should be given to the grievance officer for future use. All payments will be made by the mine in witness of the District Resettlement Commission, as well as an NGO

Step 5: On completion of payments, a review in the form of a survey should be conducted, to verify whether each affected farmer received his/her entitlement, as per the RAP report.

7.5 Implementation Activities and Assigned Responsibilities

At the time of finalising this report, the first mining construction activities were referred to as the "Stage I Priority Area". These activities include the following (refer to Figure 1.2):

- The site access road;
- The haul road;
- > The camp site;
- The plant site and future plant site;
- Contamination pond; and
- Raw water pond.

Table 7.1 below firstly provides a general implementation schedule as part of the completion of the draft RAP report. It includes activities which have already been undertaken, and also assigns responsibilities to each activity. This is followed by Table 7.2 which offers a proposed timeline for the implementation phase.

Task Nr	Activity	Actions Required	Responsibilities	Target Month	Status
1	Declaration of a cut-off-date for compensation	None		Com	pleted
2	Establishing a TWG for the implementation of the RAP	On-going consultation and engagements		On-going (until the group has been discontinued)	Completed
3	Assessment of possible affected landholdings inside the mine's Aol	None	Balama Granhite Mine	Completed	
4	Discuss valuation methodology for entitlements with the affected villagers and the TWG (i.e. how payments will be offered etc.). This will include focus groups with farmers in order to establish farm yield capacities and outputs in order to agree upon crop compensation rates.	None	Social Department	Completed	
5	Assessing alternative farmland area with the TWG, government representatives and affected farmers	On-going consultation and engagements	Balama Graphite Mine Social Department and District Resettlement Commission	Initial assessments of alternative land completed. throughout the implemer	two identified blocks of Assessments will continue ntation phase of the RAP.
6	Finalising and disclosing the Draft RAP report to the affected communities and government authorities	None	Balama Graphite Mine Social Department	Com	pleted
7	Obtain approval of the RAP from the District Government and DINAPOT (MICOA)	Submit the Final RAP report in a hard copy to the District Government and DINAPOT	EOH CES	October 2014	In process

Table 7.1: Implementation schedule for completing the draft RAP report and submitting it to the relevant government authorities for approval (2014)

Task Nr	Activity	Actions Required	Responsibilities	Target Month	Status
1	Farmer engagements	 Using the RAP report's data, identifying those farmers who needs to be compensated; and Discuss with each farmer whether he/she has alternative land, or whether they need to be accommodate on the alternative land already identified by the District Resettlement Commission. 		November/December 2014	In process
2	Budgeting	 Allocate budget resources 		October	In process
3	Prepare entitlement contracts	 Prepare individual entitlements and draw-up entitlement contracts; Confirm & agree upon compensation offers; & Determine & agree upon grave reburial procedures. 	Balama Granhite Mine		
4	Compensation payments as agreed upon	 Prepare cash compensation payment schedules; Pay cash compensation & extra allowances (as and where appropriate) to the head of household in the presence of a representative of the District Administrator; Compensate for secondary structures; and Carry out grave reburial & necessary traditional ceremonies. 	Social Department	November/December 2014 and January 2015	In process
5	Land allocation	Offer alternative land as agreed			
6	Prepare new agricultural fields as part of the Farmers Development	 Assisting new farmers with ploughing their new fields; Providing seeds; Assisting with constructing new structures on the land (as per each farmers" entitlements); and Agricultural training, mentoring, monitoring and supervision. 			
7	Post-economic displacement monitoring	Using a baseline survey instrument, evaluating the affected farmers and their levels of satisfaction with the RAP implementation phase. This will include recommendations for Syrah to take any additional steps to ensure that those farmers who have been economically displaced are satisfied with their entitlements received.	EOH CES	June 2015	Outstanding

able 7.2: Implementation schedule for a	proposed pilot phase RAP im	plementation of the access road (2014)
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8. MONITORING AND EVALUATION

8.1 Overview

Evaluating any project is key to measuring the physical progress against the milestones established. This is no different to a RAP, which requires a comprehensive monitoring and evaluation programme that should basically measure the effects of resettlement (or in this case, economic displacement) against the household's baseline data before they were economically displaced. One of many objectives of this process is to evaluate the outcomes of the displacement process and to ensure that no PAP has been left worse off after displacement. In addition, monitoring will also assist the mine to improve or correct ineffective and/or unintentional consequences of the displacement process as soon as possible before such consequences lead to negative cumulative socio-environmental impacts.

Monitoring is usually reported against a schedule of required actions. The fundamental element of this system includes internal and external monitoring and evaluation of the affected households after they had been economically displaced.

Drawing largely upon the IFC's Handbook for Preparing a Resettlement Action Plan (IFC, 2002), this chapter suggests a monitoring and evaluation system for the mine to adopt.

8.2 Internal Monitoring and Evaluation

8.2.1 Progress Monitoring

The mine's Social Department will be responsible for internal monitoring. The department will record the progress of the RAP's implementation and submit regular progress reports to the District Resettlement Commission (this should be combined with workshopsand/or meetings).

The department will establish key performance indicators for the main RAP outcomes, to be measured as performance milestones. For example, these outputs can be linked to the activities and responsibilities listed in Table 8.1. The following list is an example of the information which should be frequently reported upon:

- > The progress and completion of scheduled activities;
- > The extent to which particular targets have been met;
- > The allocation of entitlements (especially the allocation of replacement land);
- > Grievances and actions taken by the mine to resolve such grievances;
- Meetings with the TWG/District Resettlement Commission and each individual farmers/household; and
- > Any deviation in the process and corrective actions taken.

8.2.2 Re-Validation Survey

Another key step in the internal monitoring process is to conduct a re-validation survey amongst all those farmers and households who have been economically displaced.

The objective of such a survey would be to:

- Gain an understanding of whether entitlements have been delivered to each affected household in accordance with each beneficiary's entitlement contract;
- Measure the timing of entitlement delivery;
- Assess the replacement land, food security levels and whether transitional allowances have been factored into the costs for replacement land;

- Measure beneficiaries" levels of satisfaction with the displacement process and whether they are satisfied with the compensation paid/offered to them;
- Assess whether vulnerable groups have received particular attention and compensation packages;
- > Measure the farmers" levels of satisfaction with the displacement process;
- Identify whether any deficiencies should be addressed (for example, the possible need for additional compensation and/or resettlement measures etc.); and
- > Recognise any grievances and develop corrective actions.

This survey should be employed several weeks after the economic displacement process has been completed, by means of a standard questionnaire. The results and data of this survey should be used by the mine to take corrective action. Should any corrective action be undertaken in response to the findings of this survey, a re-validation survey of selected households should be undertaken to monitor the particular corrective action undertaken.

8.3 External Monitoring and Evaluation

8.3.1 Conducting a Post-Economic Displacement Socio-Economic Baseline Survey

Chapter 3 elaborated upon how resettlement or economic displacement can affect the livelihoods of those affected, sometimes with unintentional consequences. A vital step in the resettlement process is therefore to monitor such livelihood changes (not just for households, but also for all communities concerns) in order for the mine to be able to take immediate corrective actions.

As part of the implementation of RAPs, international good practice recommends that an independent social monitoring team be employed to sample key economic and social indicators of the displaced households in order to measure the impact of the RAP process against the baseline data gathered at the start of the RAP.The reason for undertaking this post-RAP survey is to measure whether the RAP's mitigation measures and development actions have had the desired effect on those displaced. A standardised household questionnaire could be used for this survey, employing both qualitative (i.e. open-ended) and quantitative (i.e. closed) questions. The same variables and parameters to those measured as part of the pre-displacement survey should be measured in order to monitor and evaluate the effects of the displacement accurately.

Secondly, it is recommended that this monitoring exercise includes a more qualitative component that should include the use of participatory approaches such as workshops, focus groups and meetings. The objectives of this qualitative approach would be to assess the following:

- The attitudes of the affected population to the compensation offered and the adequacy thereof;
- The attitudes of the affected population to the mine's livelihood restoration initiatives and the implementation thereof;
- The attitudes of the affected population to the mine's Social Responsibility Programmes and the implementation thereof;
- Perceptions and opinions regarding the impacts of the project (whether these impacts have been positive or negative) on the following aspects:
 - Income generation and the creation of employment opportunities;
 - Food security and access to land for agriculture;
 - Access to services and social infrastructure; and
 - Any development of social pathologies (crime, for example).
- Any changes to the social fabric of the communities (for example cohesion and reciprocal forms of exchange and support); and
- Satisfaction with regard to the level of community consultation and participation.

In addition to evaluating the RAP process, it is also recommended for any community SED project to be monitored by an external evaluation team to measure the project's inputs against the desired and actual outcomes. This evaluation should enable mine management to verify and adjust a particular project's inputs and resource allocation in order for the project to have the desired outcomes.

8.3.2 An Independent Post-Economic Displacement Audit

An external, independent audit should be conducted in order to assess the success of RAP implementation. The audit should largely focus on the impacts of the displacement process, not only on those displaced, but also on the PACs and host sites. The mine's livelihood restoration initiatives should also be closely monitored, especially to gauge whether these programmes are sustainable and whether these are having the desired outcomes. The World Bank recommends that such an audit be undertaken periodically during the course of the project, and it should consider the data of the external socio-economic surveys as part of the evaluation:

- > The RAP's implementation;
- > The compensation policies;
- > The delivery of entitlements (including replacement land);
- > Livelihood changes and income levels amongst those affected; and (but not limited to)
- > Consultation mechanisms and community participation.

9. COSTS AND BUDGETS

Any rap should be budgeted for upfront and the necessary resources should be allocated for the implementation of the rap in advance. According to the world bank (2013b), the costs of resettlement should be seen and treated as with any other project against the economic benefits of the project:

"The costs of resettlement, like the costs of other project activities, are treated as a charge against the economic benefits of the project; and any net benefits to resettlers (as compared to the "without-project" circumstances) are added to the benefits stream of the project. Resettlement components or free-standing resettlement projects need not be economically viable on their own, but they should be cost-effective."

(World Bank, 2013b: p.1)

The mine is responsible for compensation and should prepare a detailed budget with a breakdown of the various costs based on the schedule of activities to be undertaken (Table 9.1). As the RAP will be on-going throughout the project"s construction and implementation phase, annual RAP budgets might need to be prepared depending on particular activities identified for implementation during the year.

Table 9.1 below is an estimated draft summary budget for the implementation of the RAP, which includes allowances for inflation. The budget excludes new farms assessed during the disclosure site visit in May 2014, as more machambas will need to be assessed in response to some minor mine layout changes.

Item	Reference	Budget (MZN)	Budget (USD)	
Economic tree compensation	Table 10.2	58,83,989.0	192,287.6	
Crops	Table 10.3	68,437,530.00	2,236,524.79	
Structures (US\$100/structure)	Table 10.4	640,657.94	20,600.00	
Grave exhumation & compassionate allowance etc.		Excluded		
Farmers Development Programme (6-8months)	Table 10.5	7,712,993.96	255,000	
Subtotal		82,675,170.90	2,704,412.39	
Monitoring and evaluation (3%)		2,480,255.13	81,132.37	
TOTAL		85,155,426.03	2,785,544.76	

Table 9.1 Estimated budget for implementing the Resettlement Action Plan *

* Refer to tables 9.2-9.4 below.

Excluding the monitoring and evaluation, the budget works out at approximately 123,950.78MZN or US\$4,054.59 per farmer. This includes the mine's assistance to each farmer through the FDP.

Perennial Tree	Nr	Prices for New Trees (2014) (MZN)	Total Estimated Price(MZN)	Total Estimated Price (USD)
Banana	3886	191.64/m ²	744,713.0	24,337.07
Mango	3369	882	2,971,458.0	97,106.65
Cashew	1689	1197	2,021,733.0	66,069.83
Orange	78	1029	80,262.0	2,622.946
Papaya	61	554.55	33,827.55	1,105.478
Moringa	12	500*	6,000.0	196.0788
Coconut	10	1270.5	12,705.0	415.1969
Lemon	10	1029	10,290.0	336.2751
Breadfruit	4	500*	2,000.0	65.3596
Alteira (type of tree to be verified)	2	500*	1,000.0	32.6798.0
TOTAL	9121	Not applicable	58,83,989.0	192,287.6

 Table 9.2:Budget for economic tree compensation at established tree rates (Government rates)

* Rates for the Moringa, Breadfruit and Alteira trees are not provided by the Government. An estimation of 500MZN has been provided.

Table 9.3: Draft budget for crop compensation at established rates*

Total Area to possibly be displaced		Highest Productive Value Cost (Sesame) (MZN)	Total Estimated Price (MZN)	Total Estimated Price (USD)
ha		m ²	· · ·	. ,
1,086.31	10,863,100.00	6.30	68,437,530.00	2,236,524.79

* Rates provided by the Mozambique's MoA (refer to Table 7.2). This estimate is a worst case scenario as it assumes all land is completely productive.

Table 9.4: Draft budget for a structure

Total Nr of Structures	Total Estimated Price (MZN) (3,060.02MZN/ secondary structure)	Total Estimated Price (USD)
206	630,364.12	20,600.00

Table 9.5: Draft budget for a	a Farmers Development I	Programme
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Items	Total Estimated Price (MZN)	Total Estimated Price (USD)
Land clearing, using tractors (expenses covering petrol costs etc.)	4,500,000.000	150,000*
Inputs (seeds//transport etc.)	1,529,997.124	50,000.00
Costs associated with hiring labour for a period of six to 8 months (initially around 50 workers for a 2- month period, to be reduced to a group of around 10 workers for the duration of the FDP period; 4-6 months.	1,529,997.124	50,000.00
Equipment	152,999.712	5,000.00
TOTAL	7712993.96	255,000

* Bulldozer to be used for 60 days, eight hours per day at \$300/hour = \$144,000 (rounded off to \$150,000).

10. CONCLUSION

SYRAH RESOURCES LTD. (Syrah) and Twigg Mining and Exploration Lda.plan to develop the Balama Graphite Mine in the Balama District of the Cabo Delgado Province of Mozambique. The nature of the project triggers economic displacement of around 667agricultural landholdings, whilst there is the possible of physically resettling ten homesteads in the future.

In order to develop a comprehensive framework and strategy for offering appropriate compensation packages to those farmers and households who will be displaced, EOH Coastal & Environmental Services (CES) has been appointed by the proponent in 2013 to develop a Resettlement Action Plan (RAP) in accordance with Mozambique's Regulations for the Resettlement Process Resulting from Economic Activities (2012), and the International Finance Corporation's (IFC) Performance Standard (PS) 5 on Land Acquisition and Involuntary Resettlement (2012).

This report provided a comprehensive action plan for the envisioned economic displacement process, as well as provided guidelines to follow for the possible physical resettlement of ten homesteads. The report includes an Entitlement Framework (Chapter 8) which stipulates the fundamental valuation methodology for determining compensation packages. In addition, the aim of the report is to assist the proponent to implement the RAP with international good practice guidelines on how to work through a Social Department for this implementation, as well as provided templates to use for designing household entitlement contracts. The last chapter (Chapter 9) also provided a preliminary RAP budget which will be used by the proponent to plan the implementation of the RAP.

Any form of resettlement or economic displacement ultimately alters an area, its communities and the livelihoods of those affected. In a country such a Mozambique where local people depend on land for their entire existence, rigid and appropriate mitigation measures should be in place to guard against land insecurity. Is it EOH CES" intention for this RAP to fulfil in this aim to enable those who will be economically displaced to regain their former livelihood standards but, above all, to improve it through support from the mine.

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APPENDIX 1: PREVIOUS MINE LAYOUT PLANS

The section below provides three maps which illustrate how the mine infrastructural layout plans have changed throughout the RAP and ESHIA process. Subsequent to farmland, grave and sacred site data presented to the proponent, changes were made to particular infrastructure. A more recent layout plan was provided to EOH CES in August 2014, upon which this report is based.



Figure A.1: First Mine Layout Plan 2013



Figure A.2: Mine Infrastructural Layout in 2014 used as a buffer area for surveying farmlands, structures, graves etc.

APPENDIX 2: GPS POSITIONS OF GRAVE AND SACRED SITES AND BOREHOLES

Grave Sites		
Latitude	Longitude	
-13.296	38.647	
-13.298	38.648	
-13.300	38.647	
-13.310	38.645	
-13.311	38.644	
-13.292	38.672	
-13.291	38.676	
-13.288	38.677	
-13.318	38.643	
-13.319	38.639	
-13.320	38.641	
-13.323	38.641	
-13.325	38.640	
-13.326	38.641	
-13.325	38.641	
-13.326	38.642	
-13.325	38.643	
-13.329	38.642	
-13.334	38.637	
-13.335	38.636	
-13.291	38.680	
-13.290	38.683	
-13.293	38.685	
-13.294	38.680	
-13.296	38.682	
-13.295	38.688	
-13.298	38.684	
-13.298	38.683	
-13.301	38.682	
-13.300	38.678	
-13.288	38.682	
-13.306	38.684	
-13.334	38.640	
-13.319	38.652	
-13.335	38.636	
-13.326	38.642	
-13.325	38.643	
-13.323	38.641	
-13.326	38.641	
-13.326	38.640	

-13.332	38.637
-13.323	38.641
-13.326	38.641
-13.326	38.642
-13.325	38.643
-13.325	38.642
-13.339	38.637
-13.319	38.652
-13.334	38.640
-13.335	38.636
-13.332	38.637
-13.316	38.645
-13.326	38.641
-13.326	38.642
-13.325	38.643
-13.325	38.642
-13.326	38.640
-13.323	38.641
Bore	holes
-13.304	38.660
-13.339	38.637
Sacre	d sites
-13.299	38.647
-13.316	38.645
-13.289	38.678
-13.289	38.682
-13.291	38.676
-13.300	38.681
-13.299	38.647
-13.310	38.646
-13.318	38.659
-13.318	38.659
-13.307	38.685

APPENDIX 3: COMMUNITY MEETING MINUTES 1

Balama Graphite Mine, Mozambique MEETING MINUTES

07 July 2013



Date	Meeting venue	Time	Meeting objective
07/07/2013	Ntete Village (The chief's house)	08:53-10:25	To introduce the Resettlement Action Plan (RAP) study team from Coastal & Environmental Services (CES) and explain the purpose of the team's site visit

Balama Graphite Mine

<u>Date: 07/07/20</u>	13 Venue:	Ntete Village Time:	08:00-10:25
Attendance register			
Name	Company/Village	Position	Contact nr
Mr Declan Sheeran	Syrah		82 5094800
Mr Cabral Mutiquinhene	Syrah	Financial and Administration Manager	829182178
Ms Laura Rodolfo	Syrah	Community Relations Officer	826901653
Mr Lunguisa Bosman	CES	Social Scientist	0027715417958
Mr Anton Hough	CES	Social Scientist	Non provided
Ms Carina Saranga	CES	Social Scientist	824136038
Mr Jose Zacarias Suade	Entire district	Principal Chief	824939461/863883538
Mr Mualia	Regional area	Regional (District) Chief	869895400
Mr Manuel Cainde	Ntete	Ntete Chief	Non provided
Mr Antonio Muatuka	Ntete	Ntete Secretary	863885372
Mr Tupula Joao	Nquide	Nquide Leader	Non provided
Mr Domingos Massuti	Nquide	Nquide Leader	Non provided

General

A meeting was organised with the mine's four affected villages" chiefs by Mr Cabral Mutiquinhene (Administration and Financial Manager of Syrah Resources Ltd.) The four chiefs were informed about the meeting a week in advance and asked to attend with the principal objective of introducing the Resettlement Action Plan (RAP) study team and to explain the purpose of team's first site visit (7-12 July 2013). The meeting was primarily chaired by Mr Jose Zacarias, the District Chief, who translated the discussions from Portuguese to the villagers" local language, Macua.

Introduction

Mr Mutiquinhene introduced Mr Jan Anton Hough, Ms Carina Saranga and Mr Lungisa Bosman from CES. After this general introduction, Ms Saranga explained the purpose of CES" involvement and the study team's visit. It was explained that the development of the mine will affect farmland (machambas) and that compensation will be paid to those farm owners who will be affected by the loss of machambas. The term "money" was not used. She reiterated the fact that the mine does not intend to relocate any household, although there is a possibility that some households might have to be resettled. Furthermore, the intention to establish a Technical Working Group (TWG) was explained, which is to create a mechanism for the affected villages to engage with the mine with regard to RAP-related issues.

Mr Mutiquinhene explained to (and cautioned) the village chiefs of the need to know who the current machambas belong to in order to avoid opportunists making machambas with the intention of being compensated for it as the mine develops. It was made clear that people should not simply establish new machambas in order to receive compensation, and that new machambas will not be compensated for. A distinction was made between the bush (woodlots) and machambas, as it was explained that only machambas will be compensated for.

Ms Saranga reiterated the purpose of the study team's visit, which was to establish a TWG, but also to meet with the Balama District Administrator and government officials. The team's independence was stressed, and the need (and the process that will follow) for the team to assist the mine to follow appropriate Mozambique and international legislation in order not to affect the surrounding villages" livelihoods negatively. The attendees were reassured not to be concerned about the RAP process, and that the team and RAP's purpose is to act in to promote the interests of the villagers.

The floor was opened for discussion.

Discussion

Discussion	Responses
Mr Suade: Acknowledged the study team and the objective of their site visit. Affirmed that the villagers are open for discussions and embrace the establishment of such a group. He requested the attendees to inform their villagers about the team's independence and the establishment of the group, which is intended for the villagers to have a mechanism to voice their issues and/or concerns to mine management. Reiterated to the attendees that the study team is acting on behalf of the villagers" interest.	All confirmed
General: Some raised concern regarding the barricading which the mine erected in Pirira (next to the road) for drilling purposes, and that mine management never consulted with the villages prior to erecting this obstructive infrastructure.	Mr Mutiquinhene & Mr Sheeran (interpreter): Explained that the barricading is only temporary and there to protect the local villagers from the drilling activities currently taking place.
Mr Hough & Mutiquinhene (interpreter): In response	All affirmed

Discussion	Responses
to the concern expressed above, it was explained that a grievance mechanism will be established as part of the group which is aimed at ensuring that the villagers have the opportunity to express their concern to mine management. Acknowledged some villagers" apprehension to express their concerns, for which purposes this group and grievance mechanism should be used.	
Mr Hough & Ms Saranga (interpreter): Explicated that the group will only be established to deal with issues related to the villagers" livelihoods, and that it should not be used for mine-, labour- and employment-related issues.	All affirmed
General: A discussion followed with regard to whether group members will receive any kind of compensation or benefits by serving on the group or attending meetings etc.	Mr Hough, Mr Sheeran, Mr Bosman and Mr Mutiquinhene (interpreter): Clarified that no compensation or benefits will be provided through the operation of the group, as the latter is purely being established to act in the interest of the villagers. Explained that group benefits and money payments will act against the purpose of the group, and that this will not benefit or serve to represent the villagers themselves. Group payments will also contribute to conflict and will introduce different interests. He further explained that such payments might eventually lead to false accusations towards the mine.
Mr Hough, Mr Bosman & Ms Saranga (interpreter): Explained to each chief that the group will be represented by two village-elected representatives from all of the four villages, in addition to some government representatives (such as from the Ministry of Agriculture).	All affirmed

After the discussions, four meetings were organised with each village chief to explain the RAP and the establishment of the group. The chiefs were also informed of the study team's intention to hold a last meeting towards the end of the week with the elected group members to take discussions further. The meeting was closed by Mr Mutiquinhene at 10:25.

APPENDIX 4: COMMUNITY MEETING MINUTES 2

Balama Graphite Mine, Mozambique MEETING MINUTES

08 July 2013



Date	Meeting venue	Time	Meeting objective
08/07/2013	Ntete Village (Ntete Primary School)	14:20-15:00	To introduce the Resettlement Action Plan (RAP) study team from Coastal & Environmental Services (CES) and to establish a Technical Working Group by electing 2 representatives from the village

Balama Graphite Mine

Date: 08/07/2	013 Venue:	Ntete Village	Time: 14:20-15:00	
Attendance register				
Name	Company/Village	Position	Contact nr	
Mr Cabral Mutiquinhene	Syrah	Financial and Administration Manager	829182178	
Ms Laura Rodolfo	Syrah	Community Relations Officer	826901653	
Mr Lunguisa Bosman	CES	Social Scientist	0027715417958	
Ms Carina Saranga	CES	Social Scientist	824136038	
António Muatuka	Ntete	Secretary Ntete	86 3885	
Carlitos Buanamusse	Ntete	Villager	Non provided	
Aida Baleio	Ntete	Villager	Non provided	
Cabral	Ntete	Villager	Non provided	
Lunguisa Bosman	Ntete	Villager	Non provided	
Carina Saranga	Ntete	Villager	Non provided	
Bacar Khan	Ntete	Villager	Non provided	
José Castro Taia	Ntete	Villager	Non provided	
Razão Alves	Ntete	Villager	Non provided	
Bernardo Armando	Ntete	Villager	Non provided	
Abuturo Rimba	Ntete	Villager	Non provided	
Bila Jõao Sabonete	Ntete	Villager	Non provided	
Amisse Amido	Ntete	Villager	Non provided	
João Muhaine	Ntete	Villager	Non provided	
Jarifo Raimundo	Ntete	Villager	Non provided	
Costa lassine	Ntete	Villager	Non provided	
Amisse Muhate	Ntete	Villager	Non provided	

Carlitos Ernesto;	Ntete	Villager	Non provided
Assemane Issa	Ntete	Villager	Non provided
Alberto Augusto	Ntete	Villager	Non provided
Papaito Atanásio	Ntete	Villager	Non provided
Atibo Bilal	Ntete	Villager	Non provided
Juma Cebola	Ntete	Villager	Non provided
Augusto Sapi	Ntete	Villager	Non provided
Waite David	Ntete	Villager	Non provided
Amisse Rodrigues	Ntete	Villager	Non provided
Elias Biche	Ntete	Villager	Non provided
Amade Issa	Ntete	Villager	Non provided

General

A community meeting was organised with the village of Ntete on 8 July 2013 in order to elect two representatives from this village to act on the Technical Working Group (TWG)¹. The meeting was held in the villagers" local language, Macua. Mr Cabral Mutiquinhene (Syrah representative) translated the discussions from Portuguese and English to Macua.

Discussion

Mr Mutiquinhene introduced Mr Bosman and Ms Saraganga (the RAP study team) and made apologies for Mr Hough who could not attend the meeting. Ms Saraga continued to introduce CES and the purpose of CES" involvement in the mine and its affected villages. She further explained the study team's independence from the mine, and stressed the team's purpose of promoting the interests of the villagers in order for the mine not to affect the villagers" livelihood negatively. Ms Saraga then clarified the purpose of the RAP, emphasising that some machambas will be affected and/or lost.

Ms Saranga elaborated upon the need to establishment a TWG as part of the RAP process, as well as that two village representatives from each village need to be elected by the villagers themselves to act on this group. Mr Bosman then stressed the need for these two representatives to be able to read and write. By using this group as an engagement mechanism between the villages and the mine, Ms Saranga continued to clarify that these members will act on behalf of, and promote the interests of all the villagers.

Mr Bosman informed the villagers that the study team will return in three to four weeks to identify and engage with the owners of the machambas in order to plan compensation strategies. Furthermore, he discouraged villagers to make any new machambas in the mining area and explained that any new plantings will not be compensated. It was stressed that only affected and/or lost machambas will be compensated, and not the surrounding woodlots (or "bushes").

Issue/concern	Responses
Village representative: Asked whether the mine can provide them with employment opportunities	Mr Cabral: Stated that there are currently no employment opportunities available, however that positions will become available as the mine develops
Village representative: Requested to see a map that shows the mine's boundary and mining area that will be affected	Mr Bosman: Explained that the mine is still in the process of finalising the infrastructural layout plans

Issues and/or concerns raised

A next meeting with the elected TWG members was agreed upon on 10 July at 15:00 in Ntete. The meeting was adjoured at 15:00.

¹ The purpose of the TWG and Resettlement Action Plan (RAP) process was explained to the chief of Ntete during a previous meeting held with all the affected chiefs on 7 July 2013.

APPENDIX 5: COMMUNITY MEETING MINUTES 3

Balama Graphite Mine, Mozambique MEETING MINUTES

09 July 2013



Date	Meeting venue	Time	Meeting objective
09/07/2013	Nquide Village	09:43-10:20	To introduce the Resettlement Action Plan (RAP) study team from Coastal & Environmental Services (CES) and to establish a Technical Working Group by electing 2 representatives from the village

Balama Graphite Mine

<u>Date: 09/07/2</u>	013 Venue:	Nquide Village	<u>Time: 09:43-10:20</u>	
Attendance register				
Name	Company/Village	Position	Contact nr	
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038	
Mr Lunguisa Bosman	CES	Social Scientist	0027715417958	
Mr Anton Hough	CES	Social Scientist	079 514 76 11	
Ms Laura Rodolfo	Syrah	Community Relations Officer	826901653	
João Nicula	Nquide	Interpreter	None provided	
Sebastião Ajamo	Nquide	Villager	None provided	
Tupulo João Veriano	Nquide	Villager	None provided	
Eusébio Severiano	Nquide	Villager	None provided	
Gustava Amade	Nquide	Villager	None provided	
Rachide Geremias	Nquide	Villager	None provided	
Riquito Saide	Nquide	Villager	None provided	
Naife Deus	Nquide	Villager	None provided	
Carimo Sufo	Nquide	Villager	None provided	
Daniel Galir	Nquide	Villager	None provided	
Belito Januario	Nquide	Villager	None provided	
Baulino Jamali	Nquide	Villager	None provided	
Elisa Gelane	Nquide	Villager	None provided	
Adelia Cebola	Nquide	Villager	None provided	
Agostinho Baite	Nquide	Villager	None provided	
Falume Aiuba	Nquide	Villager	None provided	
Zainabo Rachide	Nquide	Villager	None provided	

Modeste Luís	Nquide	Villager	None provided
Januário Ausse	Nquide	Villager	None provided
Manuel Sumaila	Nquide	Villager	None provided
Siate Gaissi	Nquide	Villager	None provided

General

A community meeting was organised with the village of Nquide on 9 July 2013 in order to elect two representatives from this village to act on the Technical Working Group (TWG)². The meeting was held in the villagers" local language, Macua. Mr Joao Nicula (a village representative) translated the discussions from Portuguese to Macua. The meeting was chaired by Ms Carina Saranga (CES).

Discussion

Ms Saranga introduced herself, Mr Bosman and Mr Hough as constituting the RAP study team. She continued to introduce CES and the purpose of CES" involvement in the mine and its affected villages. She further explained the study team"s independence from the mine, and stressed the team"s purpose of promoting the interests of the villagers in order for the mine not to affect the villagers" livelihood negatively. Ms Saraga then clarified the purpose of the RAP, emphasising that some machambas will be affected and/or lost.

Ms Saranga elaborated upon the need to establishment a TWG as part of the RAP process, as well as that two village representatives from each village need to be elected by the villagers themselves to act on this group. Mr Hough stressed the need for these two representatives to be able to read and write. Mr Hough further explained that this group be will be used as an engagement mechanism between the villages and the mine, whilst Ms Saranga continued to clarify that these members will act on behalf of, and promote the interests of all the villagers.

Mr Hough informed the villagers that the study team will return in a couple of weeks" time to identify and engage with the owners of the machambas in order to plan compensation strategies (the term "money" was not used at this stage, but rather "negotiations"). Furthermore, he discouraged the villagers from making any new machambas in the mining area by explaining that any new plantings will not be compensated. It was stressed that only affected and/or lost machambas will be compensated, and not the surrounding woodlots (or "bushes").

Lastly, Ms Saranga informed the villagers that a meeting will be held with the elected TWG members on the following day at Ntete Village at 15:00.

Issue/concern	Responses
Village representative: Inquired about employment opportunities on the mine	Ms Saranga: Explained that the study team is independent from the mine, and that employment- related issues need to be discussed with the mine directly. However, she clarified that the people should firstly evacuate the mining area before the mine can be established, where after employment opportunities will become available.
Village representative: Expressed concern regarding the attendance register and recording people's names	Mr Hough and Ms Saranga: Clarified that the attendance register is purely used in order to have proof of all those individuals who attended the meeting.
Village representative: Confirmed the teams" independence from the mine and explained that employment opportunities will become available as the mine develops in 2014. Explained that the mine will announce employment opportunities once these become available.	All affirmed

Issues and/or concerns raised

²The purpose of the TWG and Resettlement Action Plan (RAP) process was explained to the chief of Nquide during a previous meeting held with all the affected chiefs on 7 July 2013.

Issue/concern	Responses
Mr Hough: Stressed that CES has been appointed by the mine to engage with the farm owners in order to inform negotiations between the mine and these affected owners. Clarified that the team intends to create a group in order to steer this process. Explained that 2 village representatives need to be elected in Nquide to act on this group, as all the villagers cannot engage with the mine directly. Stressed that these	All affirmed
Village representative: Encourage the villagers to	
support the RAP team, and stressed that the elected village representatives shall not receive any	All affirmed
compensation for acting on the group.	

The meeting was adjournedat 10:20.

APPENDIX 6: COMMUNITY MEETING MINUTES 4

Balama Graphite Mine, Mozambique MEETING MINUTES

09 July 2013



Date	Meeting venue	Time	Meeting objective
09/07/2013	Maputo Village	14:30-15:00	To introduce the Resettlement Action Plan (RAP) study team from Coastal & Environmental Services (CES) and to establish a Technical Working Group by electing 2 representatives from the village

Balama Graphite Mine

<u>Date: 09/07/2013</u>	Venue:	Maputo Village Ti	me: 14:30-15:00	
Attendance register				
Name	Company/Village	Position	Contact nr	
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038	
Mr Lunguisa Bosman	CES	Social Scientist	0027715417958	
Mr Anton Hough	CES	Social Scientist	079 514 76 11	
Ms Laura Rodolfo	Syrah	Community Relations Officer	826901653	
Victor Assane	Victor Assane	Interpreter	Non provided	
Adelino Sadique	Adelino Sadique	Villager	Non provided	
Mario Nicopilo	Mario Nicopilo	Villager	Non provided	
Pilauri Samo	Pilauri Samo	Villager	Non provided	
Abel Saual	Abel Saual	Villager	Non provided	
Amade Maula	Amade Maula	Villager	Non provided	
Iburanio lassine	Iburanio lassine	Villager	Non provided	
Amido Wanti	Amido Wanti	Villager	Non provided	
Safar Athua	Safar Athua	Villager	Non provided	
Magido Aquimo	Magido Aquimo	Villager	Non provided	
Sagibo Mario	Sagibo Mario	Villager	Non provided	
Assane Saúle	Assane Saúle	Villager	Non provided	
Brange Cucane	Brange Cucane	Villager	Non provided	
Mussa Nacuca	Mussa Nacuca	Villager	Non provided	
Luisa Aquim	Luisa Aquim	Villager	Non provided	
Aquimo Aide	Aquimo Aide	Villager	Non provided	
Ussene Dufane	Ussene Dufane	Villager	Non provided	

Amade Ali	Amade Ali	Villager	Non provided
Manuel Omar	Manuel Omar	Villager	Non provided
Julio Denis	Julio Denis	Villager	Non provided
Valente Agostinho	Valente Agostinho	Villager	Non provided
Pedro Sitima	Pedro Sitima	Villager	Non provided
Chabane Abudo	Chabane Abudo	Villager	Non provided
Ramadan Atanasio	Ramadan Atanasio	Villager	Non provided
Laussane Saide	Laussane Saide	Villager	Non provided
Ibraimo Julai	Ibraimo Julai	Villager	Non provided
Gabriel Pitchora	Gabriel Pitchora	Villager	Non provided
Antonio Acacio	Antonio Acacio	Villager	Non provided
Abento Mohamed	Abento Mohamed	Villager	Non provided
Jovenito Carlito	Jovenito Carlito	Villager	Non provided
Castro Pedro	Castro Pedro	Villager	Non provided
Rachide Mputi	Rachide Mputi	Villager	Non provided
Momade Ali	Momade Ali	Villager	Non provided
Páscoa Tomé	Páscoa Tomé	Villager	Non provided
Armandinho Atanasio	Armandinho Atanasio	Villager	Non provided
Eugenio lassine	Eugenio lassine	Villager	Non provided
Jose Abibo	Jose Abibo	Villager	Non provided

General

A community meeting was organised with the village of Maputo on 9 July 2013 in order to elect two representatives from this village to act on the Technical Working Group (TWG)³. The meeting was held in the villagers" local language, Macua. Mr Victor Assane, a teacher of the village's primary school, translated the discussions from Portuguese to Macua. The meeting was chaired in Portuguese by Ms Carina Saranga (CES).

Discussion

Ms Saranga introduced herself, Mr Bosman and Mr Hough as constituting the RAP study team. She continued to introduce CES and the purpose of the company's involvement in the mine and its affected villages. She further explained the study team's independence from the mine, and stressed the team's purpose of promoting the interests of the villagers in order for the mine not to affect the villagers' livelihood negatively. Ms Saraga then clarified the purpose of the RAP, emphasising that some machambas will be affected and/or lost.

Ms Saranga elaborated upon the need to establishment a TWG as part of the RAP process, as well as that two village representatives from each village need to be elected by the villagers themselves to act on this group. The need for these two representatives to be able to read and write was also stressed. Furthermore, she explained that this group will be used as an engagement mechanism between the villages and the mine, and that these elected members will act on behalf of, and promote the interests of all the villagers.

Ms Saranga informed the villagers that the study team will return in a couple of weeks" time to identify and engage with the owners of the machambas in order to plan compensation strategies. Furthermore, villagers were discouraged from making any new machambas in the mining area by explaining that any new plantings will not be compensated.

Lastly, Ms Saranga informed the villagers that a meeting will be held with the elected TWG members on the following day at Ntete Village at 15:00.

Issue/concern	Responses	
Village representative: Inquired about employment opportunities on the mine, and expressed a concern that the mine apparently only wants to employ educated people	Ms Saranga: Informed the villagers that this concern will be communicated to mine management. She reiterated the RAP team's independence from the mine. Explained that the team is here to work with the farmers in order to ensure that the mine does not affect their livelihoods negatively. Continued to mention that the team will return in a couple of weeks to work with those farmers who will be affected by the mine and to measure their fields for compensation.	
All: Expressed gratitude		
Village representative: Articulated excitement on behalf of all the villagers in anticipation of having their fields evaluated for compensation	Ms Saranga: Cautioned that not all machambas will be affected and thus compensated, and that the number of farmers who will be affected is still unknown. Clarified that only a selection of machambas will be affected and thus compensated for, and that all should not be expecting compensation from the mine.	
All: Expressed gratitude and appreciation		

Issues and/or concerns raised

The meeting was adjournedat 15:00.

³The purpose of the TWG and Resettlement Action Plan (RAP) process was explained to the chief of Maputo during a previous meeting held with all the affected chiefs on 7 July 2013.

APPENDIX 7: COMMUNITY MEETING MINUTES 5

Balama Graphite Mine, Mozambique MEETING MINUTES

10 July 2013



Date	Meeting venue	Time	Meeting objective
10/07/2013	Pirira Village	09:14-10:10	To introduce the Resettlement Action Plan (RAP) study team from Coastal & Environmental Services (CES) and to establish a Technical Working Group by electing 2 representatives from the village
Balama Graphite Mine

Date: 10/07/2	013 Venue:	Pirira Village	<u> Time: 09:14-10:10</u>		
Attendance register					
Name	Company/Village	Position	Contact nr		
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038		
Mr Lunguisa Bosman	CES	Social Scientist	0027715417958		
Mr Anton Hough	CES	Social Scientist	079 514 76 11		
Ms Laura Rodolfo	Syrah	Community Relations Officer	826901653		
Mario Omar	Pirira	Villager	Non provided		
Taji Sucule	Pirira	Villager	Non provided		
Adohori Ramia	Pirira	Villager	Non provided		
João Raibo	Pirira	Villager	Non provided		
Assane Matias	Pirira	Villager	Non provided		
Tauacal Sobra	Pirira	Villager	Non provided		
Domingos Raimundo	Pirira	Villager	Non provided		
Amane Nusso	Pirira	Villager	Non provided		
Tiago Juma	Pirira	Villager	Non provided		
Jorge Rodrigues	Pirira	Villager	Non provided		
Benetício Cornelio	Pirira	Villager	Non provided		
Bachir Eusébio	Pirira	Villager	Non provided		
Rabuna Sauane	Pirira	Villager	Non provided		
Adriano Massiambe	Pirira	Villager	Non provided		
Julieta Rachide	Pirira	Villager	Non provided		
Maria Abujate	Pirira	Villager	Non provided		
Lucia Jamal	Pirira	Villager	Non provided		

Racinda Benjamin	Pirira	Villager	Non provided
Azia Salimo	Pirira	Villager	Non provided
Isabel Jorge	Pirira	Villager	Non provided
Ines Pertalize	Pirira	Villager	Non provided
Luisa Suabane	Pirira	Villager	Non provided
Rosa Feliz	Pirira	Villager	Non provided
Ligia da Conceicao	Pirira	Villager	Non provided
Maria Saibo	Pirira	Villager	Non provided
Bertina Leontino	Pirira	Villager	Non provided
Virginia Anane	Pirira	Villager	Non provided
Julieta Jorge	Pirira	Villager	Non provided
Auasse Ali	Pirira	Villager	Non provided
Camilo Ali	Pirira	Villager	Non provided
Saibo Ali	Pirira	Villager	Non provided
Simão Amimo	Pirira	Villager	Non provided
Venâncio Bilal	Pirira	Villager	Non provided
Jaime Bilal	Pirira	Villager	Non provided
Alfane Ali	Pirira	Villager	Non provided
Nazario Venancio	Pirira	Villager	Non provided
Candido Julio	Pirira	Villager	Non provided
Jose Benjamim	Pirira	Villager	Non provided
Chabane Machute	Pirira	Villager	Non provided
Aiuba Sauane	Pirira	Villager	Non provided
Josquinho Naite	Pirira	Villager	Non provided
Joaquim Nunes	Pirira	Villager	Non provided

Joaquim Mariano	Pirira	Villager	Non provided
Pedro Arlindo	Pirira	Villager	Non provided
Nazareo Assane	Pirira	Villager	Non provided
Raquibo Mussa	Pirira	Villager	Non provided
Pedro Manuel	Pirira	Villager	Non provided
Alberto Macuba	Pirira	Villager	Non provided
Gilberto Nantia	Pirira	Villager	Non provided
Omar Bertino	Pirira	Villager	Non provided
Pedro Agostinho	Pirira	Villager	Non provided
Lino Estevão	Pirira	Villager	Non provided
Benito Pipa	Pirira	Villager	Non provided
Visardo Simão	Pirira	Villager	Non provided
Joao Alfane	Pirira	Villager	Non provided
Cesário Armando	Pirira	Villager	Non provided
Carlina Soana	Pirira	Villager	Non provided
Emilia Geraldo	Pirira	Villager	Non provided
Justina Solate	Pirira	Villager	Non provided
Luciana Sumaila	Pirira	Villager	Non provided
Julieta Almasse	Pirira	Villager	Non provided
Missina Chabane	Pirira	Villager	Non provided
Maria Jaime	Pirira	Villager	Non provided
Lucia Zacarias	Pirira	Villager	Non provided
Tomazina Bejamim	Pirira	Villager	Non provided
Ancha Bruhane	Pirira	Villager	Non provided
Rosalina Muatemuie	Pirira	Villager	Non provided

Cristina Issa	Pirira	Villager	Non provided
Fatma Raibo	Pirira	Villager	Non provided
Peliana Manuel	Pirira	Villager	Non provided
Idalina Armando	Pirira	Villager	Non provided
Estefanea Jacinto	Pirira	Villager	Non provided
Felizarda Celestino	Pirira	Villager	Non provided
Minezia Omar	Pirira	Villager	Non provided
Arminda Atuse	Pirira	Villager	Non provided
Jusa Antonio	Pirira	Villager	Non provided
Hortencio Celestino	Pirira	Villager	Non provided
Rajabo Pirane	Pirira	Villager	Non provided
Ali Augusto	Pirira	Villager	Non provided
Castro Pacente	Pirira	Villager	Non provided
Buia Majerica	Pirira	Villager	Non provided
Frederico Omar	Pirira	Villager	Non provided
Faruque Castro	Pirira	Villager	Non provided
Jose Manuel	Pirira	Villager	Non provided
Suale Andrice	Pirira	Villager	Non provided
Hilario Francisco	Pirira	Villager	Non provided
Diamantino da Conceicao	Pirira	Villager	Non provided
Mines Ernesto	Pirira	Villager	Non provided
Cali Assane	Pirira	Villager	Non provided
Zacarias Sadique	Pirira	Villager	Non provided
Alifo Maulano	Pirira	Villager	Non provided
Joaquim Cabral	Pirira	Villager	Non provided

Nuro Afisse	Pirira	Villager	Non provided
Almeida Mario	Pirira	Villager	Non provided
Amimo Aiane	Pirira	Villager	Non provided
Samuel Manuel	Pirira	Villager	Non provided
Joao Oqua	Pirira	Villager	Non provided
Jora Mahulana	Pirira	Villager	Non provided

A community meeting held in the village of Pirira 10 July 2013 in order to elect two representatives from this village to act on the Technical Working Group (TWG)⁴. The meeting was held in the villagers" local language, Macua. Mr Gorge Rodrigues, a village representative, translated the discussions from Portuguese to Macua. The meeting was chaired in Portuguese by Ms Carina Saranga (CES).

Discussion

Ms Saranga introduced herself, Mr Bosman and Mr Hough as constituting the RAP study team. She continued to introduce CES and the purpose of the company's involvement in the mine and its affected villages. She further explained the study team's independence from the mine, and stressed the team's purpose of promoting the interests of the villagers in order for the mine not to affect the villagers' livelihood negatively. Ms Saraga then clarified the purpose of the RAP, emphasising that some machambas will be affected and/or lost. In addition, she explained to the attendees that, of all the surrounding villages, the likelihood that several households will have to be displaces are most likely in Pirira.

Ms Saranga elaborated upon the need to establishment a TWG as part of the RAP process, as well as that two village representatives from each village need to be elected by the villagers themselves to act on this group. The need for these two representatives to be able to read and write was also stressed. Furthermore, she explained that this group will be used as an engagement mechanism between the villages and the mine, and that these elected members will act on behalf of, and promote the interests of all the villagers.

Ms Saranga informed the villagers that the study team will return in a couple of weeks" time to identify and engage with the owners of the machambas in order to plan compensation strategies. Furthermore, villagers were discouraged from making any new machambas in the mining area by explaining that any new plantings will not be compensated.

Lastly, Ms Saranga informed the villagers that a meeting will be held with the elected TWG members in the afternoon at Ntete Village.

Issue/concern	Responses
Village representative: Expressed concern regarding the involvement of the Ministry of Agriculture in the compensation payments. The concern is that the ministry might provide crop compensation rates without the villagers" involvement in the process or any form of negotiations with the villagers.	Mr Hough & Ms Saranga: Explained that the study team is here to start the compensation process and that the Ministry of Agriculture needs to be involved in this process. Confirmed that the crop compensation rates of the ministry will only be used as a baseline measurement from which negotiations with the villagers will follow. The need to pursue international and Mozambique resettlement legislation was stressed, which means that the ministry needs to be involved. Mr Hough explicated that, by following the legislation, mine management will be held accountable for their actions and their social responsibilities towards the affected villagers. It was stressed that the study team is here on behalf of the affected villagers who will be involved in the entire RAP process.
Village representative: Acknowledged and expressed	Mr Hough & Ms Saranga: Referred to this mentioned
appreciation. Uttered concern that some households in	concern by clarifying that it is the RAP study team's
the area have allegedly already been affected by	purpose to ensure that compensation is paid and to
line through their village. It is alleged that no	Reiterated that the team will ensure that RAP

Issues and/or concerns raised

⁴The purpose of the TWG and Resettlement Action Plan (RAP) process was explained to the chief of Maputo during a previous meeting held with all the affected chiefs on 7 July 2013.

Issue/concern	Responses
compensation was paid to those households who were	international legislation is followed which will hold mine
affected and land that was lost.	management accountable for their actions.
	Mr Hough, Mr Bosman & Ms Saranga: Noted that
Village representative: Articulated appreciation on behalf of all the attendees. Enquired whether the same process of the machamba compensation will be followed for the loss of households.	those households who will be affected and/or lost will still be identified, and that new houses will be build by the mine in a new area. The mine will engage with the affected households and provide resettlement assistance, as this is an international requirement.
Village representative: Enquired about the mine boundaries and whether the villagers are allowed to make new machambas outside these boundaries.	Mr Hough, Mr Bosman & Ms Saranga: Explained that the exact mine infrastructural boundaries are still unknown, and that these will be illustrated on a map during the study team's next site visit.
Village representative: Complained that the mine allegedly affected her own machaba when a pipeline was constructed through her homestead to the mine camp. Claimed that no compensation was offered to her.	Mr Hough, Mr Bosman & Ms Saranga: Noted concern and promised to inform mine management. Explained that it will be the role of the RAP study team to ensure that such grievances are formally recorded and noted by the mine.

The meeting was adjournedat 10:10.

APPENDIX 8: COMMUNITY MEETING MINUTES 6

Community Meetings Balama Graphite Mine, Mozambique MEETING MINUTES

06 August 2013



Date	Meetings venue	Time	Meetings objective
06/08/2013	a) Nquide b) Ntete c) Pirira d) Maputo	a) 08:19-09:00 b) 09:35-10:15 c) 11:17-12:36 d) 14:10-15:00	 To explaining the farmland assessment process and introduce the CES recruited fieldworkers to each village; To read to the villagers their rights according to the Constitution of Mozambique and resettlement guidelines; To introduce the Technical Working Group members and explain the functioning of this group; and Establishing a Grievance Mechanism.

Attendance register			
Name	Company/Village	Position	Contact nr
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038
Mr Anton Hough	CES	Social Scientist	079 514 76 11
Ms Laura Rodolfo	Syrah	Community Relations Officer (Syrah representative)	826901653
Levi	Montepuez	CES recruited survey fieldworker	824393926/862278762
Ramadane	Balama	CES recruited survey fieldworker	866256225/829979442
Adamo	Montepuez	CES recruited survey fieldworker	863126400
Bambarmudi	Balama	CES recruited survey fieldworker	868203347
AbinaSaibo	Pirira	Community member	Non provided
Rosalina Pangala	Pirira	Community member	Non provided
FilomenaZacarias	Pirira	Community member	Non provided
Maria Abujate	Pirira	Community member	Non provided
AyanaSirini	Pirira	Community member	Non provided
Zaurinela Mariano	Pirira	Community member	Non provided
Virginia Amane	Pirira	Community member	Non provided
Elisa Camilo	Pirira	Community member	Non provided
JustinaSalade	Pirira	Community member	Non provided
RozenaSumaile	Pirira	Community member	Non provided
Isabel Zacais	Pirira	Community member	Non provided
BachirEusébio	Pirira	Community member	Non provided
Tiago Juma	Pirira	Community member	86828293
Camilo Ali	Pirira	Community member	823279976
LuísSulemane	Pirira	Community member	860025854
BasílioAntónio	Pirira	Community member	Non provided

Auasse Ali	Pirira	Community member	Non provided
JõaoCocova	Pirira	Community member	Non provided
Ali Alfredo	Pirira	Community member	Non provided
Adriano Massiambe	Pirira	Community member	Non provided
DiamantinoPsuali	Pirira	Community member	Non provided
AdelinoSaibo	Pirira	Community member	866206628
ZacariasSadique	Pirira	Community member	Non provided
Gilberto Nantilia	Pirira	Community member	Non provided
PapaitoCecelio	Pirira	Community member	862277576
BicheMuiquia	Pirira	Community member	Non provided
Omar Rafito	Pirira	Community member	Non provided
SalmoSaimo	Pirira	Community member	Non provided
Almeida Mario	Pirira	Community member	Non provided
JõaoRaibo	Pirira	Community member	Non provided
TauacalSobra	Pirira	Community member	Non provided
Menezes Ernesto	Pirira	Community member	Non provided
AyubaSawale	Pirira	Community member	Non provided
Nazario Armando	Pirira	Community member	Non provided
Jaime Saila	Pirira	Community member	Non provided
AnastacioMecaquia	Pirira	Community member	Non provided
BuanausseBacar	Pirira	Community member	Non provided
Jorge Cama	Pirira	Community member	861290528
Mario Omar	Pirira	Community member	861465574
AssaneeZauma	Pirira	Community member	Non provided
LourençoBurua	Pirira	Community member	Non provided

Maria Saibo	Pirira	Community member	Non provided
Angelina Jorge	Pirira	Community member	Non provided
CarlinaSuala	Pirira	Community member	Non provided
Emilia Geraldo	Pirira	Community member	Non provided
UsseneBuana	Nquide	Community member	866805530
LourençoGimo	Nquide	Community member	869597200
AmtoninhoJacame	Nquide	Community member	Non provided
GostavoAmade	Nquide	Community member	869418209
Abilio Joao	Nquide	Community member	865892720
QuisitoJanuario	Nquide	Community member	Non provided
RainaneSaíde	Nquide	Community member	Non provided
DaniloSulemane	Nquide	Community member	Non provided
Coutinho Bento	Nquide	Community member	Non provided
Bernardo Macaissa	Nquide	Community member	Non provided
RamadanePascoal	Nquide	Community member	Non provided
Henriques Gabriel	Nquide	Community member	Non provided
Martins Nicula	Nquide	Community member	Non provided
José Raisse	Nquide	Community member	Non provided
LuísAssane	Nquide	Community member	Non provided
HenriquesRame	Nquide	Community member	Non provided
MagrinhoSameje	Nquide	Community member	Non provided
Ribeiro Roberto	Nquide	Community member	Non provided
DamiãoVenancio	Nquide	Community member	Non provided
Carlitos Jorge	Nquide	Community member	Non provided
Alfa Samugi	Nquide	Community member	Non provided

Momade José	Nquide	Community member	Non provided
Joao Bernardo	Nquide	Community member	Non provided
FalumeAiuba	Nquide	Community member	Non provided
VaivaleAmimo	Nquide	Community member	Non provided
SalimoAssimo	Nquide	Community member	Non provided
Armando Eduardo	Nquide	Community member	Non provided
EusebioAmealo	Nquide	Community member	Non provided
Martins Pascoal	Nquide	Community member	Non provided
Alberto Toto	Nquide	Community member	Non provided
Vasco Taibo	Nquide	Community member	Non provided
CharbiDuamal	Nquide	Community member	Non provided
TionisioSaide	Nquide	Community member	Non provided
MussaRichide	Nquide	Community member	Non provided
Mussa Adriano	Nquide	Community member	Non provided
Alberto Latifo	Nquide	Community member	Non provided
Florencio Alice	Nquide	Community member	Non provided
Luisa Aquino	Maputo	Community member	Non provided
SeverinaNazario	Maputo	Community member	Non provided
SafinaRazao	Maputo	Community member	Non provided
Luisa Horácio	Maputo	Community member	Non provided
Luisa Farija	Maputo	Community member	Non provided
Sura Armando	Maputo	Community member	Non provided
Luisa Armindo	Maputo	Community member	Non provided
GerinaArtur	Maputo	Community member	Non provided
Deolindalssufo	Maputo	Community member	Non provided

MassinaUssene	Maputo	Community member	Non provided
AmidoMorage	Maputo	Community member	Non provided
Jaime Mendes	Maputo	Community member	Non provided
Miguel Pedro	Maputo	Community member	Non provided
Joao Firmo	Maputo	Community member	Non provided
MausseMaulane	Maputo	Community member	Non provided
Martins Jaime	Maputo	Community member	Non provided
IbraimoVassini	Maputo	Community member	Non provided
AssaneSatine	Maputo	Community member	Non provided
Mirage Saide	Maputo	Community member	Non provided
Sulemane Luciano	Maputo	Community member	Non provided
Nazareo Alberto	Maputo	Community member	Non provided
Almeida Pius	Maputo	Community member	Non provided
RodasAbujate	Maputo	Community member	Non provided
ConstantinoArlindo	Ntete	Community member	Non provided
JarifoRaimundo	Ntete	Community member	Non provided
AtiboBilali	Ntete	Community member	Non provided
Ali Jose	Ntete	Community member	Non provided
UsseneMussa	Ntete	Community member	Non provided
Iacobe Antonio	Ntete	Community member	Non provided
ArlindoJoaquim	Ntete	Community member	Non provided
AbobacarAmade	Ntete	Community member	Non provided
SualeSaide	Ntete	Community member	Non provided
AbdalaFeliz	Ntete	Community member	Non provided
America Rachaside	Ntete	Community member	Non provided

BinonaMualimo	Ntete	Community member	Non provided
NazariSaide	Ntete	Community member	Non provided
CausseRajabo	Ntete	Community member	Non provided
RamadaneAfonso	Ntete	Community member	Non provided
Tomas Selemane	Ntete	Community member	Non provided
Agostinho Paulo	Ntete	Community member	Non provided
NuroAntoninho	Ntete	Community member	Non provided
WilhamoAtanalio	Ntete	Community member	Non provided
Pedro Geraldo	Ntete	Community member	Non provided

Four meetings were convened by the Technical Working Group (TWG) members in the villages of Nquide, Ntete, Pirira and Maputo on 6 August 2013. The meetings were primarily aimed at introducing the TWG members to each village and explain to the villagers the functioning of this group in the displacement process. In addition, a Grievance Mechanism was established in each village, and a poster explaining this mechanism was placed in central locations. Each meeting was chaired by Mr Anton Hough and Ms Carina Saranga from CES, whilst the TWG members translated the discussions into Macua. Each meeting was well-attended.

Discussions

Mr Hough introduced himself and Ms Saranga as the social team from CES and explained their role to assist the mine to "work with the communities". CES" independence as a consultancy firm was also stressed. Mr Hough continued to emphasise the fact that, as the mine is investigating ways to minimise any social impact, not all the farms and households in the area will be affected and/or loss.

Mr Hough explained the progressive nature of the mine's infrastructural development, aiming to clarify that the entire mine site will not be developed overnight. In this way, it was explicated that only a certain number of farms and households will actually be loss and/or affected, and that all the villagers and farmers should thus not expect compensation. Mr Hough continued to distinguish between the loss of land and the loss of crops/structures on such land. As explained, the government will assist those farmers who will lose land to find alternative land. It was made clear that the mine will not pay for loss and/or disturbed land. Alternatively, attention was drawn to the fact that only the loss and/or disturbance of crops/structures etc. will be paid by the mine to those affected.

The establishment of the TWG was explained, drawing attention to the fact that the social team cannot consult each villager individually. The relevant TWG representatives of each village were introduced (two in each village), and their roles in the resettlement process were reiterated. The latter include representing the interests of all the villagers in their respective villages, to receive grievances, as well as to provide feedback to village members of any TWG discussions and outcomes. Mr Hough then reassured all of their rights in this resettlement process according to the Mozambique Constitution. Mr Carina briefly elaborated upon particular rights pertaining to resettlement, read from the new Regulations on the Resettlement Process Resulting from Economic Activities (2012).

A brief introduction was made to the social team's work schedule for the next three weeks. Each CES recruited fieldworker was introduced to the attendees, where after the farmland assessment and household survey process was described by explaining that only those farms/households within the mine's footprint area will be assessed and surveyed. The attendees were reassured that not all those farmers and/or households that will be assessed will necessarily be affected.

Each meeting was concluded with the establishment of a Grievance Mechanism. Using a poster with grievance steps and procedures, Ms Carina clarified that all grievances (issues and/or concerns) with regard to the resettlement process should be directed through the TWG members, village chiefs or the District Administrator. These members will be responsible for lodging such grievances with mine management who will then take appropriate steps. A Portuguese version of the Grievance Mechanism document was provided to each village.

The floor was opened for discussion.

Issues and/or concerns raised

Village	Issue/concern	Responses
Navida	Village representative: Asked or Mr Hough to confirm that the mine will only pay for crops and/or structures loss, whilst the government will assist affected farmers to find alternative land	Mr Hough & Ms Saranga: Confirmed
Nquide	Village representative: Inquired about employment opportunities on the mine	Mr Hough & Ms Saranga: Explained that CES is independent from the mine, and that any labour- related issues should be discussed with mine management or Laura Rodolfo directly
	Village representative: Complained that the mine's prospecting activities are currently damaging his crops on his machamba near the mountain	Mr Hough & Ms Saranga: Requested Laura Rodolfo from the mine to record the grievance and the farmer's details for mine management to take corrective steps
Ntete	General: Villagers expressed concern that new land provided by the government might be far from their village	Mr Hough & Ms Saranga: Clarified that the government will discuss land allocation with each farmer, and that the new land will be at least of the same quality or better. Farmers will be engaged with in the provision of alternative land.
	Village representative: Inquired about some marking pegs which the mine recently erected in her machamba near the mountain	Mr Hough & Ms Saranga: Explained that these pegs are probably exploration areas ("they are looking at the ground to see where the graphite is"), and that if any damage is done to her machamba, she should lodge a complaint through the grievance mechanism
	Village representative: Inquired about jobs on the mine	Ms Saranga: Clarified that CES is not here to discuss any labour- related issues; issues which have to be discussed with mine management or Ms Rodolfo. She explained that jobs will become available once the mine is operational.
Pirira	Village representative: Unclear as to whether they will be compensated for their land loss or not	Mr Hough: Reiterated that the mine will pay those affected farmers/households only for the crops, structures and/or houses loss, whilst the government will assist affected farmers to find new land. Clarified that no money will be paid for land loss, as this is the legislation in Mozambique. Ms Saranga: Explained that money is not sustainable to support their livelihood restoration in the long- term, and hence the government will find other land for those affected
	General: Some attendees expressed dissatisfaction, as they were under the impression that the mine will pay them for land loss. According to some, many Pirira farmers currently do not have any crops on their land, which is why they are concerned that the mine will thus not pay them at all. Moreover, many are already frustrated and even disappointed with the government for allegedly not supporting them with	Mr Hough & Ms Saranga: Noted that the Mozambique legislation has to be followed, which clearly bestows the government with the responsibility to find alternative land without monetary compensation. Reiterated that the mine will only pay those affected villagers for any crops, structures and/or households loss. Explained that all the land in Mozambique belongs to the

Village	Issue/concern	Responses
	past land loss issues. They understand that legislation needs to be followed, but expressed dissatisfaction with involving the government in this process. They request the mine to pay for land loss.	government, and that the mine is thus not responsible to pay any farmer for land loss.
	General: A general discussion followed with regard to fallow land, and whether the mine will pay for such land	Mr Hough: Clarified that the mine will only pay for crops affected and/or loss, however that particular compensation packages will be discussed between the mine and a particular farmer for fallow land
	Village representative: Noted that the rainy season is approaching, and that alternative land should be provided to those affected prior to the rains in order for them to prepare the soil	Mr Hough: Acknowledged. Stated that the development of the mine will take time, and that farms will not be loss simultaneously or overnight. Clarified that alternative land and the provision thereof will be discussed with each farmer by the government. It was also clarified that new land will be of the same guality or better.
Maputo	Village representative: Inquired about fallow land, and whether the mine will pay a farmer if there is nothing planted on his/her field	Mr Hough: Explained that some compensation package for fallow land will be discussed between the mine and a particular farmer
	Village representative:Inquired about the numbers which will be assigned to each farmer and/or household affected	Mr Hough: Clarified that a number will be assigned to each farmer and household that will be affected, and that this number should be used to lodge a grievance with the mine
	Village representative: Inquired whether the mine will pay for the land loss	Mr Hough: Clarified that the mine will only pay for crops affected and/or loss

APPENDIX 9: COMMUNITY MEETING MINUTES 7

Meetings with the four village chiefs

MEETING MINUTES

28 November 2013

MINUTES PREPARED FOR:
A SYRAH RESOURCES
MINUTES PREPARED BY:
CES
Carina Saranga
Coastal & Environmental Services
GRAHAMSTOWN
P.O. Box 934
Grahamstown, 6140
046 622 2364
With offices also in East London and Port Elizabeth (South Africa) and
Maputo (Mozambique)
www.cesnet.co.za

Date	Meeting venue	Time	Meeting objective
28/11/2013	Ntete Village	09:09-10:10	 Explain to the village chiefs the purpose of the RAP social team's site visit, which was to continue towork withthe owners of thefarmslocatedwithin the mine's area of influence; To introduce the fieldworkers to the chiefs; To show the mine's current mine layout plan and where farms and/or households might be loss/affected and the changes made on the layout; Reiterate the procedures of the established Grievance Mechanisms; and Requestauthorisation to commence with the surveys.

	Date: 28/11/2013	Venue: Ntete Village Time: 09:09-10:10	
		Attendance Register	
Name	Company/ village	Position	Contact nr
Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038
Lungisa Bosman	CES	Social Scientist	079 514 76 11
Laura Rodolfo	Syrah	Community Liaison Officer (Syrah representative)	826901653
Levi	Montepuez	CES recruited survey fieldworker	824393926/862278762
Ramadane Sauate	Balama	CES recruited survey fieldworker	866256225/829979442
Octavio Gildo	Montepuez	CES recruited survey fieldworker	863126400
Zacarias	Ntete	Ntete Chief	Non provided
Edio Jose Rafael	Ntete	Ntete Chief	Non provided
Manuel Crinde	Ntete	Ntete Chief	Non provided
Omar Bacar	Ntete	Ntete Chief	Non provided
Sebastião Jacame	Nquide	Nquide Chief	Non provided
Tupula Joao Viriano	Nquide	Nquide Chief	Non provided
Adelino Sadique	Muali/Maputo	Muali/Maputo Chief	Non provided
Antonio Muatuka	Ntete	Ntete Chief	Non provided

Balama Graphite Mine

The meeting was chaired by Ms Carina Saranga (CES) in Portuguese. The primary objective of the meeting was to commence with the second round of farmland assessments and household socio-economic surveys for the Resettlement Action Plan (RAP). In order to do this, the meeting was primarily organised to ask permission to work with the communities. The meeting was very productive also in terms of planning the days" work schedule.

Discussions

Ms Saranga introduced the social team from CES and explained CES" involvement in the mine in assisting the mine to assess those farms and/or households that might be loss/affected. CES" independence as a consultancy firm was also reiterated. Ms Saranga continued to stress the fact that, as the proponent is investigating ways to minimise the social disturbance, not all the farms and households in the area would be affected.

She explained that, during the last survey period, some farmers could not be surveyed, and that an additional mine layout plan has since been provided by the client. Hence, some new farm areas and farmers would need to be surveyed. Using a poster, Carinaexplained the next few days" working procedure, illustrating the new mine layout plan. Indicating thison the map, she continued toidentify areaswhere farms andhouseswould be identified and evaluatedby the fieldworkersduring the coming week. She clarified that not all the families or farmers that are evaluated should expect to be affected (and thus compensated). The area that is be studied by the fieldworkers is only used to guide the fieldworkers in their assessment.

Ms Saranga made a distinction between the loss of land and the loss of crops (i.e. that only the loss of crops will be compensated by the mine). She explained that the District Services of Economic Activities (DSEA) will assist all the affected farmers to find alternative land.

Another priority of the meeting was to discuss the week's work schedule. Carina explained that each farmer to be surveyd would have an entitlement sheet that would act as a declaration of the study's cut-off-date; cautioning farmers that any new farm land crops or structures inside the mine's Area of Influence (AoI) would not be compensated by the mine. Adding to this, Ms Saranga reminded all those attending of the established Grievance Mechanismavailable for all to make complaints, intended for the mine to resolve such complains in consultation with those affected.

Conclusion

The meeting closed at 10:10.

APPENDIX 10: TECHNICAL WORKING GROUP MEETING 1

Balama Graphite Mine, Mozambique MEETING MINUTES

TECHNICAL WORKING GROUP MEETING 1

10 July 2013

MINUTES PREPARED FOR:
A SYRAH RESOURCES
MINUTES PREPARED BY:
CES
Jan Anton Hough
Coastal & Environmental Services
GRAHAMSTOWN
P.O. Box 934
Grahamstown, 6140
046 622 2364
With offices also in East London and Port Elizabeth (South Africa) and
Maputo (Mozambique)
www.cesnet.co.za

Date	Meeting venue	Time	Meeting objective
10/07/2013	Ntete Village	15:43-16:10	To establish the Technical Working Group (TWG), to elect a chairperson and to outline the objectives of the group

Balama Graphite Mine

<u>Date: 10/07</u>	7/2013 Venue:	Ntete Village Time:	<u>15:43-16:10</u>
		Attendance register	
Name	Company/Village	Position	Contact nr
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038
Mr Lunguisa Bosman	CES	Social Scientist	0027715417958
Mr Anton Hough	CES	Social Scientist	079 514 76 11
Ms Laura Rodolfo	Syrah	Community Relations Officer	826901653
Constantino Arlindo	Ntete	Group member(chairperson)	866092848
Bachir Euse"bio	Pirira	Group member	867108403
Adelino Sadique	Maputo	Group member	Non provided
Chabane Elisa	Maputo	Group member	860035812
Useno Buana João	Nquide	Group member	866805530
Lowrenço Gimo	Nquide	Group member	Non provided
Jarifo Raimundo	Ntete	Group member	869447738
Jorge Chiquira	Pirira	Group member	Non provided

Ameeting was held on 10 July 2013 in Ntete Village with each of the elected village members in order to establish the Technical Working Group (TWG). Ms Carina Saranga chaired the meeting in Portuguese. She commenced by introducing the RAP study team, where after she explained that the development of the mine will affect some machambas and that some households might also have to be displaced. She highlighted that, of all the villages, households in the village of Pirira are the most likely to face displacement. In addition, the members were informed that the mine will only compensate the current affected machambas, whilst any new machambas or structures in the mine area will not be compensated.

Ms Saranga continued to elaborate upon CES" involvement in the mine, explaining that CES has been appointed to undertake this RAP. She then explained the reasoning for establishing the TWG, which is to represent the interests of all the villagers throughout the RAP process. Lastly, she informed the members of the team's second site visit in a couple of weeks, and that the meetings would be organised through the chairperson in advance.

Subsequent to these introductions, Ms Saranga explained that the TWG would act as a representative body where resettlement and/or compensation matters would be discussed between the mine and the villagers. In addition, she stressed that the group will also serve as an implementation forum for a Grievance Mechanism.

Lastly, Ms Saranga outlined the objectives of the TWG. The following objectives were highlighted:

- To represent the voices and convey the issues and concerns of villagers from Ntete, Maputo, Pirira and Nquide;
- To represent members from relevant government departments and provide a platform for the latter to engage with the villages and the mine regularly (through the Community Liaison Officer, or CLO);
- To provide a platform for the affected villages to engage with the client, in the full presence of the department authorities, with regard to future resettlement and/or economic displacement matters;
- To formalise a system for submitting grievances to the mine and the relevant department authorities involved in this RAP, as well as for resolution of such grievances;
- If needed, to assist with the identification of alternative agricultural fields and/or sites for relocation (should this become necessary);
- If needed in the future, to contribute to the determination of an appropriate mode and level of compensation for farmland;
- > To support with efforts to engage with other institutions such as NGOs;
- > To support initiatives in the identification of employment and business opportunities;
- > To act as a body which can, if they so wish, take discussions further with the mine regarding the company's proposed outgrowers' scheme; and
- > To regularly provide feedback and information to the affected communities on the project

In the form of their fingerprints, the group members were asked to declare their affiliation to the group and responsibilities assigned thereto. The meeting was adjourned at 16:10.

APPENDIX 11: TECHNICAL WORKING GROUP MEETING 2

Technical Working Group Meeting 2 Balama Graphite Mine, Mozambique MEETING MINUTES

05 August 2013



Date	Meeting venue	Time	Meeting objective
05/08/2013	Ntete Village	15:22-17:20	 To introduce the relevant government officials to the Technical Working Group; To show the mine's current mine layout plan and where farms and/or households might be loss/affected; Explaining the farmland assessment process & the work schedule; and Introducing the four CES recruited fieldworkers

Balama Graphite Mine

Date: 05/08/2	013 Venue	e: NteteVillage Time:	<u>15 :22-17 :20</u>		
Attendance register					
Name	Company/Village	Position	Contact nr		
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038		
Mr Anton Hough	CES	Social Scientist	079 514 76 11		
Ms Laura Rodolfo	Syrah	Community Relations Officer (Syrah representative)	826901653		
Júlio Mabote	Government	SPDI (Ministry of Planning and Infrastructure)	821525903		
Celso Nhumaio	Government	SDAE (Ministry of Agriculture)	822831840		
Lucio Nazário	Government	District Administration representative	861097466		
Júlio Mabote	Government	SPDI (Ministry of Planning and Infrastructure)	821525903		
Levi	Montepuez	CES recruited survey fieldworker	824393926/862278762		
Ramadane	Balama	CES recruited survey fieldworker	866256225/829979442		
Adamo	Montepuez	CES recruited survey fieldworker	863126400		
Bambarmudi	Balama	CES recruited survey fieldworker	868203347		
Constantino Arlindo	Ntete	Group member(chairperson)	866092848		
Bachir Euse"bio	Pirira	Group member	867108403		
Adelino Sadique	Maputo	Group member	Non provided		
Chabane Elisa	Maputo	Group member	860035812		
Useno Buana João	Nquide	Group member	866805530		
Lowrenço Gimo	Nquide	Group member	Non provided		
Jarifo Raimundo	Ntete	Group member	869447738		
Jorge Chiquira	Pirira	Group member	Non provided		

The District Administrator convened a meeting on 5 August 2013 with the eight elected Technical Working Group (TWG) members and district-level representatives of the Ministry of Agriculture and the Ministry of Planning and Infrastructure. A representative of the District Administrator attended the meeting on her behalf.

The meeting was chaired by Mr Jan Anton Hough from CES, and translated into Portuguese by Ms Carina Saranga (CES). The primary objective of the meeting was to commence with the farmland assessment and household socio-economic surveys for the Resettlement Action Plan (RAP). In order to do this, the meeting was used to introduce to the group these government representatives who will be part of the RAP process and future TWG meetings. The meeting was very productive also in terms of planning the next three weeks" work schedule.

Discussions

Mr Hough introduced the social team from CES and explained CES" involvement in the mine in assisting the proponent to assess those farms and/or households that might be loss/affected. CES" independence as a consultancy firm was also reiterated. Mr Hough continued to stress the fact that, as the proponent is investigating ways to minimise the social disturbance, not all the farms and households in the area will be affected.

The ministry delegates were introduced to the group members, and requested to briefly explain their purpose in the displacement process. Through this introduction, Mr Hough explicated that CES is not only following World Bank RAP guidelines, but also foremost Mozambique legislation which requires the involvement of government officials in the RAP process. Thereafter, the officials were briefed on the establishment of this TWG. Each village representative acting on the group was then asked to identify and introduce themselves to the officials.

Mr Hough explained the progressive nature of the mine's infrastructural development, aiming to clarify that the entire mine site will not be developed overnight. In this way, the team was also reassured that the entire mining site will not be fenced, but only particular components and selected roads. Rather, as far as possible, villagers should have continued access to the surrounding environment. It was explained that only a limited number of farms and, perhaps some households, will actually be loss and/or affected, and that villagers should thus not expect that all the farms and households will be affected and compensated.

Lastly, Mr Hough distinguished between the loss of land and the loss of crops. As explained, the Ministry of Agriculture will assist those farmers who loss land to find alternative land. It was made clear that the proponent will not compensate for loss and/or disturbed land. Alternatively, attention was drawn to the fact that only the loss and/or disturbance of crops will be compensated by the client.

A degree of caution was raised with compensation-related expectations. As the mine's lifetime is actually relatively short in relation to a community's and households' existence, Mr Hough warned that crop compensation will not necessarily allow those affected to restore their livelihoods. This, as explained, can only be realised by the provision of alternative land. By using this distinction, any possible unrealistic assumptions or expectations of compensation that will be paid to all of those farms and households inside the mining area were dampened and addressed.

The remainder of the discussion centred on establishing a working schedule for the social team's next three weeks on-site. After the four fieldworkers were introduced, the farmland assessment and household socio-economic survey processes were discussed. With the assistance of a large map of the mine's provisional infrastructure and footprint area, Mr Hough described the mine's current layout which includes several haul road alternatives. Indicating this on the map, he continued to identify those areas in which farms and/or

households will be assessed and surveyed (the assessment's footprint area) during the next few weeks by the fieldworkers, as these areas might be affected by the mine's progressive development. By indicating *machambas* to be assessed on the map, he reiterated that, although these will be assessed and surveyed, not all the farms and/or households will necessary be affected inside this footprint area (demarcated with a yellow line on the map). In other words, not all those farmers and/or households to be assessed should expect to be affected and thus compensated. As explained, this footprint will only be used to guide the fieldworkers in their assessment.

A general open discussion followed mostly with regard to the proposed mine layout plan. Several group members, as well as the representative of the Ministry of Planning and Infrastructure, encouraged the mine to upgrade the existing road running from Pirira to the current camp site, as opposed to constructing an alternative haul road that entirely bypasses Pirira and Maputo. This request is based on the rationale that Pirira will benefit from this road in terms of economic opportunities and socio-economic development. Although Mr Hough promised to inform the proponent of this request, the negative impacts of such a road were highlighted, such as that some households, as well as the primary school, will have to be relocated. However, the team was reassured that all the road alternative areas will be assessed by the social team during the next few weeks, and that the map presented is still not necessarily the final infrastructural layout plan.

Key Actions and Decisions

The following actions have been agreed upon and decisions made during this meeting:

- I. Representatives from the Ministry of Planning and Infrastructure, as well as the Ministry of Agriculture, need to be present throughout the farmland assessment process. These representatives will have to sign each farmer's entitlement sheet subsequent to the assessment by the fieldworker;
- II. Each of the four fieldworkers will be paired with one TWG member and a government representative (refer to point above) for the duration of the farmland assessment and household socio-economic survey. Stated differently, four "teams" will thus conduct the assessment; and
- III. The assessment's footprint area will be ground-truthed (walked) and demarcated for the fieldworkers with spray-painted bamboo sticks on Wednesday (7 August). These four "teams" will transect different sections of the footprint area which each team will be assigned to during the next few weeks to assess.

Conclusion and Way Forward

Four community meetings have been arranged on Tuesday (6 August 2013) in each village in order to introduce the fieldworkers, establish a grievance mechanism and introduce the farmland assessment and socio-economic survey process. The commencement of the latter process has been scheduled for Thursday (8 August 2013).

APPENDIX 12: TECHNICAL WORKING GROUP MEETING 3

Technical Working Group Meeting 3 Balama Graphite Mine, Mozambique MEETING MINUTES

23 August 2013



Date	Meetings venue	Time	Meetings objective
23/08/2013	Ntete	14:08-15:16	 A closure meeting to finish off the farmland and household assessment process; To reiterate the conditions of the moratoriums declared with each studied farmer/household and encourage the villagers to continue their farming practices in the interim; To establish a procedure for any village claims regarding farmland within the mining area to be lodged within the next four week (until the end of September) with the TWG members and Laura; and To plan for the RAP team's next site visit in November.

Apologies: MrAdelino Sadique (Maputo Group Member); Júlio Mabote (Ministry of Planning and Infrastructure); and Celso Nhumaio (Ministry of Agriculture).

Attendance register				
Name	Company/Village	Position	Contact nr	
Ms Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038	
Mr Anton Hough	CES	Social Scientist	079 514 76 11	
Ms Laura Rodolfo	Syrah	Community Relations Officer (Syrah representative)	826901653	
Levi	Montepuez	CES recruited survey fieldworker	824393926/862278762	
Ramadane	Balama	CES recruited survey fieldworker	866256225/829979442	
Adamo	Montepuez	CES recruited survey fieldworker	863126400	
Bambarmudi	Balama	CES recruited survey fieldworker	868203347	
Constantino Arlindo	Ntete	Group member(chairperson)	866092848	
Bachir Euse"bio	Pirira	Group member	867108403	
Chabane	Maputo	Group member	860035812	
Useno Buana João	Nquide	Group member	866805530	
Lowrenço Gimo	Nquide	Group member	Non provided	
Jarifo Raimundo	Ntete	Group member	869447738	
Jorge Chiquira	Pirira	Group member	Non provided	

A site visit closure meeting was convened by Mr Jan Anton Hough (CES) with the Technical Working Group (TWG) in Ntete Village on 23 August 2013. Although two district-level representatives from the Ministry of Agriculture and Ministry of Planning and Infrastructure were invited, they unfortunately could not attend. The meeting was chaired by Mr Hough, whilst those present included seven of the eight TWG members, Ms Laura Rodolfo (acting as a representative of the mine), as well as Ms Carina Saranga (CES). Ms Saranga translated the meeting from English to Portuguese.

The aim of the meeting was to provide closure on the RAP team's site visit (5-23 August 2013), which entailed household and farmer assessments in the mining area. In addition, the meeting was also called to establish an appropriate procedure for any villager/farmer in the study area who claim not to have been surveyed, or who has loss land/structures to the mine, to lodge such claims with the TWG members.

Discussions

Mr Hough commenced the meeting by expressing gratitude to all those part of the household and farmland assessments, in particular the TWG members who provided their support and assistance during the past three weeks. He noted that the assessments should be completed by this coming Sunday (25 August 2013).

A procedure was established to manage any further claims. Mr Hough explained that some farmland might have been overlooked by the assessments, and that such farmers, as well as farmers who have already loss land to the mine, have the right to make claims to the TWG. The procedure agreed upon is for any villager to lodge such a claim with a TWG member who shall be assigned with the responsibility of assessing the claim and whether the farmland in question is within the mining area. Should the claim be legitimate, the TWG member shall lodge the claim with Laura from the mine. As settled, the mine shall then ensure to consider the claim further by obtaining a GPS reading of the land parcel, which shall be emailed to Mr Hough for further contemplation.

Mr Hough continued to elaborate upon the RAP team's next site visit in November 2013, and that all the TWG members will be informed about the visit and first meeting at least two weeks in advance. The objectives of the next visit were clarified, which are to assess all the claims lodged during September, to discuss compensation packages with those affected, as well as to, with the supervision of the Ministry of Agriculture, assist the affected farmers to find alternative land. He stressed that it is CES" intention to assist the ministry and affected farmers to find suitable alternative land, as those affected should have a direct input in this process. In the interim, members were requested to start to think about alternative areas for farmland.

Lastly, Mr Hough noted that more clarity regarding the mine's implementation schedule and the project's time frame should hopefully be provided during the RAP team's next visit. As this is still largely unknown, Mr Hough encouraged the group to inform their villagers to continue farming.

Issue/concern raise	Response
General: Inquired whether village members are allowed to make any alterations to their existing houses/structures, and whether such alternations will be compensated	Mr Hough: Explained that villagers are not in any way discouraged from continuing with their livelihoods, which include making alterations to their structures and building new ones. As clarified, small alterations to structures (such as new roofs etc.) should not affect the beneficiary's entitled compensation package, as the latter will be a discussion between the mine and

Issues and/or concerns raised

Issue/concern raise	Response
	the respective beneficiary. As made clear, this discussion will take into account a beneficiary's compensation preference and support needed. Mr Hough clearly explained that only brand new structures - such as an entire new house - will not be compensated after this survey.
	Mr Hough continued to explicate that villagers should not only see compensation in terms of money. As clearly explained and reiterated, money is not a sustainable way to compensate for what a farmer has lost. "Money cannot replace what you have lost". Therefore, Mr Hough briefly elaborated upon the mine's intentions to assist the villagers with an agricultural programme which is being developed.
	It was clarified that the only area where physical resettlement is likely is in Pirira Village. However, Mr Hough stressed that it is, in fact, not the intention of the mine to replace any household. It will mostly be machambas that will be affected.
General: Expressed concern over the reasons for why the mine will not compensate any new structures or crops on new farmland	Mr Hough: Explained that the purpose of this RAP is to ensure that compensation provided to those affected is fair and just. This was explained by making an example of an opportunist from Montepeuz who comes to establish a new machamba in the area in the anticipation of getting compensation. As illustrated, such a claim would be unfair to those who already have farms in the area and who are rightfully entitled to the land and the value of its loss. A second example was drawn upon of someone who, subsequent to these surveys and moratoriums, constructs more structures on his/her land, whilst his/her old neighbour is physically too sick to do the same. This would mean that an opportunist would benefit at the expense of someone who could not manipulate the system. In this way, the reason for these moratoriums on the establishment of any new farmland or structures was rationalised on the basis of providing fair and equitable compensation to all affected, and that it is in the best interest of the villagers.

All group members were requested to disseminate the meeting's discussions with their villages, reiterating their role to act as village representatives. The members were asked to make village claims (as explained) directly to Laura after they have assessed such claims themselves. In conclusion, members were informed to communicate directly with Laura should there be any further concerns.

The meeting was adjournedat 15:16.

APPENDIX 13: TECHNICAL WORKING GROUP MEETING 4

Technical Working Group Meeting 4 Balama Graphite Mine, Mozambique

MEETING MINUTES

29 November 2013



Date	Meeting Venue	Time	Meeting objective
29/11/2013	Ntete Village	10:15-11:20	 To show the mine"s current mine layout plan and where farms and/or households might be loss/affected and the changes made to the layout; To introduce the four CES recruited fieldworkers; To reiterate the functioning of the Grievance Mechanism; and To explain the farmland assessment process and site visit work schedule.

Balama	Graphite	Mine
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Date: 29/11/2013 Venue: Ntete Village Time: 10:15-11:20

Attendance Register			
Name	Company/ village	Position	Contact nr
Carina Saranga	CES	Social Scientist (meeting chairperson)	824136038
Lungisa Bosman	CES	Social Scientist	079 514 76 11
Laura Rodolfo	Syrah	Community Liaison Officer (Syrah representative)	826901653
Zacarias	Ntete	Ntete Chief	Non provided
Lúcio Domingos Nazareo	Balama	District Administration Representative	Non provided
Celso Nhumaio	Government	SDAE (Ministry of Agriculture)	822831840
Júlio Mabote	Government	SPDI (Ministry of Planning and Infrastructure)	821525903
Levi	Montepuez	CES recruited survey fieldworker	824393926/862278762
Ramadane Sauate	Balama	CES recruited survey fieldworker	866256225/829979442
Octavio Gildo	Montepuez	CES recruited survey fieldworker	863126400
Constantino Arlindo	Ntete	Ntete Chief	866092848
Bachir Eusébio	Pirira	Group member	867108403
Adelino Sadique	Maputo	Group member	Non provided
Chabane Saualia	Maputo	Group member	860035812
Ussene Buana	Nquide	Group member	866805530
Lourenço Gimo	Nquide	Group member	Non provided
Jarifo Raimundo	Ntete	Group member	869447738
Jorge Chiquira	Pirira	Group member	Non provided

The District Administrator convened a meeting on 29 November 2013 with the eight elected Technical Working Group (TWG) members and district-level representatives of the Ministry of Agriculture and the Ministry of Planning and Infrastructure. A representative of the District Administrator attended the meeting on behalf of the Administrator.

The meeting was chaired in Portuguese by Ms Carina Saranga (CES). The primary objective of the meeting was to obtain permission from the affected villagers to commence with the farmland assessment and household socio-economic surveys for the Resettlement Action Plan (RAP). The meeting was very productive also in terms of planning the days" work schedule.

Discussions

Ms Saranga introduced the social team from CES and explained CES" involvement in the mine in assisting the mine to assess those farms and/or households that might be loss/affected. CES" independence as a consultancy firm was also reiterated. Ms Saranga continued to stress the fact that, as the proponent is investigating ways to minimise the social disturbance, not all the farms and households in the area would be affected.

She explained that, during the last survey period, some farmers could not be surveyed, and that an additional mine layout plan has since been provided by the client. Hence, some new farm areas and farmers would need to be surveyed. Using a poster, Carinaexplained the next few days" working procedure, illustrating the new mine layout plan. Indicating thison the map, she continued toidentify areaswhere farms andhouseswould be identified and evaluatedby the fieldworkersduring the coming week. She clarified that not all the families or farmers that are evaluated should expect to be affected (and thus compensated). The area that is be studied by the fieldworkers is only used to guide the fieldworkers in their assessment.

Ms Saranga made a distinction between the loss of land and the loss of crops (i.e. that only the loss of crops will be compensated by the mine). She explained that the District Services of Economic Activities (DSEA) will assist all the affected farmers to find alternative land.

Another priority of the meeting was to discuss the week's work schedule. Carina explained that each farmer to be surveyd would have an entitlement sheet that would act as a declaration of the study's cut-off-date; cautioning farmers that any new farm land crops or structures inside the mine's Area of Influence (AoI) would not be compensated by the mine. Adding to this, Ms Saranga reminded all those attending of the established Grievance Mechanismavailable for all to make complaints, intended for the mine to resolve such complains in consultation with those affected.

The issue of future alternative farmland was briefly discussed. The representative of the DSEA, Mr Celso Nhumaio, clarified that the District Services of Planning and Infrastructure (DSPI) would inspect new areas of land that might be suitable as alternative farmland (depending on the availability of the land). Thereafter, the DSPI would approve the use of this land which should then be allocated to the beneficiary farmers by the mine as part of the implementation of the RAP.

A discussion followed regarding theproposed mine layout plan. The government representatives and TWG members encouraged the mine to upgrade and use the existing road that runs past Pirira to the current mine camp. Thisrequest was based upon the logic that Pirira andNtete would benefit from such an upgrade in termsof economic opportunitiesandsocio-economic development. In response, Mr Bosman explained the reason behind constructing the main road outside a residential area; that such a road would carry largetrucks. As explained to all, trucksinresidential areaswouldbring socialproblems as communities are notused to having large vehicles around.

Mr Bosman continued to draw upon the new site location of the camp and labour residential area where around 200 labourers will be accommodated. The layout of this residential area was briefly elaborated upon, such as that four housing blocks will be constructed with water treatment systems.

Lastly, Mr Bosman briefly elaborated upon the mine's intention to design and implement several community projects such as the production and cultivation of chickens and fish, as well as an agricultural project. The idea would be for these projects to support the affected villagers after the life of the mine.

Conclusion

The meeting closed at 11:20.

APPENDIX 14: TECHNICAL WORKING GROUP MEETING 5

Meeting with the TWG Balama Graphite Mine, Mozambique Minutes of Meeting

May 12, 2014



Date	Venue	Duration	Purpose of Meeting
12/05/2014	Community Ntete	14:15-15:40	 To explain the purpose of the site visit, which was to disclose the RAP report to the TWG members and obtain their input; To assess the remaining machambas that might possibly be affected by the mine; and To discuss compensation packages with the TWG members.
ATTENDANCE REGISTER

	Ð,	Twigg Explora Moz LISTA DE	ation & Mining Ltd. ambique PRESENÇAS	CES
CID/	ADE N-	tete - TWG Meet	ting	
FAC	CILITADOR Cov	rina	8	
DATA	A 12	/ 05 / 2014		
<u>Fim:</u>	15:40			
	NOME	Cidade/Comunidade	Posição	Detalhes de contato
C	NOME arina Saranga	Cidade/Comunidade Majouto	Posição Ass. Administrativa.	Detalhes de contato
	NOME arina Saranga aurs Antonio	Cidade/Comunidade Majouto Bajana - Se 80	Posição Ass. Administrativa. Fugniliais & Agoonos	Detalhes de contato 824136038 8617 プロググリ / 8268211851
	NOME avina Saranga aura Antorios Tarro Josinito	Cidade/Comunidade Majouto Balara-Se 80 Balara-Jede	Posição Ass. Administrativa. Fuginhais & Agoonos Manifica Sur	Detalhes de contato 824136038 861770854 /826841851 824483750/861761828
C. Ce Júl	NOME avina Saranga aura Antorio Tavro Jozinito Tavro Jozinito	Cidade/Comunidade Majouto Balana-se de Contana-Jedu Koleme-Rich	Posição Ass. Administrativa. Fuginhair & Degovnos Marija Degovnos Tremo-plonificação Temidonel	Detalhes de contato 824136038 861770854 / 826241851 124483750/1861768728 322905288
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Co Co Túli A A Ma	NOME avina Saranga aurs Antonios Tavio Josinito ita Veste Zolomas delimo Sadique ida Basilio ario Lecopoito anuel Cainde	Cidade/Comunidade Maputo Bala - se & Conta - se & Conta - se & Kaleme - Rede Maputo Rainha - Ntete - Mualia Ntete	Posição Ass. Administrativa. Fugillais & Degovnos Marija Degovnos Teuro-Plenificição Temibonel Rainha Dicler Comunitari bicler	Detalhes de contato 824136038 861770854 /826241851 824483750/861765728 322905288 5
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General

The meeting was organised by the District Administrator and chaired by Ms Carina Saranga (CES). Those present included all the TWG members, as well as the CES social team (Ms Saranga and Mr Bosman). In terms of mine representation, Ms Redolfo (CLO) and Mr Célio Panquene attended the meeting. In terms of government representation, Octávio Sozinho (District Administrator Representative), Mr Júliop Mabote (DSPI) and Mr Laura António (DSEA) were present. Refer to the attendance register, attached as Appendix L.

The main purpose of the meeting was to disclose the RAP report in accordance with Article 23 of the Mozambique Regulations on the Resettlement Process Resulting from Economic Activities (2012), whilst discussing the compensation packages with the TWG members. In addition, a number of machambas still had to be surveyed and assessed, for which purposes this meeting was also aimed at sensitising the community about this survey and to make planning arrangements for this process.

Presentation

The report was disclosed to the TWG members by MsCarina, whointroduced the social team and explained that CES is an environmental consulting firm, appointed by Syrah to undertake this work. Officials of the District Administrator, DSPI and DSEA were also introduced. Ms Laura Redolfo and Mr Célio Panquene from the mine were also introduced.

Ms Saranga explained that around 208 farms and 2,076 fruit trees might be lost to the mining development, which are thus within the mining path. She further explained that some extra machambas needed to be surveyed and assessed, as these farmers were not recorded during the last site trip. She further clarified that most of the affected machambas are planted with Cassava, Peas, Corn, Beans and Sorghum, whereas the Cashew, Mango and Papaya trees are abundantly planted on most machambas.

Ms Saranga continued to define the principles upon which the compensation packages (detailed in the RAP report) have been designed:

- The mine will offer those affected farmers compensation for the loss of assets (crops, trees and structures) at full replacement cost (as established by the Government), as well as other assistance necessary to help farmers improve their standards of living or livelihoods;
- Alternative machamba land of the same or better value will be offered by the government for each affected machamba lost (the mine shall assist with this process);
- > No land shall be taken by the mine before to new land has been provided;
- Those who will receive new land will be assisted by the mine to re-establish their fields (this will form part of a Farmers" Development Programme); and
- > No structure will be destroyed before compensation has been offered.

In terms of land replacement, Ms Saranga made reference to the following key compensation package principles:

Mozambique legislation states that it is the responsibility of the government to find and allocate alternative machambas, however the mine will assist with this task;

- > Cash will not be provided for land, since affected farmers will receive alterative land;
- Prior to the mine taking their land, affected farmers will be provided with enough assisted at least for six months to prepare his/her new machamba up to a point where the first crops of the new field can be harvested for food security;
- The mine will assist those affected with preparing their "new" land in order for those who received new land to be able to harvest their first crops before the mine has taken their current land;
- The mine will make available resources to clear new land, and will also provide initial seeds;
- The mine will assign local agricultural workers to assist and monitor the farmers with preparing their "new" fields;
- The mine will only take land after the affected farmers have been assisted to establish their new fields, and after the first crops could be harvested. If this is not possible (and the mine has to take current land before "new" alternative land has been fully prepared), the mine will discuss with each affected farmer the option to provide food packages for the duration until their new land starts to produce harvests; and
- If alternative land is not be available, the mine will initiate alternative options, such as to assist farmers with intensive training to farm more productively on smaller land parcels, for example.

All the TWG agreed with these principles. Most agreed, however, that there is not sufficient replacement land.

Ms Saranga continued to elaborate upon the crop compensation packages proposed in the RAP report. She explained that a standard Government crop compensation rate has been applied. A table was presented listing all the crops that have been planted by the affected farmers. Using this table, she explained that each farmer would receive a crop compensation offer that equates to the highest crop value of the land. She clarified this with an example: if one hectare of land is affected and the farmer agrees that cassava is the highest valued crop on this particular land, then the value of one hectare of cassava will be compensated to that farmer. In addition, she clarified that the mine would still offer the affected farmers seeds, and that each farmer would be assisted on his/her new field until their first crops prior to any land acquisition.

Ms Saranga continued to elaborate upon the compensation packages for structures, as proposed in the RAP report. It was made clear that there are no established compensation rates for structures in Mozambique. In consequence, the client proposes to provide affected farmers with a fixed sum of money for each lost structure. The meeting was open for discussions. Discussions points have been included in an Issues and Response Trail in Section 7.3 that deals with the compensation methodology.

The meeting concluded by providing each community representative with a list of those surveyed farmers in their respective villages whose machambas are currently inside the mine"s Area of Influence. Each community representative was then tasked to contact those members to ensure that each affected farm owner is present at the RAP disclosure meetings in each village the following few days.

The meeting adjourned at 15:40.

APPENDIX 15: MINUTES OF THE COMMUNITY DISCLOSURE MEETINGS OF THE RESETTLEMENT ACTION PLAN

Resettlement Action Plan Disclosure Meetings with the Communities of Ntete, Nquide, Pirira, Maputo and Balama

Balama Graphite Mine, Mozambique

Minutes of Meeting

May 14& 16, 2014

Minutes Prepared For:		
A SYRAH RESOURCES		
Minutes Prepared By:		
CES		
Carina Saranga		
Coastal & Environmental Services		
GRAHAMSTOWN		
P.O. Box 934		
Grahamstown, 6140		
046 622 2364		
With offices also in East London e Port Elizabeth (África do		
Sul) & Maputo (Mozambique)		
www.cesnet.co.za		

Date	Venue	Duration	Purpose of Meeting
14/05/2014	Ntete	15:10-16:10	To explain the purpose of the site visit which was to
15/05/2014	Nquide	09:20-10:30	disclose the RAP report to
15/05/2014	Balama	14:30-16:00	the TWG members and affected farmers and
16/05/2014	Maputo	14:00-15:30	obtain their input;
16/05/2014	Pirira	09:10-10:30	 To assess the remaining machambas that might possibly be affected by the mine; and To discuss compensation packages with the TWG members and affected farmers.

Refer to the attendance registers attached as appendices O to T.

General

Each of the RAP disclosure meetings were organised by the District Administrator and chaired by Ms Carina Saranga (CES). Those present in each meeting included foremost representatives of the mine (Mr Célio Panquene and Ms Laura Redolfo), as well as representatives of the District Administrator, DSPI and DSEA. Above these members, those farmers who are affected by the loss of machamba land in each village have been called by the TWG members and were also present.

The main purpose of the meeting was to disclose the RAP report in accordance with Article 23 of the Mozambique Regulations on the Resettlement Process Resulting from Economic Activities (2012), whilst discussing the compensation packages with those farmers affected. In addition, a number of machambas still had to be surveyed and assessed, for which purposes this meeting was also aimed at sensitising the community about this survey and to make planning arrangements for this process.

Presentation

The report was disclosed to the TWG members by Ms Carina, who introduced the social team and explained that CES is an environmental consulting firm, appointed by Syrah to undertake this work. Officials of the District Administrator, DSPI and DSEA were also introduced. Ms Laura Redolfo and Mr Célio Panquene from the mine were also introduced.

Ms Saranga explained that around 208 farms and 2,076 fruit trees might be lost to the mining development, which are thus within the mining path. She further explained that some extra machambas needed to be surveyed and assessed, as these farmers were not recorded during the last site trip. She further clarified that most of the affected machambas are planted with Cassava, Peas, Corn, Beans and Sorghum, whereas the Cashew, Mango and Papaya trees are abundantly planted on most machambas.

Ms Saranga continued to define the principles upon which the compensation packages (detailed in the RAP report) have been designed:

- The mine will offer those affected farmers compensation for the loss of assets (crops, trees and structures) at full replacement cost (as established by the Government), as well as other assistance necessary to help farmers improve their standards of living or livelihoods;
- Alternative machamba land of the same or better value will be offered by the government for each affected machamba lost (the mine shall assist with this process);
- No land shall be taken by the mine before to new land has been provided;
- Those who will receive new land will be assisted by the mine to re-establish their fields (this will form part of a Farmers" Development Programme); and
- > No structure will be destroyed before compensation has been offered.

In terms of land replacement, Ms Saranga made reference to the following key compensation package principles:

- Mozambique legislation states that it is the responsibility of the government to find and allocate alternative machambas, however the mine will assist with this task;
- Cash will not be provided for land, since affected farmers will receive alterative land;

- Prior to the mine taking their land, affected farmers will be provided with enough assisted at least for six months to prepare his/her new machamba up to a point where the first crops of the new field can be harvested for food security;
- The mine will assist those affected with preparing their "new" land in order for those who received new land to be able to harvest their first crops before the mine has taken their current land;
- The mine will make available resources to clear new land, and will also provide initial seeds;
- The mine will assign local agricultural workers to assist and monitor the farmers with preparing their "new" fields;
- The mine will only take land after the affected farmers have been assisted to establish their new fields, and after the first crops could be harvested. If this is not possible (and the mine has to take current land before "new" alternative land has been fully prepared), the mine will discuss with each affected farmer the option to provide food packages for the duration until their new land starts to produce harvests; and
- If alternative land is not be available, the mine will initiate alternative options, such as to assist farmers with intensive training to farm more productively on smaller land parcels, for example.

Ms Saranga continued to elaborate upon the crop compensation packages proposed in the RAP report. She explained that a standard Government crop compensation rate has been applied. A table was presented listing all the crops that have been planted by the affected farmers. Using this table, she explained that each farmer would receive a crop compensation offer that equates to the highest crop value of the land. She clarified this with an example: if one hectare of land is affected and the farmer agrees that cassava is the highest valued crop on this particular land, then the value of one hectare of cassava will be compensated to that farmer. In addition, she clarified that the mine would still offer the affected farmers seeds, and that each farmer would be assisted on his/her new field until their first crops prior to any land acquisition.

Ms Saranga continued to elaborate upon the compensation packages for structures, as proposed in the RAP report. It was made clear that there are no established compensation rates for structures in Mozambique. In consequence, the client proposes to provide affected farmers with a fixed sum of money for each lost structure.

The meeting was open for discussions. The meeting was open for discussions. Discussions points have been included in an Issues and Response Trail in Section 7.3 that deals with the compensation methodology.

The meeting concluded with a promise from Ms Saranga to continue engaging with the communities, whilst all attending were reminded of the Grievance Mechanism and the procedures thereof.

APPENDIX 16: ATTENDANCE REGISTER OF THE RESETTLEMENT ACTION PLAN DISCLOSURE MEETING HELD IN NTETE ON 14 MAY 2014

1	Twigg Exploration & Mining Ltd. Mozambique	0-90
61	LISTA DE PRESENÇAS	E
CIDADE	Nitete	
FACILITADOR	Caring	
DATA	14/05/2014	

Começo: 15:10

Fim: 16:10

NOME	Cidade/Comunidade	Posição	Detalhes de contato
MALITA LA FARTA			
PELLIC AD COSIA			
970 JU	Pa		
DELENE HIMADOC ANALAS	20		
(JUIEIIO ENDONATO			
Causse pajabe			
Vanin 200 201e			
550 MANI CHIKIMO			
Varene Afeba			
SADILA'J' DEDONELE			
BINADO DALIALE			
Arbalt Meanan			
Andrissa fidel Ali			
Carlos Mario NThue			

Twigg Exploration & Mining Ltd. Mozambique	
DE PRESENÇAS	CE S
	DE PRESENÇAS

Fim: 16:10

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Jacinto Pedro			
1			
0			

1	Twigg Exploration & Mining Ltd. Mozambique	-ma
61	LISTA DE PRESENÇAS	CE S
CIDADE	Niete	
FACILITADOR	Carina	
DATA	1 4 / 05 / 2014	

Começo<u>: 15:10</u> Fim: 16:10

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Carina Saranga	Ntete	Ass. Adm	824136038
Octavi or formits	Adama Jele	Manga cacas	824483790/861765828
Laurs António	(Balan - sede)	trepulierop 296.	861770854/826841837
Julo Na Sode	Bele inc Seale	Fec. Prof. ok Planaquento temporal	872905282
Laura Redolto	Bailama	Reg. dos comunidado	B26921653
constantin Holma	Niele		861475148
Assimio comiqui	NTele		869176988
Venancio A. USSen	- Ntete		
Ataliasio dailo	Atete		862899377
Armanolo JOAO	NTGte		861443638
Samuel Rillite	Attete		861379883
AXIIOXIIO SUPER	AlTere		
EVaristo Vteca	N'te te	a Gi cto	

NOME	Cidade/Comunidade	Posição	Detalhes de contato
JOSE	PASILIO	PAGONIE	864658018
Wortencio Delfin Miquel	a Vitete	Cam ponés	NATE
Josi Alañ	Vitate	Campone,	869124623
Yangerste	Adako	Porceion	869174623
capting Foot	no ede	cam pomos	972961945
Xaures Manuel	1/tele	Camponés	
Joor Amame	Attete	Canbone S	11
sama Zacarias	NEG	Campones	
Tillis Consancio	Ntete	Comba nês	877008415
nesio Somtes Pijar	stete	Combonês	869896679
n's Marinez	Niere	camponis	872982709
uliao KHaele	stete	Compones	1/
Saulia Mulhate	NTELE	camponés	
Ruchide Fidel Ali	Ntete	Componés	872880906
140 JOÃO	NEGO	Cumpo mês	982880906
SANTOD ISSA ABUDO	STETE	ARTESÃO (12ECANICO)	8602-24303
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se castro Taig.	Nteli	Camponés	860154474
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armone Matias	Ntate	Campunes	
Tanderia Alfredo	NITELE	Company	872991350

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APPENDIX 17: ATTENDANCE REGISTER OF THE RESETTLEMENT ACTION PLAN DISCLOSURE MEETING HELD IN NQUIDE ON 15 MAY 2014

4	Twigg Exploration & Mining Ltd. Mozambique	- Par
100	LISTA DE PRESENÇAS	CES
CIDADE	Navide	
FACILITADOR	Carina	
DATA	15/05/2014	

Começo: 9:20

Fim:

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Carina Saranga	Papito	Ass. Adm	824136038
laws Artonio	Balong-sldo	Fuge Assono a	5617708 JU 80 FF138
OCTAVI O JOZINSTO	Belama Jede	Planitica ca 2	824483790/861765828
Célio Panquene	Balama	Gester Besenv! Comunit-TWH	6 82 80 81 960
Sebastião Antoni	- SI da Aldeia	SI da Aldeía	861002037
Jotquin SAIDE	SI Adjusto to ALDEIA	Si Adjunto la Histeria	
nose paisse	N'ande	7.8070	869123541
flasting Mieula	Neuricle	El do 2º Bairro	872386516
SINTICATSET.	Acride	ci do La bairre	5 7
Francisco, Manuel	Nauide		869128727
Cakentino Rinto	Neville		4
CODSTA Down K	Naile	Cc do 2 9 20 (17120	
A mando Afai	Navide		

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Rapael Ribut	Neuide		
ABILIO JOS francisco	Necide		
Rabana Valentim	Neuido		
Louis Naguito	aluido		
Ougenip Range			
Amade Buona	Navide		
Momal Seliane	Naride		
Samuel Vedro	Nauide		
Ali Mario	NCCide		
LALIFO KAMUSSI	Nonde		
Jula Sanito	Neile		
Juni Auti	1		
Jiefilo Aulindo	N. Euride		
ACácio Bento	Nanide		
Mosily chip			
Egidio Anlindo	Arl Naude		
CASIRO ANTONINGO	N Cuide		
Magnampo Samete	Ni Cuirle		
Sanale Saina	raniele		
SABA DO MUSA	Neuride		
Fernancy Carine Jame	cr Cruide		
feismino Alle	Dol level		

NOME	Cidade/Comunidade	Posição	Detalhes de contato
de mando Nula	N Cuide		
Jusuph Luis	Naude		
CARINA HAIDARI	Neuide		
Adelinto Pike Mising.	pleade		
Satino PinAssi	Nounde		
Domingos Francisco	Veride		
Haracio garlo	1		
1 A KABIAChur	N wush		
D'aulana Venanaco	Nouige		
ABSCIME AWASSE	Neuisee		



	TWIGG EXPLORA	FION & MINING LIN	1ITADA
	SU	BSIDIÁRIA DA	
	SYRAH RE	SOURCES LIMITED	
	PROJECTO DE	GRAFITE DE BALAT	ИA
COMUNIDADE/CIDADE	Nquide	Da	ta <u>151051</u> 121
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# APPENDIX 18: ATTENDANCE REGISTER OF THE RESETTLEMENT ACTION PLAN DISCLOSURE MEETING HELD IN BALAMA ON 15 MAY 2014



Começo: 14:30

Fim: 16:00

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Carina Daganga	Balama		824136038
Lugera Bosma	11		
large Antonio	Bila-a-sede	Eug? Agrona	8262101222
Julio Masole Balanias	Bolama - Se de	Tee. Prof. Places fi Colas fami tonial	822905282
Cého Panguene	Balama	Grestor Degenv. Comunit. TTWK-6	82 80 81960
UCIAVID JOZINITO	Jalama Jede	Manipica Dor	824483790/86176VP28
Physenhin Artices	Bolanna	0	861475148
Rall Recreto Jarak	ZNGOVANE	SecrEARIO	868293867
EMULIAND AGE IE	MARINBA "B"	SECRETARIO	860214925
AMULANEE AMUL	Marines ti	STERETARIO	827349342
Alberto Afai	Balabara	Bainta	
MARIO WRITE	MARIAIGA "A"	-	
Vazario Orlando Orinica	Marinba "B"		865623646

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Lassimo Enpesto	Engonane		
Jaime Salis	Maringa 3		
Ottortencio reelestino	Engangine	Baimo	_
CALISTO. B. J. LOPES	MARAMBA . B		
Halentin Joe Puh	a Parimba 11A	12	
Toge giguna causa	Ingamane	GTT-Pirira	
Pracintle Missar	B		
Eand Ot Minane	Allariba		86 9796054
Deife Hide	Maniba-3		
Heb Phiserlink	MARINBA-B	**************************************	865292637
Gabriels Aqueimo	Marimba B	Induced	
Hannarg Jahape	Mayunga B		
ACONTO FATTONIA MA	Mantz	-	87220560
( )			
2			







### TWIGG EXPLORATION & MINING LIMITADA

SUBSIDIÁRIA DA

### SYRAH RESOURCES LIMITED

## PROJECTO DE GRAFITE DE BALAMA

COMUNIDADE/CIDADE Balama Sede Data 15.05.14

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	. Surfice		

# APPENDIX 19: ATTENDANCE REGISTER OF THE RESETTLEMENT ACTION PLAN DISCLOSURE MEETING HELD IN MAPUTO ON 16 MAY 2014

	TWIGG EXPLORAT	ION & MINING LIMITA	DA	
	SUB	SIDIÁRIA DA	111.00	2
	SYRAH RES	SOURCES LIMITED	15-3	30
	PROJECTO DE	GRAFITE DE BALANIA		
COMUNIDADE/CIDAD	E Maputo )	lubalis Data	16.05.14	
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Alianoga Sua Dhe	Maguoete Amtonio	savané	Jaime Bilale	
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# TWIGG EXPLORATION & MINING LIMITADA

SUBSIDIÁRIA DA

SYRAH RESOURCES LIMITED

### PROJECTO DE GRAFITE DE BALAMA

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Dahilo	Mate	A fi	Assand	
Junia	Jules	A funa joa mion	fliang f Sisacare	P
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Tavida Milisa	VEROMica Marsiei	o Raionoord	o Suote	

Draft Resettlement Action Plan of the Balama Graphite Mine – August 2014

	Mualia J	la ruto Pasisão	Detalhes de contato
NOME	Cidade/Comunidade	Fosição	Detaines de contato
Carina Sarange			
OCTAVIO DEINTO	Balana Jede	11 genercador	824483790/861765828
Paula Monteiro Schiciano	Bathing - Sedt	Superorisor- Extensão Agrania	861427-633
Adelina Sadidul	Mabrito	Sepretánio alden	2
JCJEABIPO	Maprito		
NASSTIN allata	Maprila		
Josaro Artur	Mahuto		
Toin AQUISTIMIAN	Materio		
Reinsad and Atom	20 Barketo		
Apprel Saulia	Majuto		
MAISEG JOGO	Mapito	ς	877007097
Xallies Rahiba	Pachito		1
PAUDOLOUREARD	MAPITA		
Manage Ferrando	MERLITO		872932534
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ARISONA DISCHIT	DIaPuto		869124918
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HOELO DULAVAIDE	Mabiel		
Tiongo Concheo	And to		
Trederico Agrino	- 10 panco		
Muamup H Same	Naputo		869123061
Elemente Vaguine	Maputo		106 3 1 2 3 0 0 7

	PIFFOCO	Posição	Detalhes de contato
NOME	Cidade/Comunidade	1 031940	
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# APPENDIX 20:ATTENDANCE REGISTER OF THE RESETTLEMENT ACTION PLAN DISCLOSURE MEETING HELD IN PIRIRA ON 16 MAY 2014

4	Twigg Exploration & Mining Ltd. Mozambique	- Pas
51	LISTA DE PRESENÇAS	CES
CIDADE	Porira	
FACILITADOR	Carence	
DATA	16/05/2014	

Começo: 9:10

Fim: 10:30

NOME Cidade/Comunidade	Posição	Detalhes de contato
Bachur Luscow Pinira	G.T.T	872229761
mgly Gigung Caura Virina	C.T.T.	010010100
All Antonio prairie	1-1-1-	821999228
Antumane Maginica Pinina		06102224
DIONISIO JATACIO PIRIRA		801830291
ALISTO . B. J. LOPES PIRI RA		869998126
ASSAMO CALIMANT. DIRIRA		960115420
Inglist. Nagen PAire		265562015
LOCICENCO PUBLIHAXIE PIRIDX		265540420
Janacal Sobra PiRiRA		
poletino Caibo DiziBA		
Maises Jou PIRIRA		077 man 4 m Q Y
Jaime Dalis Lode		strot 17
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4	Twigg Exploration & Mining Ltd. Mozambique	mine
01	LISTA DE PRESENÇAS	CE9
CIDADE	Pirira	
FACILITADOR	lamis	
DATA	1 6 / 05 / 2014	
Comeco: 9:10		

Fim: 10:30

NOME	Cidade/Comunidade	Posicão	Detalhes de contato
huisa Mastampa	Pikiha		Dotantes de contato
Felisming ABralpo	Sede		
andido Menano	Sodo.		
Mario Dutório Omar	Pinna	Lider da Comundal	
Janto Monting teliciono	Balgena-Sede	Hampurs Digo	824483790/861765828
úbio Masote Za Canias	Balama - Jede	Tec. Prof. Pleneamento territoria (	861427633 862905288
Celio Panyvene		Gestor Desenv. Comunt. Tw/G	6 82 80 81 960

4	Twigg Exploration & Mining Ltd. Mozambique	mine
01	LISTA DE PRESENÇAS	CE S
CIDADE	Pirira	
FACILITADOR	Corina	
DATA	1 05 / 2014	

Começo: 01:10

Fim: 10:30

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Pachir Euséhio	Pinina	G. T. T.	822229764
Toge giguna causa	Viring	SIT-TO	012215704
IIssa Bruhane	Periza	Regulo	
Saibo Ali	Pikika	0.000	

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	SVRAH RE		
	PROJECTO DI	E GRAFITE DE BAI	AMA
COMUNIDADE/CIDADE	Piliha		Data 16.05.14
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Luassil	The plinage	Ernesto	Adelino
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Saipo Ali	Alberto Sover	a Anastasio	
		Mecaquia	
Camilo Ali	Maria Saibo	Molande S.	Dma
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Г	WIGG EXPLORATION 8	MINING LIMITADA
	SUBSIDIÁR	IA DA
	SYRAH RESOUR	CES LIMITED
	PROJECTO DE GRAF	ITE DE BALAMA
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COMUNIDADE/CIDADE	Ivura	Data 16.05.14
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# APPENDIX 21: ATTENDANCE REGISTER OF THE RESETTLEMENT ACTION PLAN DISCLOSURE MEETING HELD IN BALA WITH THE DISTRICT RESETTLEMENT COMISSION ON 8 MAY 2014

4	Twigg Exploration & Mining Ltd. Mozambique	- nor
01	LISTA DE PRESENÇAS	ES
CIDADE	Balama - Secle do Distrito	
FACILITADOR	Lina Buque	
DATA	08/05/2014	

 $\frac{\text{Começo: } 10:50}{\text{Fim: } 12:10}$ 

NOME	Cidade/Comunidade	Posição	Detalhes de contato
Sima Bugue	Maputo	Consultoria	21243500
Célio Panquene	Balama	Gestor de Desen. Com Syra	82 80 81 960
Locitifa Antonio	Pemba - DPCA-CD	Tochica	828137937
Claudio Alfen	Pemba-DPCA-CD	Tecnico	829883109
Laurea Reditte	Balama	Oficial de estarcad coma commun.	878901653
Dims Vaput	Balang	ali rector	825540440
TSSA RAPHIAZ VAMINIHO	BALAMA	SIPERMANEXTRAIST	82-5277123
Carina Saranga	Plaputo	Assistente Administration	824136038
Tillio Mehote Balanas	Belone	Tecuito, Plona mendo territorio	872905282
Lucio Domingos Marário	Balgrona	Técnico	851779546
Kits De fesers	Balang	Directora do SDAE	866153536
			/

# **APPENDIX 22: ENTITLEMENT CONTRACTS**



# MINA DE GRAFITE DE BALAMA, MOÇAMBIQUE Twigg Exploration & Mining Lda.

Moçambique

ECONOMIC DISPLACEMENT AS PART OF THE RESETTLEMENT ACTION PLAN

# ENTITLEMENT CONTRACT SUMMARY PAGE

Name of Household Head	
Household ID Number	
Location	

#### SUMMARY OF COMPENSATION OFFERED

TOTAL	MZN

	Forms Attached to this Summary Page		omplete	Date
1	Household Landholding Entitlement Sheet	Yes	No	
2	Household Landholding Crop/Tree Compensation Offer and Confirmation of Acceptance	Yes	No	
3	Household Landholding Structure Compensation Offer and Confirmation of Acceptance	Yes	No	

### FORM 1:

#### HOUSEHOLD LANDHOLDING ENTITLEMENT SHEET

There is a possibility that this/these agricultural land/productive trees/structures might need to be cleared. The mine is committed to minimising such clearance to the greatest extent possible. Where this cannot be avoided, the mine will pay farmers/owners for any crops/productive trees/structures which need to be removed, in accordance with the compensation rates of the Mozambigue Government. This document serves as a written record of any agricultural crops/productive trees/structures belonging to the Project Affect Person (PAP) for which, should this be loss, the PAP will be entitled to receive money for. PAPs will be provided with a unique entitlement number to keep record of the land used and assets.

### **CROP/PRODUCTIVE TREE/STRUCTURE FARMER/OWNER DETAILS**

Owner/Farmers Name	
Household Number	
Village	

m² Field size (tablet reading):

Crop 1 (main)	Crop 4	
Crop 2	Crop 5	
Crop 3	Crop 6	

Type of Productive Tree	Number	Type of Productive Tree	Number
1.		5.	
2.		6.	
3.		7.	
4.		8.	

Type of Structure	Number
1.	
2.	
3.	
4.	
5.	

	Number	Comment
Graves		
Wells/Pumps		

#### Signed:

I confirm that after the date of signature, any production or further use of this land is done at my own risk.

Crop/Tree/Structure Owner Mozambique Government Ministry Representative

Syrah Representative

/08/2013 Date

#### FORM 2: HOUSEHOLD LANDHOLDING OFFER AND CONFIRMATION OF ACCEPTANCE CROP/TREE COMPENSATION

The crops on your machamba will be lost to the development of the Balama Graphite Mine. The mine is committed to ensure that your household receives appropriate compensation for this loss, and that the payment of this compensation is fair and adequate. This document serves as a written record of what has been offered to your household as compensation for the loss of your crops/trees. It also serves as confirmation that you are satisfied with this offer.

Owner/Farmer Name	
Household ID Number	
Village	

#### PARTICULARS OF HOUSEHOLD CROP COMPENSATION

Landholding size:	_m ²	
Agreed maximum land value production rate/m ² =	MZN	
Total compensation amount paid to household head	MZN	
Amount paid to the recipient on this dayof	at	

#### PARTICULARS OF TREE COMPENSATION

	Type of Tree	Number	Agreed Value per Tree (MZN)	Tree saplings Nr Received
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

Total compensation amount paid to household head	N	//ZN

Amount paid to the recipient on this day	of	at	

We, the undersigned, hereby confirm that we have received full compensation for the loss of landholding crops/trees in accordance with the table above. We have further been notified that we are allowed to harvest our land of all the crops before the land will be acquired. The trees on the land may now be removed. We understand that, should we have any issues and/or concerns with regard to the compensation offer or the project, that we must register these with the mine or through the established Technical Working Group (TWG).

#### SIGNATURES

Name	Signature	Date
Household Head		
Community Leader		
Mine Management		
Twigg Exploration & Mining Lda. Representative		
Mozambique Government Ministry Representative		

EOH Coastal & Environmental Services

### FORM 3:

### HOUSEHOLD LANDHOLDING OFFER AND CONFIRMATION OF ACCEPTANCE STRUCTURE COMPENSATION

The structures on your machamba will be lost to the development of the Balama Graphite Mine. The mine is committed to ensure that your household receives appropriate compensation for this loss, and that the payment of this compensation is fair and adequate. This document serves as a written record of what has been offered to your household in compensation for the loss of your crops. It also serves as confirmation that you are satisfied with this offer.

#### PARTICULARS OF STRUCTURES ON THE LAND AT THE TIME OF SURVEY

Type of Structure	Compensation Option [only one option can be selected for each structure]		
1.	Replacement of structure	Payment	
2.	Replacement of structure	Payment	
3.	Replacement of structure	Payment	
4.	Replacement of structure	Payment	
5.	Replacement of structure	Payment	

The following offer was made for replacing my structures:

Agreed payment for structures: _____MZN
Total payment made to household head for lost structures _____is____is_____MZN
Amount paid to the recipient on this day_____of____at____

We, the undersigned, hereby confirm that we have received full compensation for the loss of structures in accordance with the table above. We further confirm that we no longer have ownership of structures and that these structures may now be removed. We understand that, should we have any issues and/or concerns with regard to the compensation offer or the project, that we must register these with the mine or through the established Technical Working Group (TWG).

#### SIGNATURES

Name	9	Signature	Date
Household Head			
Community Leader			
Mine Management			
Twigg Exploration & Mining Lda. Representative			
Mozambique Government Ministry Representative			

# APPENDIX 23: PROGRESS REPORT PROOFS OF DELIVERY

1) Proof of Delivery of the Progress Report sent to the provincial authorities on 30 January 2014.



ATENÇÃO:Direção Provincial para Coordenação da Acção Ambiental

28 de Janeiro 2014

De acordo com o Regulamento de Moçambique no processo de reassentamento Resultante de Actividades Económicas (2012), gentilmente aceite em anexo um relatório sobre o Plano de Ação de Reassentamento (PAR) da proposta da mina de grafite no distrito de Balama da Província de Cabo Delgado.

Por favor, note que agradecemos o seu contributo para este processo de reassentamento, e, portanto, serão bem-vindos quaisquer comentários que possa ter em relação a este relatório de progresso, ou o PAR (Plano de Acção de Reassentamento).

Agradecemos atempadamente a vossa consideração.

Com os melhores cumprimentos

Sra. Carina Saranga (Assis trativa)

Mata: & Environmental Services Mozambique, Lda
 Ras: de Frente de Libertação de Mozambique nº 324
 Maputo - Mozambique
 Tet: (+258) 2124 3500 . Faz: (+258) 2124 3550
 Website.www.cesnet.co.za

2)

### 3) Proof of Delivery of the Progress Report sent to the district authorities on 07 February 2014.



ATENÇÃO:SDAE- Serviços Distritais das Actividades Económicas

28 de Janeiro 2014

De acordo com o Regulamento de Moçambique no processo de reassentamento Resultante de Actividades Económicas (2012), gentilmente aceite em anexo um relatório sobre o Plano de Ação de Reassentamento (PAR) da proposta da mina de grafite no distrito de Balama da Província de Cabo Delgado.

Por favor, note que agradecemos o seu contributo para este processo de reassentamento, e, portanto, serão bem-vindos quaisquer comentários que possa ter em relação a este relatório de progresso, ou o PAR (Plano de Acção de Reassentamento).

Agradecemos atempadamente a vossa consideração.

5)	Com os melhores cumprimentos	ENTRADA Nº 21 DATA 07 102 12/4
	<u>Garina</u> <u>Sranga</u> Sra. Carina Saranga	ASSIMATURA
	(Assistence Administrativa)	
	Coastal & Environmental Services Mozambique, Lda Rua de Frente de Libertação de Moçambique nº 324 Maputo - Moçambique fel:(+258) 2124 3500. Fax: (+258) 2124 3550 Website.www.cesnet.co.za	
	Hobald, If WHY WARDER, CO, Za	


- Se necessário, no futuro, contribuir para a determinação de um modo adequado e o nível de compensação pelas terras agrícolas;
- > Apoiar com os esforços para se envolver com outras instituições, como ONGs;
- > Apoiar iniciativas na identificação de emprego e oportunidades de negócios;
- > Actuar como um corpo que pode, se assim o desejar, tomar as discussões adiante com a mina em relação aos "esquemas integrados" propostos pela empresa; e
- > Fornecer regularmente o retorno e informação para as comunidades afectadas no projecto.

### 1.3 Membros do Comité Eleitos

Membro	Posição na comissão	Detalhes de contacto
Constantino Adindo		866092848
Bachin Lusébio		867108403
Adelino Sadique		
Collabane San Rig		860035812
ilsene Buong		866805530
Louren co gimo		
Jarifo Daemundo		869447738
JORGE GIQUIBA GAWAA		86129521
	ŧ	

## 3

#### 1.4.4 Recepção de Reclamações/Queixas

Deve ser fornecida informação por escrito a respeito das medidas que serão tomadas para resolver a reclamação e o tempo de espera para sua resolução ao reclamante no prazo de <u>duas</u> <u>semanas</u>. Todas as trocas de informação serão inscritas no registo.

# 1.4.5 Resolução

A reclamação deve ser investigada e, se for o caso, o OLC da mina deverá discutir o assunto com o autor da queixa, o chefe, e/ou o representante da comunidade, através de reuniões ou discussões. Abordagens gerais para a resolução de reclamações podem incluir propor uma solução 1) de forma unilateral (a empresa propõe uma solução), 2) bilateralmente (a empresa e o reclamante chegam a uma resolução através da discussão ou negociação), 3) através de um terceiro (seja formal ou informalmente através da mediação), ou 4) por meio de práticas tradicionais e costumeiras.

#### 1.4.6 Encerramento

Uma vez concluída a investigação e as medidas necessárias tenham sido tomadas, o resultado será comunicado ao reclamante e inscrito no registo e no banco de dados. Independentemente do resultado, a resposta deve ser fornecidaa todos os reclamantes.

#### 1.4.7 Verificação dos Resultados

O resultado da questão será discutido com o reclamante, que será convidado a assinar a sua aceitação da "solução". Se a situação não for tratada ou o reclamante continuar insatisfeito, pode ser acordada uma acção corretiva adicional a ser levada a cabo pela mina.

\$ ~ +17 3 . . . . . .

Nome Assinatura Constantino Artindo Ntete Bachin Eusebio Pirira Adelino Saclique Map Chabane Elias Maputo Mapulo Usseno Buana João Nguide Lourenço Gino Nguido Jarifo Raimundo Niete Jorge Chiguira Causa Pirira

# APPENDIX 25: MEMBERS OF THE DISTRICT RESETTLEMENT COMMISSION



República de Moçambique Provincia de Cabo Delgado Governo do Distrito de Balama



SECRETARIA DISTRITAL

# Proposta da Comissão de Reassentamento no âmbito do Projecto da Mina de Grafite de Balama

- 1. Issa Rachide Vamutho SPD- COORDENADOR
- 2. Direcção Provincial de Coordenação da Acção Ambiental
- 3. José Zacarias-Chefe da Localidade de Ntete
- 4. Coutinho Nhamahango-Planeamento e Infra-estruturas
- 5. Octávio Sozinho Vitorino-Secretaria Distrital (Repartição de Planificação)
- 6. Laura António-SDAE
- 7. Celso Numaio-SDAE
- 8 Julio Mabote-Técnico de Obras Públicas e Habitação

Ao critéio de V. Excia

