Executive Summary

Nyumba Ya Akiba Cement Plant, Bas-Congo Province of Democratic Republic of Congo: Updated Environmental & Social Impact Assessment

Report Prepared for

Nyumba Ya Akiba

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Report Prepared by

srk consulting

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Nyumba Ya Akiba

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa)(Pty) Ltd (SRK) by **Nyumba Ya Akiba Sarl (NYA).** SRK has exercised due and customary care in revising this Environmental and Social Impact Assessment but has not, save as specifically stated, independently verified information provided by others. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's limited investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

Executive Summary

Introduction

Nyumba Ya Akiba SARL (NYA), a joint venture between Lucky Cement Pakistan and Groupe Rawji DRC, proposes to construct a 3,000 tonnes per day clinker and 3,580 tonnes per day cement manufacturing facility, limestone quarry and associated facilities in Bas-Congo Province of DRC.

The project was approved by local authorities in 2011, following an Environmental Impact Assessment (EIA) by an accredited local consultant, OEMS. Subsequently, an Environmental and Social Impact Assessment (ESIA) for lender approval was submitted in March 2013 by the Pakistani consulting firm ECTECH. Gaps in this ESIA relative to the requirements of international funders were identified via an independent environmental and social due diligence (ESDD) by ERM on behalf of the lenders.

To address these gaps, NYA appointed SRK Consulting (SRK) in June 2013 to prepare an updated ESIA and Environmental and Social Management Plan (ESMP) for the Nyumba Project ("the project"), in line with good international industry practice (GIIP) based on the IFC Performance Standards and other lender requirements. Due to time limitations, SRK's ESIA update did not constitute a complete revision of the ECTECH ESIA, but rather focussed on addressing the gaps identified where possible within the given timeframes, and noting requirements for further investigation where this was not possible (notably, with regard to hydrological and hydrogeological studies). Key findings relating to this ESIA update, and not necessarily the full content of the ECTECH ESIA, are therefore included in this Executive Summary.

Regulatory Framework

The ESIA was undertaken in accordance with both DRC legislation, including the various relevant articles of the DRC Mining Code (2002) and associated Mining Regulations (2003), and the applicable international guidelines and standards, including the following:

- The Equator Principles (EP III, 2013)
- The International Finance Corporation (IFC) Performance Standards (2012) and relevant guidelines
- The World Bank / IFC Environmental Health and Safety Guidelines (2007)
- The applicable EU Reference Documents and Directives
- The guidelines of lenders, including African Development Bank and European Investment Bank (EIB)
- The International Labour Organization (ILO) Guidelines on Occupational Safety and Health Management Systems (2001)
- Applicable international conventions, treaties and agreements.

Project Location

The project will be located on a greenfields site approximately 250 km south west of Kinshasa and 100 km east of Matadi port in the vicinity of the N-1 road and Kinsua Village, in Songololo territory, Bas Congo province of DRC (see Figure 1).

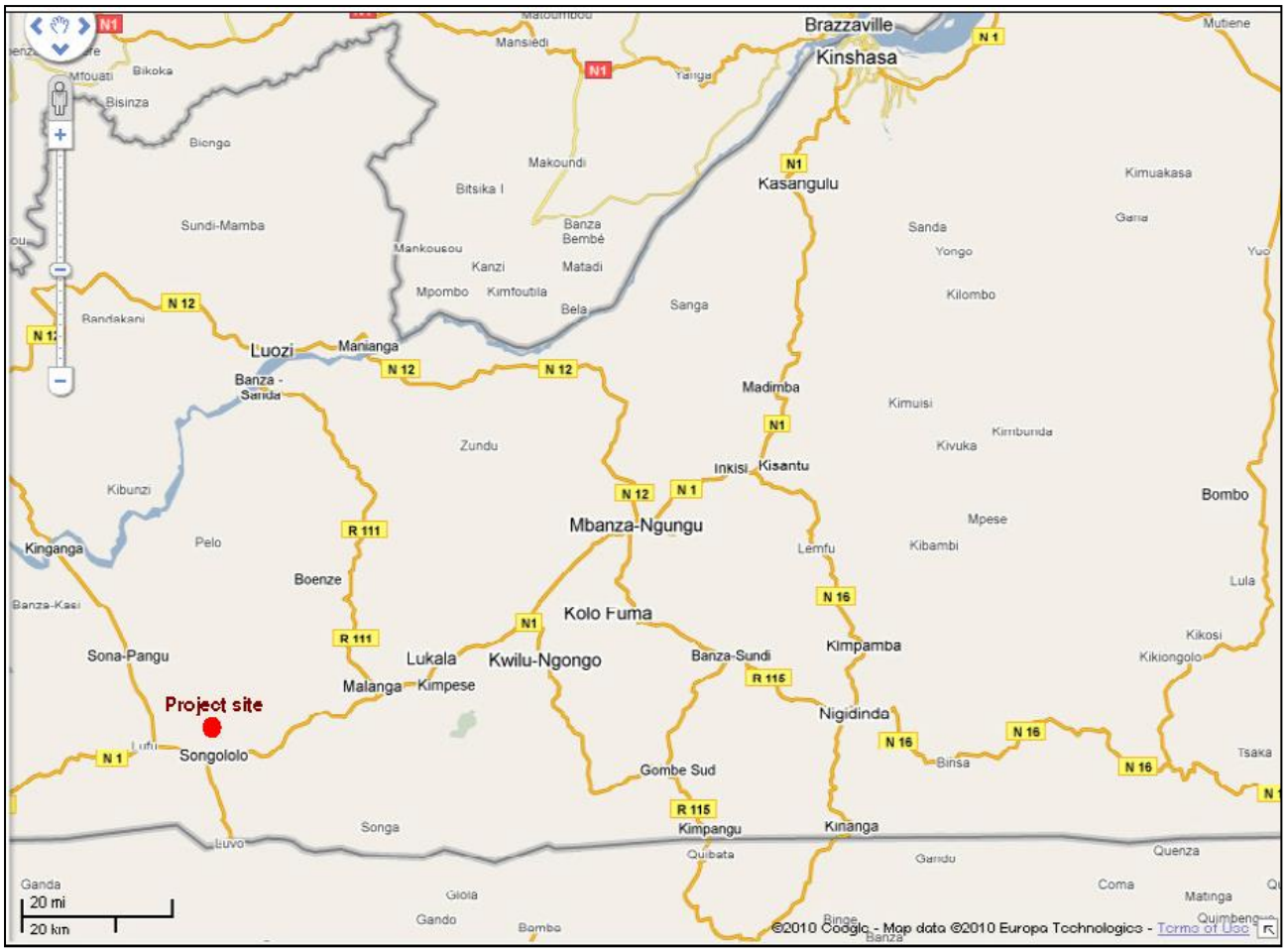

Figure 1: Project Location

Project description

Layout

The project will consist of a cement production plant, limestone quarry, and associated facilities, as shown on the preliminary site layout drawing (see Figure 2). The cement plant will be supplemented by limestone and clay from mining concessions located approximately 1.5 km north of the cement plant site. An access road linking the plant to the N1, and a haul road between the quarry and plant (following an existing track), will be constructed, as well as a powerline, linking the project to the national energy grid. The total footprint area of the project will be approximately 150 ha.

In summary, the Key Components of the Project include:

- Cement plant (annual production capacity 1.18 Million tpa)
- Limestone quarry
- Overburden storage facility
- 220 KV powerline (6 km long) to an existing substation
- Employee accommodation camps (for 300 personnel)
- Waste management facility
- Access and haul roads

- Railway connection to the national rail network
- Auxiliary facilities (water management infrastructure, package sewage treatment plant, explosives store, etc.).

While the final locations and design of certain infrastructure, including the overburden storage facility, waste management facility, and water management infrastructure, have not been determined, potential locations for some of these are indicated on Figure 2, based on a high level sensitivity analysis by SRK. The final locations and design of these facilities will however depend on the outcomes of further site-specific investigations.

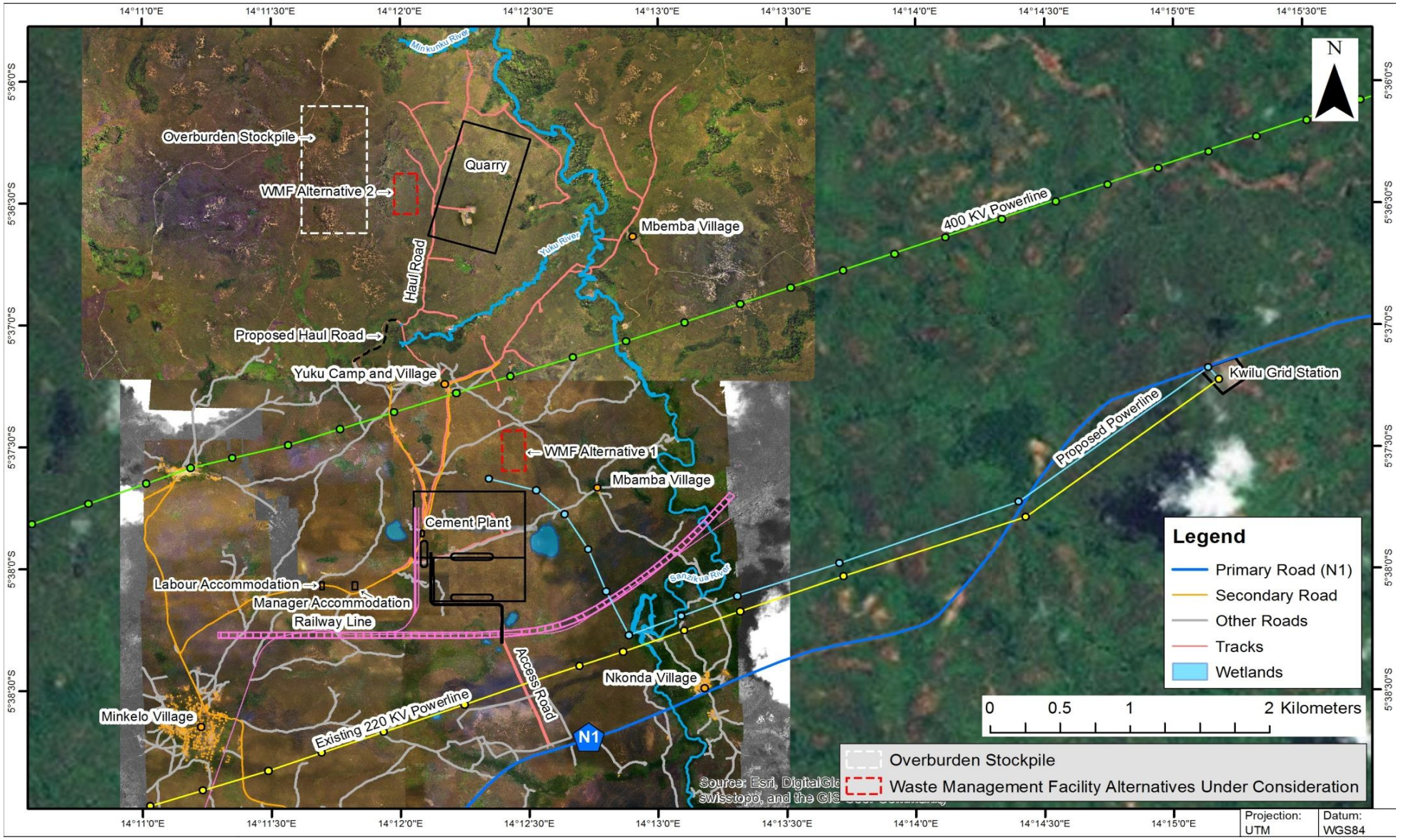

Figure 2: Site locality map showing quarry, plant and associated infrastructure (including existing infrastructure)

Raw material extraction

The quarry will be operated during daylight hours only and will use mechanized opencast mining. Excess overburden will be spoiled to a suitable area close to the quarry (location yet to be finalised). Raw material (limestone, laterite and clay) extraction will involve:

- Stripping of overburden by excavators
- Excavation of the limestone deposit using mechanical drills and blasting
- Loading of the raw materials from the quarry onto dump trucks for transportation to the plant along the haul road over a distance of 1.5 km.

As the quarry depth increases, dewatering of the pit will be required to remove groundwater inflows. This could potentially amount to substantial volumes of pit water being discharged. The quality and quantity of this water are still to be confirmed via further studies.

Cement production

NYA has selected FLSmidth (FLS) of Denmark as the design engineering and procurement contractor for the cement plant. The cement manufacturing process involves six steps, as shown diagrammatically in **Figure 3**:

1. **Raw material preparation, blending and storing:** Raw material transported from the quarry will be crushed, blended in the required proportions and stockpiled in a storage area before being conveyed to the Raw Mix Proportioning Station.
2. **Raw material proportioning and grinding:** The blended material will be mixed with other additives and transferred to the Raw Mill for grinding. After grinding, the Raw Meal will be transferred to the Blending Silo for storage and further blending.
3. **Pre-Heater Phase:** Meal from the Blending Silo will be fed into a preheater, from where it will pass through Cyclones and Feed Pipes and finally through a Pre Calciner before feeding into the Kiln.
4. **Kiln Phase:** The Calcined Raw Meal passes through a rotating Kiln and is subjected to temperatures of 1450°C, causing it to be converted to clinker.
5. **Cooling:** The clinker drops into a cooler at the discharge end of the Kiln, cooling it to 65°C + ambient temperature, before being discharged to the Clinker Storage Yard.
6. **Clinker Grinding:** The clinker is transferred from the Clinker Storage Yard to the Cement Proportioning Station. Clinker is withdrawn and Gypsum (Calcium Sulphate) added to it, followed by transfer of the mix to the Grinding Mill for fine grinding before being transferred to the Cement Silos for storing.
7. **Packing and Transport:** The ground cement will be stocked into silos before being transferred to two packing plants for packaging into 50 kg bags for dispatch. The project will primarily service the local cement market, supplemented by exports to neighbouring countries.

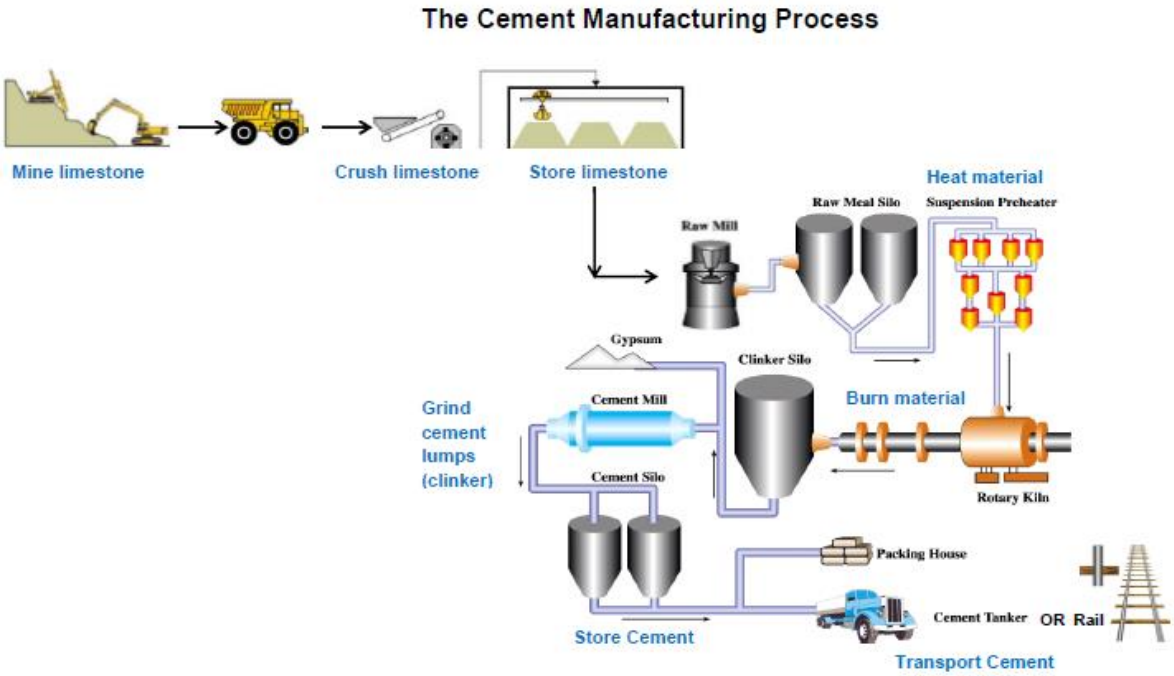

Figure 3: Diagrammatic representation of the cement manufacturing process

Process Control: The plant will be managed from a central control room that will allow the monitoring of all processes, including temperatures and pressures. Continual testing of the materials, sample preparation, chemical analysis and physical testing will take place in the on-site laboratory. While the plant will operate 24 hours a day, certain components such as the crushers, will operate during daylight hours only.

Environmental controls: Various dust control measures, including filters, are included in the plant design to minimise dust emissions during cement manufacturing.

Fuel: Coal fuel for the cement plant will be imported from South Africa via ship, and transported from Matadi Port to the site via either road or preferably by rail. For this purpose, a railway siding on the western side of the plant has been included in the design.

Power and Water supply: Power for the project will be sourced from the DRC national electricity grid, with generators available at the plant for emergency supply to essential equipment. This will not however be sufficient to maintain operation of the plant. Raw water supply will be obtained from either the rivers in the area, or groundwater sources. Where possible, process water will be recycled.

Employment: Up to 500 personnel will be required during the peak of the construction phase of the project (approximately 4-5 months), approximately 50% of which will be locally sourced unskilled labour. During the operational phase, it is anticipated that 373 employees will be required, approximately 300 of which will be housed at the project's accommodation camps close to the plant.

Resettlement: Yuku village, a small local settlement located between quarry and cement plant, will be resettled as part of the Project, due to the alignment of a new 400 KV national powerline (not related to the project), as well as its proximity to the proposed project haul route. The village comprises 9 houses with a total population of about 50 inhabitants.

Project setting

Water resources

The project area is characterised by gently undulating topography and numerous wetland areas. Two main rivers cross through the project area: the Sanzukua River, flowing in a northerly direction, and the Yuku River, which originates between the proposed quarry and plant, and flows eastwards to connect onto the Sanzikua River.

These rivers, as well as the wetlands and the natural spring near Yuku village, are used as a source of potable water to the surrounding villages. Available information on the baseline water quality is unreliable, however preliminary water quality measurements recorded on site by SRK indicate the general quality is good. Groundwater depth varies from 20 to 25 m.

Climate and air quality

A tropical Sudanese climate prevails and is characterized by separate rainy and dry seasons. Temperatures range from 18°C to 28°C. The insolation of the NYA Project Area is particularly low, and the average annual rainfall varies from 900 mm to 1,500 mm.

Due to the current lack of development, air pollution levels in the area are low. Key emissions are airborne dust from vehicles on the nearby road; smoke from burning of agriculture residues and bushes; and coal and dust from household fires. Levels of emissions increase during the dry season as wind strength increases.

Soils and Land use

The soils in and around wetlands generally show good fertility and water retention capabilities, supportive of the agricultural activities currently occurring on the site, as well as conservation purposes. In other areas, the soils are highly permeable and the presence of laterite may limit root growth.

Land use over the site is limited, with much of the site existing in its natural state. Anthropogenic land use is limited to subsistence type agriculture, where a variety of crops such as cassava, corn, squash, peanuts, bananas and beans are cultivated. Shifting agriculture is implemented where natural vegetation is burned prior to cultivation of the land. When productivity of the cultivated land drops, a new area is burned. The abandoned field is then left fallow for colonisation following a process of natural succession

Biodiversity

The vegetation cover over the project area consists mainly of savanna, with patches of dense gallery or swamp forest bordering swamps, wetlands and rivers. The diversity of mammals in the study area is believed to be low and that of birds moderate, while insects showed higher diversity. A number of Red List species occur in the area, most of them being specific to forest habitat.

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

Socio-economic environment

Demographics

The area is rural in nature and is characterised by a lack of development or infrastructure. Approximately 10 000 people are estimated to live in the vicinity of the proposed project. Settlements in the project area include: Yuku, Kokolo, Nkonda, Mbemba, Kinsua, Mbamba and Minkelo.

The area comprises several ethnic groups, the most dominant being Mboma, Ndibu, Manianga and Kakongo. Kimpese is the largest settlement in the project vicinity and is the most ethnically diverse.

Livelihood and economy

A traditional lifestyle prevails and subsistence agriculture is the main livelihood. Land availability is therefore vital to local communities, who rely on it for agriculture, charcoal, medicinal plants, sacred sites and other natural resources.

Most households are reliant on a mixed economy including, crop cultivation, hunting, commerce, trade and to a lesser extent, animal husbandry. A secondary form of income is generated from fishing, mainly in the Sanzikua River.

Facilities and infrastructure

Education facilities in the area are very limited and poor, and basic facilities such as electricity, telephone networks, health care, sanitation, potable water supply and road networks are largely absent. Wood and charcoal are the primary sources of energy for cooking, while candle-power, kerosene lanterns and torches provide light.

There is no public transport system and the roads are generally in poor condition. Most local residents walk to their destinations, while some use motorbikes and bicycles.

Health

The most prevalent diseases are malaria; diarrhoea and typhoid fever; sexually transmitted diseases; HIV/AIDS; tuberculosis; meningitis; high blood pressure and influenza. Malaria is the biggest public health threat. Alcohol and drug abuse is widespread, particularly amongst the youth, as is sexual violence.

Cultural heritage

A number of sites of heritage importance were recorded over the project area, including ceramics, cemeteries, sacred sites and iron age artefacts. Of the 36 recorded sites within the project lease area, 6 sites are expected to be indirectly impacted on by the proposed mining activities. Of these 6 sites, 5 are of medium heritage significance and the 6th (the Yuku village cemetery) is of high significance.

Project alternatives

Various alternatives have/ are being considered as part of the project process. The ‘no-go’ alternative would perpetuate dependency on cement imports into DRC and is not considered further. Project site alternatives within Bas Congo were limited by requirement for close proximity to reserves of quality limestone, clay and laterite, transport routes, as well as the national power grid. Within the site, high-level environmental screening was carried out which influenced the location of the overburden stockpile, waste management facility and haul road alignment . Surface and groundwater studies have been commissioned by NYA and layout plans may require amendment in line with findings.

Sub-surface open cast mining and underground mining were considered as mining method alternatives, with sub-surface open cast mining being selected as the most safe and economical approach. Chosen cement production technology is ‘state of the art’ Best Available Technology (BAT) for environmental controls and energy efficiency. Water-saving dry process technology and open recirculating cooling systems are being implemented. Energy-saving is being achieved through choice of vertical roller mills, as well as 5-stage preheater with pre-calciner. Air pollution control methods to be implemented include fabric filters and electrostatic precipitator (ESP) technologies. Coal (to be imported) is preferred to HFO for clinker production based on cost. Raw water for

process cooling and domestic use is still under investigation, and will be sourced either from surface water resources (the Yuku and Sanzikua rivers); or groundwater abstraction (possibly linked to pit dewatering at the quarry).

A waste management facility (WMF) will be developed for non-mining waste including hazardous waste from the project. Co-processing (incineration) or project-generated and local waste will require feasibility assessment after commencement of operation before its viability is confirmed. Co-disposal of waste with the overburden from the quarry is not being pursued, for reasons including undetermined effects on groundwater. Process water at the cement plant will be recycled, reducing the raw water requirement.

Package sewage treatment plants have been chosen over septic tank based on the improved treatment of sewage and larger numbers of employees which the system can deal with.

Impact assessment process

As part of the ESIA update, SRK commissioned the following specialist studies to supplement the available information in ECTECH's report and address the gaps identified by ERM:

- Cultural heritage
- Ecology and biodiversity
- Ecosystem services
- Greenhouse gases
- Air quality
- Noise
- Socio-economic
- Water resources
- Soils and landuse
- Traffic.

The studies were undertaken by SRK's in-house expertise as well as external consultants as required and consisted of desktop studies supplement by on-site investigations where timeframes allowed. Where possible, the assistance of local experts was used, notably for the ecological, social and cultural heritage studies. It is noted that due to time limitations, additional quantitative sampling and detailed predictive modelling was not possible and the studies were largely qualitative in nature, the intention being to supplement the existing baseline information reported by ECTECH.

SRK's standard impact assessment methodology, which takes into account intensity, duration, spatial scale, and probability of the impact, as well as a score of the confidence in the impact rating, was used to rate the significance of the identified impacts during the construction, operation, closure and post-closure phases of the project. Recommended management measures (mitigation measures to reduce negative impacts or enhancement measures to increase benefits) were identified for each impact, and are listed in

Table 2, which also identifies the project phases the measures are applicable to. These measures form the basis of NYA's commitments to environmental management of the project. A summary of the significance ratings for the impacts assessed, both before and after effective implementation of the recommended mitigation or enhancement measures, is provided in **Error! Reference source not found.**.

Cumulative impacts resulting both from other potential and existing developments in the area, and from the NYA project (e.g. multiple impacts affecting Mbamba village), were also discussed.

Table 1: Summary of impact significance ratings before and after implementation of recommended management measures

Impact groups	Identified impacts	Impact Significance	
		Pre-management	Post-management
CONSTRUCTION PHASE			
Biophysical impacts			
Visual	Impact VI1: Loss of sense of place affecting local communities due to site clearing and construction activities	Medium (-ve)	Low (-ve)
Soils, land capability & land use	Impact SL1: Placement of project infrastructure, resulting in a transient loss of soil resource, and change in soil characteristics, land capability and land use	Medium (-ve)	Medium (-ve)
	Impact SL 2: Placement of permanent project infrastructure, resulting in a permanent loss of soil resource, and change in soil characteristics, land capability and land use	Medium (-ve)	Medium (-ve)
	Impact SL 3: Spillage of chemicals and seepage from waste resulting in permanent loss of soil resource, and change in soil characteristics, land capability and land use	Medium (-ve)	Low (-ve)
	Impact SL4: Site clearance resulting in a permanent loss of soil resource, and potential change in soil characteristics, land capability and land use as a result of increased erosion	Medium (-ve)	Low (-ve)
Air quality	Impact AQ1: Increase in PM_{10} emissions resulting from land clearing, earthworks, and vehicular movement	Low (-ve)	Low (-ve)
	Impact AQ2: Increase in gas (SO_2, NOx, CO and VOCs) emissions resulting from vehicle exhaust emission and biomass burning	Low (-ve)	Low (-ve)
Water resources	Impact WR1: Chemical contamination of surface water resulting from accidental spills during transportation and handling, and seepage from waste	Low (-ve)	Low (-ve)
	Impact WR2: Sedimentation of surface water resulting from erosion and runoff from exposed surfaces and roads	Low (-ve)	Low (-ve)
	Impact WR3: Contamination of groundwater resulting from seepage from sewage and other waste	Low (-ve)	Low (-ve)
Noise and Vibration	Impact NV 1: Continuous noise impact on Mbemba Village resulting from night-time construction at the quarry	Low (-ve)	Low (-ve)
	Impact NV 2: Air-blast noise impact on Mbemba Village resulting from blasting at the quarry during construction	Low (-ve)	Low (-ve)
Ecology & Biodiversity	Impact EB1: Loss of savanna habitat due to site clearing and earthmoving activities	Medium (-ve)	Low (-ve)
	Impact EB2: Loss of forest habitat due to site clearing and earthmoving activities	Medium (-ve)	Low (-ve)
	Impact EB3: Loss of aquatic habitat due to site clearing and earthmoving activities	Medium (-ve)	Low (-ve)

Impact groups	Identified impacts	Impact Significance	
		Pre-management	Post-management
	Impact EB4: Loss or disturbance of species of special concern due to site clearing and construction activities	Medium (-ve)	Low (-ve)
	Impact EB5: Loss or degradation of ecological processes due to site clearing and construction activities	Medium (-ve)	Low (-ve)
	Impact EB6: Fragmentation of habitats and ecological processes due to positioning of project infrastructure	Medium (-ve)	Low (-ve)
	Impact EB7: Modification or degradation of aquatic habitats due to altered hydrological regimes and surface or groundwater quality	Medium (-ve)	Medium (-ve)
	Impact EB8: Introduction of alien invasive plants due to site clearing and disturbance of vegetation	Medium (-ve)	Low (-ve)
	Impact EB9: Impeded photosynthesis and transpiration rate of plants due to dust generation	Low (-ve)	Low (-ve)
Traffic	Impact T1: Impact of construction related traffic on utilisation capacity on the N-1	Medium (-ve)	Low (-ve)
	Impact T2: Impact of construction related traffic on traffic flow in Matadi	Medium (-ve)	Low (-ve)
	Impact T3: Safety impacts on local communities and other road users due to increased road accident rates during construction	Medium (-ve)	Medium (-ve)
Socio-economic impacts			
Population & Demographic movement	Impact PD1: Influx of potential job seekers into the area and associated risks	Medium (-ve)	Low (-ve)
Health & Safety	Impact HS1: Increased chances of the spread of communicable diseases such as HIV/AIDS and STDs linked to influx of predominantly male job-seekers and workers	Low (-ve)	Low (-ve)
	Impact HS2: Increased pressure on healthcare infrastructure due to project related influx	Medium (-ve)	Low (-ve)
	Impact HS3: Increased risk of accidents and injuries to communities from improved roads and additional traffic	Low (-ve)	Low (-ve)
	HS4: The visible presence of DRC police within the project area, and their secondment as a subcontractor for the mine security	Low (-ve)	Low (-ve)
Land & Natural Resources	Impact LN1: Physical displacement of households residing at Yuku Village and the protection of vulnerable groups	High(-ve)	Medium(-ve)
Economic Impacts	Impact EC1: Local and regional benefits resulting from increased Revenue to Government	Low (+ve)	n/a
	Impact EC2: Stimulation of increased regional investment in the DRC Economy	Low (+ve)	n/a

Impact groups	Identified impacts	Impact Significance	
		Pre-management	Post-management
	Impact EC3: Generation of direct, indirect and induced employment and income	Medium (+ve)	Medium (+ve)
Cultural Heritage Resources	Impact CH1: Indirect damage to Iron Age archaeological resources through land transformation activities	Medium(-ve)	Low(-ve)
	Impact CH2: Indirect damage to cemeteries through land transformation activities	Medium(-ve)	Low (-ve)
Ecosystem Services	Impact ES1: Reduced availability of natural resources and ecosystem services to local communities	Medium (-ve)	Low (-ve)
OPERATIONAL PHASE			
Biophysical impacts			
Air quality	Impact AQ3: PM_{10} emissions due to activities at the quarry and the vehicle entrainment of dust affecting air quality of nearby villages	Medium (-ve)	Low (-ve)
	Impact AQ4: Dust emission from activities at the cement plant affecting air quality for nearby communities	Medium (-ve)	Low (-ve)
	Impact AQ5: Gas (SO_2, NOx and CO) emissions from activities at the cement plant affecting air quality for nearby communities	Medium (-ve)	Low (-ve)
Greenhouse Gases	Impact GH1: Increase in greenhouse gas emissions in the area resulting from the cement plant	Medium (-ve)	Low (-ve)
Noise and Vibration	Impact NV3: Continuous noise resulting from daytime operations of the quarry, cement plant and associated infrastructure	High (-ve)	Low (-ve)
	Impact NV4: Continuous noise resulting from night-time operations of the cement plant and associated infrastructure	Medium (-ve)	Medium (-ve)
	Impact NV5: Air blast pressure and vibration resulting from blasting at the quarry	High (-ve)	Medium (-ve)
Ecology & Biodiversity	Impact EB10: Loss or disturbance of fauna species of special concern due to collisions and noise disturbance	Medium (-ve)	Medium (-ve)
	Impact EB11: Introduction of alien invasive flora and fauna	Medium (-ve)	Low (-ve)
	Impact EB12: Increased hunting/poaching of wildlife	Medium (-ve)	Low (-ve)
	Impact EB13: Modification or degradation of aquatic habitats due to pollution or nutrient loading	High (-ve)	Medium (-ve)
	Impact EB14: Impeded photosynthesis and transpiration rate of plants due to dust generation	Medium (-ve)	Low (-ve)
Soils, land capability &	Impact SL5: Chemical spills and release of contact water resulting in permanent loss of soil, and change in soil characteristics, land capability and land use	Medium (-ve)	Low (-ve)

Impact groups	Identified impacts	Impact Significance	
		Pre-management	Post-management
land use	Impact SL6: Operational activities causing increased erosion, resulting in a permanent loss of soil resource, and change in soil characteristics, land capability and land use	Medium (-ve)	Low (-ve)
Water Resources	Impact WR4: Contaminated stormwater runoff from roads and other surfaces affecting surface and groundwater quality	High (-ve)	Low (-ve)
	Impact WR5: Discharge of contaminated pit water to surface water resources, affecting downstream users	High (-ve)	Low (-ve)
	Impact WR6: Risk of flooding of project infrastructure due to placement within the 1:100 year floodline	Medium (-ve)	Low (-ve)
	Impact WR7: Dewatering of the quarry resulting in groundwater drawdown and reduced contribution to surface water baseflows and wetlands, affecting users	High (-ve)	Medium (-ve)
	Impact WR8: Stormwater inflows into the pit, reducing surface water flows and availability to users	High (-ve)	Medium (-ve)
	Impact WR9: Raw water abstraction for the project reducing availability to other users	Medium (-ve)	Low (-ve)
	Impact WR10: Seepage from waste affecting surface and groundwater quality	Medium (-ve)	Medium (-ve)
	Impact WR11: Wastewater effluent discharge to streams, affecting water quality for downstream users	High (-ve)	Medium (+ve)
	Impact WR12: Sinkhole formation resulting from dewatering of subsurface cavities, resulting in safety and structural stability risks	High (-ve)	n/a
Visual	Impact VI2: Loss of sense of place affecting local communities due to project infrastructure and illumination	Medium (-ve)	Low (-ve)
Traffic	Impact T4: Impact on utilisation capacity on the N-1 affecting other road users	Medium (-ve)	Medium (-ve)
	Impact T5: Impact on traffic in Matadi affecting other road users	Medium (+ve)	n/a
	Impact T6: Increased road accident rates and road safety of other road users	High (-ve)	Medium (-ve)
Socio-economic impacts			
Economic Impacts	Impact EC4: Local and regional benefits resulting from increased Revenue to Government	Medium (+ve)	n/a
	Impact EC5: Generation of direct, indirect and induced employment and income	High (+ve)	High (+ve)
Ecosystem Services	Impact ES2: Reduced availability of natural resources and ecosystem services to local communities due to use by the project and impacts on these resources	Low (-ve)	Low (-ve)
Population & Demographic	Impact PD2: Influx of potential job seekers into the area and associated risks	Medium(-ve)	Low(-ve)

Impact groups	Identified impacts	Impact Significance	
		Pre-management	Post-management
Movement			
Health & Safety	Impact HS5: Increased chances of the spread of communicable diseases such as HIV/AIDS and STDs linked to influx of predominantly male job-seekers and workers	Low(-ve)	Low(-ve)
	Impact HS6: Increased pressure on healthcare infrastructure due to project related influx	Medium(-ve)	Low(-ve)
	Impact HS7: Increased risk of accidents and injuries to communities from improved roads and additional traffic	Low(-ve)	Low(-ve)
	Impact HS8: The visible presence of Congolese police within the project area, and their secondment as a subcontractor for the mine security	Low(-ve)	Low(-ve)
DECOMMISSIONING AND CLOSURE PHASE			
Ecology & Biodiversity	Impact EB15: Re-establishment of habitats or creation of new habitats via rehabilitation	Medium (+ve)	Medium (+ve)
	Impact EB16: Introduction of alien invasive flora and fauna	Medium (-ve)	Low(-ve)
	Impact EB17: Loss or disturbance of fauna species of special concern due to collisions and noise disturbance	Medium (-ve)	Low (-ve)
	Impact EB18: Increased hunting/poaching of wildlife and loss of habitats for crop production	Medium (-ve)	Medium (-ve)
Water Resources	Impact WR13: Chemical contamination of surface water resulting from accidental spills during transportation and handling, and seepage from waste	Low (-ve)	Low (-ve)
	Impact WR14: Sedimentation of surface water resulting from erosion and runoff from exposed surfaces and roads	Low(-ve)	Low(-ve)
	Impact WR15: Contamination of groundwater resulting from seepage from hazardous materials and waste	Low(-ve)	Low(-ve)
Soils, land capacity & land use	Impact SL7: Remediation of contaminated soils and demolition of project infrastructure, resulting in re-establishment of baseline soil characteristics and land capability	Medium (-ve)	Low(-ve)
Air Quality	Impact AQ6: Increase in PM_{10} emissions resulting from land clearing, earthworks, and vehicular movement	Low(-ve)	Low(-ve)
Visual	Impact VI3: Dust generation and site disturbance due to earth moving and removal of project infrastructure, affecting the visual character for communities	Medium(-ve)	Low(-ve)
POST-CLOSURE PHASE			
Ecology & Biodiversity	Impact EB19: Increased hunting/poaching of wildlife and loss of habitats for crop production	Medium (-ve)	Medium (-ve)

Impact groups	Identified impacts	Impact Significance	
		Pre-management	Post-management
Water Resources	Impact WR12: Pit lake formation due to inflow of ground and surface water, resulting in safety risks to animals and humans, and environmental contamination	Low (-ve)	Low (-ve)
Soils, land capacity & land use	Impact SL8: Demolition and restoration of project infrastructure, resulting in re-establishment of baseline soil characteristics and land capability	Medium (-ve)	Low (-ve)
Visual	Impact VI4: Re-establishment of baseline visual character due to rehabilitation of the site and removal of project infrastructure	Medium(-ve)	Medium(+ve)

Table 2: Mitigation and enhancement measures recommended to manage environmental and social impacts

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
VI, SL, AQ, WR, EB	Minimize the disturbed footprint as far as practically possible.	■	■	■	
	Undertake stripping, stockpiling and stockpile management as per the Soil Management Plan (Section 9.5 of ESIA).	■	■	■	
	Revegetate and landscape disturbed areas as soon as possible, to reflect the surrounding topography and vegetation.	■	■	■	■
VI	Consider the use of screening tools such as dense vegetation where practical and appropriate to the surroundings.	■	■	■	
VI, WR, EB	Clear vegetation in phases so that only those areas required for immediate development are cleared.	■	■	■	
VI, WR	Implement the waste management plan for the project (Appendix 15).	■	■	■	
VI	Use directional lighting in areas operating at night, if communities are affected by lighting.		■		
VI, SL	Implement the Closure and Rehabilitation Plan as described in the report to support the proposed project.				■
SL	Implement livelihood restoration and compensation measures in areas where livelihood are impacted by the loss of agricultural lands.	■			

[1] VI – Visual impacts; SL – Soils, land capability and land use; AQ – Air Quality; WR – Water Resources; NV – Noise and Vibration; EB – Ecology and Biodiversity; T – Traffic; PD – Population and Demographic Movement; HS – Health and Safety; LN – Land and Natural Resources; CH – Cultural Heritage; EC – Economic Impacts; ES – Ecosystem Services; GH – Greenhouse gases; SR – Safety Risks

[2] Applicable project phases indicated via grey shading

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
SL	Assist community members where livelihood impacted with establishing new agricultural areas on land of equal or better land capability.				
SL, SR	The preparation of procedures to ensure that spillage during mobile equipment maintenance is minimized, and that only designated areas are used for this purpose.				
SL, EB, SR	The provision of appropriate secondary containment (to hold 110% of the stored volume) in areas where hydrocarbons, solvents and other potentially hazardous materials are stored.				
SL	Implement emergency preparedness and response measures plan as described in Section 9.6.				
SL	Implement storm water control measures around infrastructure.				
AQ, WR, VI, EB	Apply dust suppressants to sections of roads used routinely by vehicles that pass through and close to villages;				
	Locate stockpiles within site boundaries considering the location of potential sensitive receptors and the predominant wind direction;				
AQ, WR, VI	Design road alignments to minimize travel distances and eliminate unnecessary traffic;				
	Cover vehicles carrying dusty materials to prevent materials being blown from the vehicles;				
	Set speed limits to minimize the creation of fugitive dust within the project boundary;				
AQ, GH	Development and implementation of a routine air quality monitoring program.				
AQ	Limit vehicle idling and keep vehicles well maintained to minimize particulate and gaseous emissions;				
AQ	Where possible, biomass burning should be considered and a schedule should be maintained to allow for pollutants to disperse into the atmosphere in a short amount of time;				
AQ	Avoid constructing roads close to human settlements				
AQ	Vegetation and soil should be removed together (mixed) so that the plant matter helps to hold the soil. Alternatively, vegetation can be stripped and stockpiled and then spread over the newly made stockpiles of soil				
AQ	Biomass burning should be conducted during the during the day and during the summer months;				
AQ, WR, VI	Minimise vegetation clearing. As the quarry expands, clearing should not take place a long time in advance of quarrying. Planned planting of trees and vegetation outside the quarry limits will minimize spreading of dust to surroundings				
	Where practical, rehabilitation of the quarry should be progressive – i.e. it should be implemented as soon as a section is worked out				
AQ, GH	Regular maintenance and efficient operation of the cement manufacturing plant				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
AQ	Install spray bars, enclosure of transfer points or other means of control will be employed as necessary to ensure dust emissions from the crushing and conveying systems is properly managed to meet emission and ambient air quality targets				
AQ	Start-up conditions should be short as possible as this will reduce emissions during this process				
AQ	Develop an emergency response plan for Mbamba village to include on-going training and drills with the villagers. Impacts are likely to occur when the prevailing winds are towards the village during an upset condition.				
AQ	Start-up should be delayed when the prevailing winds are towards the village.				
WR	Where contaminants are transported along construction roads, emergency contaminant and mitigation measures must be developed to minimize impacts should accidental spillages occur along the transport routes				
WR	Equip all trucks and equipment carrying fuels or oil with spill response materials and train personnel in the use of such materials				
WR, EB, SR	Store all potential sources of contamination in secure facilities with appropriate Storm Water management systems in place to ensure that contaminants are not released to the water resource through Storm Water runoff				
	Use oil & silt traps to remove these types of contaminants from stormwater, and use designated areas for equipment servicing				
WR	Construct access roads and infrastructure in a way that sensitive ecosystems are avoided;				
WR, EB	Ensure that proper designs are prepared and implemented to manage stormwater runoff in a manner that minimizes sediment transport to the receiving water resource and minimizes erosion along runoff channels.				
WR	Prioritise construction of a properly lined and designed waste landfill site and sewage treatment system as early as possible				
WR	Implement a stormwater management plan which will separate dirty water from clean water and divert run off from dirty areas to a pollution control dam which should have a silt trap to settle any sediment				
WR	Re-use water from the pollution control dam as a first resort. Only discharge after treatment and compliance with discharge limits can be demonstrated				
WR	Construct concave surfaces to ensure run-off is directed				
WR	Optimise water reuse and reclamation within the mining operations, to limit raw water abstraction				
WR	Where practical, intercept clean ingress water as close as possible to its source in order to prevent or minimize water quality deterioration and to allow this water to be pumped up to surface for appropriate use or discharge				
WR	If possible, undertake dewatering upgradient of the quarry to keep the pit dry and prevent water quality deterioration.				
WR	Discharge pumped underground water into a dam for treatment and possible re-use as a first priority rather than discharging into the surface				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
	water resource				
WR	Undertake flood line study investigation to establish 1:100 year flood line				
WR, SR	Locate plant, associated infrastructure, material storage areas and quarry outside the 1:100 year floodline				
WR	Construct cut-off trenches and storm water control measures to contain the 1:100 year flood event				
WR	Monitor groundwater levels to determine extent of dewatering impact				
WR	Ensure water supply for domestic and agricultural purposes to communities affected through dewatering activities				
WR	If necessary, treat removed groundwater to a quality that is suitable for discharge to streams and agricultural use				
WR	Monitor discharge water quality to ensure it is compliant with the necessary guidelines.				
WR	Cut-off trenches to be installed around the pit perimeter to manage the extent of inflows (divert clean water away from the pit)				
WR	Discharge treated effluent into streams to compensate for abstraction losses (provided it meets the quality criteria)				
WR	Especially ensure the removal of nitrates from treated water as streams and rivers already contain elevated nitrate background concentrations;				
WR	Water to be discharged need to comply with maximum concentrations of contaminants in waste water as per Article 66 of Congolese Law.				
WR	Undertake monthly monitoring up-gradient and down gradient of the discharge point				
WR	Design the waste landfill in accordance with the requirements (eg lining and cover) for the type of waste handled				
WR	Cap waste landfill facility after closure to limit artificial recharge and seepage forming				
WR	Implement groundwater monitoring around waste disposal facility				
WR, EB,HS	Restrict access (and ingestion of pit water) by animals and humans by fencing the pit.				
NV	Restrict activities at the quarry to daytime hours 07:00 am to 07:00 pm.				
NV	Restrict blasting at the quarry to afternoon hours 14:00 to 17:00 pm, or employ alternative techniques to avoid blasting.				
NV	Change the alignment of the haul road to bypass Yuku Village (or relocate the village)				
NV	Implement noise screening measures for the mills in the plant design (or relocate Mbamba village)				
EB, ES	All cleared or degraded areas that do not form part of NYA's operations must be rehabilitated to a stable ecological state, as close to the pre-				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
	construction condition as practically possible;				
EB, ES	A Rehabilitation Plan to be developed and implemented (overseen by an appropriately qualified botanist/ecologist), with different objectives and rehabilitation approaches established for each habitat/ecosystem.				
EB, ES	A Biodiversity Action Plan to be developed to inform NYA's protection and management of biodiversity in the entire concession.				
EB, ES	Gallery and Swamp forest to be avoided to the greatest practical extent possible (including road and powerline alignments);				
EB, ES	A No-Go buffer of 50 m to be established around Gallery forest present in the north of the proposed overburden stockpile. No spoiling of material may be undertaken upgradient of this Gallery Forest. No spoiling of material to take place to the west of the existing (most western) road to the proposed spoil site, to avoid impacts to the extensive swamp and Swamp forest system west of the road;				
EB, ES	The proposed haul road should be constructed via an upgrade of the existing road to the west of the current staff camp, as opposed to the development of a new road through/over the Yuku River to the east of the camp;				
EB, ES	Re-shaping of slopes near Gallery and Swamp forest to be avoided to the greatest practical extent possible;				
EB, ES	Remaining Forest habitat that has been degraded must be restored to their pre-construction condition;				
EB, ES	Construction in or near to wetlands, swamps, streams and rivers must be avoided to the greatest practical extent possible, including the road and powerline alignments;				
EB, ES	The plant, railway siding and haul road must not be moved any closer to the Kawenga wetland (immediately west of plant) and no construction or earthmoving activities may take place within 50m of the wetland and the swamp surrounding it. The plant site must be fenced and no slope/bank modifications may be conducted along the eastern boundary of the plant site;				
EB, ES	A stormwater management plan must be developed for all project components to address stormwater run-off volumes, velocity, water quality to minimise impacts on natural areas, focussing on minimising increased sedimentation of the wetlands and swamps,				
EB, ES	The largest practically possible size of culvert/s to be installed at any stream/swamp crossings, particularly at the intersection of the proposed haul road and current railway line, to minimise impacts on the hydrological regime and aquatic habitat loss				
EB, ES	The alignment of the new powerline must avoid the southern catchment of the Mbamba wetland (immediately east of plant) to the greatest practical extent possible;				
EB, ES	A No-Go buffer of 100 m should be established around all other wetlands, with the exception of the proposed roads, where site clearing and bank modification must be minimised the greatest practical extent possible;				
EB, ES	Aquatic habitats and areas immediately adjacent to them that have been degraded during the construction phase must be restored to their pre-construction condition;				
EB, ES	Sessile fauna present at construction sites to be relocated by appropriate experts prior to the commencement of site clearing;				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
EB, ES	No fauna are to be hunted or destroyed by any project personnel;				
EB, ES	An environmental education training programme to be developed and implemented, including regular refresher sessions;				
EB, ES	Effective penalties (e.g. fines) must be imposed for the hunting or harm to fauna by any staff;				
EB, ES	No diversions or bank modifications to any of the rivers, streams, wetland and swamps must take place;				
EB, ES	The ecological water requirements of the aquatic ecosystems should be determined. Water abstraction from any of the rivers and from groundwater must not exceed levels that result in the ecological water requirements of the aquatic ecosystems being compromised. Abstraction from the wetlands and swamps must not be allowed;				
EB, ES	Natural fire regimes in the study area to be allowed to continue, or active management must be instituted to mimic natural regimes as advised in the Biodiversity Action Plan.				
EB, ES	A weir or gabion system must be constructed at the toe of the Kawenga and Mbamaba wetlands if increased run-off into these wetlands results in associated erosion immediately downstream of these systems. The weirs must be constructed to maintain the natural water levels of the wetlands and must not facilitate increased flow out of the wetlands;				
EB, ES	A programme for the control of alien invasive plants in the concession to be developed and implemented as a component of the Biodiversity Action Plan.				
EB, ES	Bird collision minimisation technologies (e.g. bird flappers) to be installed on the new powerline from the grid station at Kimpese to the plant to minimise collisions. The most appropriate technology is to be determined by an experienced ornithologist;				
EB,ES	The waste water treatment plant to be located at least 100m from all wetlands.				
EB,ES	Areas immediately adjacent to important habitats (e.g. lacustrine wetlands, swamps, Gallery and Swamp Forest) that have been degraded must be restored to their natural, pre-construction condition;				
EB, ES	All other cleared or degraded areas that are not identified in the closure plan for alternative commercial use (e.g. utilise the plant site for a new factory) must be rehabilitated to a stable ecological state as close to the pre-construction condition as practically possible.				
EB, ES	NYAs social and labour plan to address the provision of sustainable, alternative livelihoods upon cessation of operations				
T	Widening of the N-1 at the access road to allow for turning lanes and reduce the potential for accidents and congestion at this intersection.				
T	Clear signage and traffic calming measures on the N-1 warning motorists of the intersection would reduce potential traffic safety impacts at this intersection.				
T	Truck staging and/or rest area to enable trucks to exit the N-1 safely, and enable site staff to schedule deliveries in an orderly manner.				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
T	Provision of temporary on-site accommodation for construction personnel to limit the volumes of daily commuter traffic to the project site;				
T	Provision of dedicated buses for construction personnel not accommodated on the site to reduce daily commuter traffic to the project site;				
T	Schedule the delivery of materials outside peak traffic times.				
T	NYA to specify maximum loads for shipping of equipment to site (size and weight).				
T	A maintenance schedule for all vehicles directly under the control of NYA must be developed and implemented to ensure ongoing roadworthiness of vehicles. Suppliers, contractors, and sub-contractors must be instructed to implement the same maintenance schedule				
T	Random inspections for roadworthiness of all vehicles entering or leaving the site must be implemented				
T	NYA management to pursue the revitalisation of the rail network with the relevant authorities.				
T	Rest area for drivers should be implemented, and maximum driving hours per driver established and enforced.				
PD	Optimise the use of local labour as far as practically possible as per the Labour and Human Resources Management Plan (Appendix 11).				
PD	Develop a code of conduct with which contractors and their employees must comply. The code should deal with the interaction with local communities and substance abuse among other things.				
PD	Implement the Stakeholder Engagement Plan (Appendix 17) which clarifies the principles of engagement with community and other stakeholders, sets in place appropriate liaison forums and describes the grievance management procedure to be adopted by NYA.				
PD	Develop and communicate a clear and concise employment and recruitment policy to prevent opportunistic job seekers from settling in the area (Appendix 17)				
PD, HS	Develop a comprehensive HIV/AIDS program to employees through employee wellness programmes which should include the following: • Awareness campaigns targeting project workers, senior management, contractors, sub-contractors and their spouses, communities near project facilities, risk groups (commercial sex workers, truck drivers) • Prevention, voluntary counselling for HIV testing, as well as anti-retroviral treatment for employees and surrounding communities. There are already HIV/AIDS programs developed by Kimpese Hospital, which NYA could potentially be involved in.				
PD, HS	Develop and update an influx management plan				
HS	Develop an MOU with the Local Healthcare Centres in Minkelo and Kimpese for service provision to the local workforce and their dependents				
HS	Identify NGOs in the area that might support operations at the Minkelo Clinic and Kimpese Hospital, with special focus on refurbishment of key areas, equipment and building maintenance, as well as, improved healthcare management information systems.				
HS	Develop and implementation community development/sustainability plans to support infrastructure development in the area				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
HS, T	Awareness campaigns in neighbouring communities, particularly at Nkonda village, with a focus on school children and mothers, about risks related to traffic				
HS, T	Enforcement of speed limits and sanctions for any personnel found in violation of speed limits, including senior staff and contractors' and sub-contractors' employees				
HS, T	Appropriate signalling of moving heavy machinery, and escort vehicles where needed				
HS, T	All drivers to be given safety education focussing on speed and conflicts between pedestrians and cyclists.				
HS, T	Advanced warning signs including sirens to be erected at locations of high pedestrian and cyclist activity				
HS	Develop a code of conduct for police personnel, especially in relation to handling community violence				
HS	Proper screening of appointed security personnel to ensure they were not implicated in human rights abuses in the past				
HS, EC	Monitor the use of violence by the mine security in instances of labour unrests				
LN	Implementation and updating of the Resettlement Action Plan (RAP) (Appendix 18)				
CH	Demarcate sites prior to construction, facilitating preservation of the site by avoidance.				
CH	The work activities must be monitored to successfully mitigate any chance finds.				
CH	A CHMP should be developed to manage and conserve the sites located on the periphery of the development footprint. This plan should include all sites recorded in the project area and make provision for communication channels to follow in the case of chance finds, and ensure that the sites are monitored and protected from any adverse development effects..				
CH	Demarcate Site 36 (Nkondo Sacred Tree) prior to construction, facilitating preservation or accidental impact of the site by avoidance. In the case of Site 16 (Yuku Village cemetery) this will have to be agreed with by family members.				
CH	If Site 16 (Yuku Village cemetery) is to be preserved in-situ the site will have to be fenced off with an access gate for family members.				
GH	Implementation of GHG Management Plan (Appendix 14) including the development of a GHG inventory and ongoing programme of GHG emission reduction initiatives				
GH	Identification and implementation of offset opportunities e.g. reforestation, use of biofuels.				
SR	To reduce the risk of injury the Project will conduct blasting in accordance with international safety standards				
SR	Open pit blasting will be conducted using standard mining industry practices and procedures for securing personnel and equipment. This includes the development and implementation of standard operating procedures, blasting rules and a safety management plan that:				

Impact category[1]	Proposed Mitigation / enhancement measures	Project Phase[2]			
		C	O	DC	PC
	• Delineates the danger zone associated with each blast and clear workers from this zone before, during and after each blast; and • Provides an audible warning at least three minutes before a blast is fired.				
SR	Design hazardous material containment structures taking into consideration natural hazards and the implications of these on structural integrity of the containment facilities.				
SR	Pave fuel delivery and dispensing pump areas and design these areas to drain into the adjacent storage tank containment areas.				
SR, WR, SL	Develop and implement a Spill Prevention Control and Countermeasure Plan for the site.				
	Standard international good practice will be followed with regard to storage and handling of hazardous materials.				
SR	Occupational health and safety guidelines with regard to safe working conditions and the use of PPE will be adhered to				
SR	Fire extinguishers will be available at storage areas for flammable substances, and a fire water system will be installed, servicing the plant and accommodation areas.				
EC	Stipulate in the Recruitment Plan mechanisms to employ local workers if applicants with the appropriate skills are available.				
EC	Procure goods and services locally, if available.				
EC	Work closely with the community before and during the project to identify and publicise skills and resources that the local community could provide. Establish relevant mechanisms in the relevant social and labour plans.				
EC	Explore opportunities with local and regional businesses to diversify the local and regional economic base and local skill level, thereby providing workers with opportunities for alternative employment. Initiatives in this regard should be undertaken throughout the project lifetime and include: • Develop a Grievance Procedure to capture and address grievances arising due to retrenchments and downscaling. • Compliance with IFC's Performance Standard 2 "Labor and Working Conditions" • Actively promoting the development of different economic sectors from an early stage, e.g. through incentivising other industries to locate in the area, contributing to adequate infrastructure and promoting an increase and diversity of skills • Develop a decommissioning and closure plan which is updated every five years increasing in detail as closure approaches, and actively engaging with a range of stakeholders throughout the life-of-project to discuss potential consequences of decommissioning and possible mitigation.				
EC	Opportunities should be explored with local and regional businesses to compensate for any loss in cement production.				
EC, ES	Implement the Resettlement Action Plan and Sustainable Development Plan (Appendix 19 and 20) to maximise community resilience and ensure fair compensation where resources are directly affected.				
ES	The project must comply with GIIP for air emissions, water (stormwater and effluent) discharge quality and solid waste disposal				

Public Consultation and Disclosure

Consultation and interaction with various stakeholders and stakeholder groups took place during December 2012, as part of the ESIA conducted under the guidance of ECTECH. Stakeholders comprised representatives from local government and Ministry of Environment officials, mining, and the traditional authorities, community leaders, and community members from nearby villages. In addition to meetings and surveys where verbal presentations were made in Lingala and Kikongo, stakeholders had the opportunity to provide written responses on a questionnaire (translated into French). A list of the stakeholders consulted during this process was also compiled.

SRK then undertook a series of focus group and key informant meetings in June 2013 for the ESIA update, during which stakeholders were informed about progress with the project, and were invited to raise further comment about the project. Invitation letters to these meetings were distributed by hand and electronically in advance. Verbal presentations in French and Lingala were given by the SRK facilitators, and stakeholders were encouraged to comment verbally or via a questionnaire used to focus discussion. Information sharing and planning meetings were also held with traditional and administrative authorities representing local communities, and focus group meetings were held with groups of women, youth and men. SRK further identified additional villages to include in the ESIA studies, and included these in the consultation process for the ESIA update.

Stakeholder comments received during the ESIA conducted by ECTECH in 2012 indicated a positive perception about the project, with perceived benefits including provision of job and business development opportunities, poverty reduction, promotion of education, improvement to infrastructure (notably roads and electricity) and health facilities, as well as increased social mobility being major themes. Government officials responded favourably in terms of expectations of macroeconomic benefits and improved availability, as well as pricing of cement in DRC.

Comments, issues and overall perceptions expressed by stakeholders consulted during the focus group meetings and key informant interviews undertaken by SRK in June 2013 for the ESIA update mirrored those of the 2012 ESIA. Items noted included a request for support for local farmers, improved road access such as bridges over rivers and to markets for produce, improved lives for the youth, reduced reliance on charcoal-making which impacts on the environment, and alcoholism linked to unemployment. Opportunities for collaboration by NYA with local non-governmental and government (including police) structures were noted. Concerns raised included loss of salaries and fair remuneration at project closure, availability of electricity for both the plant and communities in the light of existing shortages, loss of agricultural land from the project footprint, potential loss of a sacred prayer site, as well as air pollution and dust impacts from the project.

Public disclosure of the ESIA update was undertaken through the distribution of a Non-Technical Summary (NTS) in French, Lingala and Kikongo. The NTS describes the project and provides a summary of the key findings and recommendations of the specialist studies. Stakeholders were notified by letter in French, Lingala and Kikongo, hand delivered by NYA project team members, that the NTS is available for comment, where to find the reports, and how to comment. The NTS together with comment forms were made available from **Tuesday, 16 July to Wednesday, 31 July 2013** in the following locations:

- Local Government Sector office in Mawete (on the N1 national road)
- Nyumba Ya Akiba (NYA) office, 7eme Etage Immeuble Forescom, 16, Avenue Lukusa, Kinshasa – Gombe
- Homes of the traditional Chiefs in the Kokolo, Yuku Camp, Nkonda, Minkelo, Mbemba, Kinsua, Mbamba, Mawete and Nkondo-Kiombia Villages

- On the SRK website, http://www.srk.co.za/en/page/esia-nyumba-ya-akiba-project (also in English).

Stakeholders had the opportunity to comment by:

- Completing the comment form available with the NTS, and placing it in the Comment Box provided at the Mawete Local Government Sector office, or at the NYA office in Kinshasa.
- Writing a letter or sending an email by 31 July 2013 to the contact details provided.

Copies of the NTS together with the notification letter and comment form were also hand delivered to the relevant authorities in Kinshasa, the Territory Office in Songololo and Mawete Sector, as well as to traditional authorities and community leaders in the project area, for distribution to community members.

A total of approximately 430 comments sheets and 65 NTS reports in the different languages were distributed to stakeholders during public disclosure of the ESIA update. To date, the key comments received from stakeholders on the ESIA update, focus mainly on the following:

- Employment opportunities for local communities
- Eagerness for the project to start as soon as possible, and to bring development and improved infrastructure into the region
- Concern about the impact of dust generated by the project on air quality in the area.
- Concern about potential impacts of project related activities on water resources in the area, particularly because water is a precious resource.
- Hope that NYA will adhere to high standards and providing fair treatment and good salaries to employees.

Following the public disclosure period, the ESIA Report will be updated with inputs from stakeholders received by 31 July 2013. The NTS will however still be available in the abovementioned locations for stakeholders to review.

The Final ESIA will be submitted to NYA in early August 2013.

Environmental and Social Management Plan

SRK as part of the ESIA update has prepared the Environmental Management Plan (EMP) and Social Management Plan (SMP) in line with NYA policy. Figure 4 below indicates how the EMP and SMP interrelate in an overarching Environmental and Social Management System (ESMS) framework. Table 3 summarizes mitigation and management measures for environmental and social impacts from project activities for all project phases. Management measures contained in the main body of the document cover soil, biodiversity, air quality and stormwater management, as well as closure planning. Stand-alone plans have been developed to cover, labour and human resources, occupational health and safety, community health and safety, greenhouse gas (GHG) emission, waste management, emergency preparedness and response, stakeholder engagement, resettlement, as well as sustainable development.

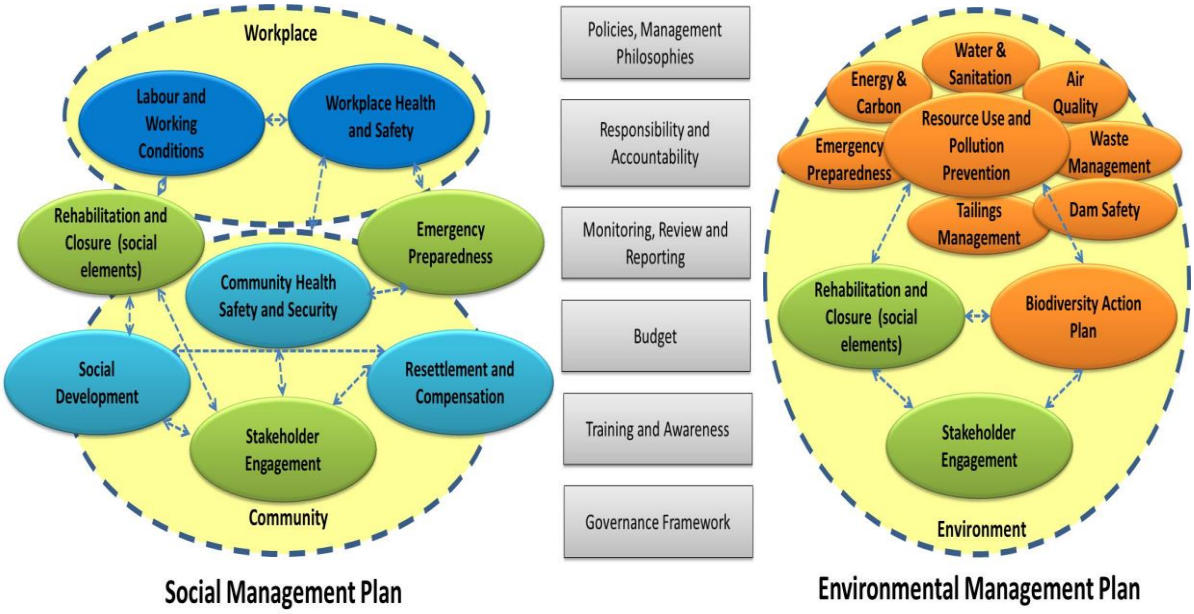

Figure 4: Diagrammatic representation of the interrelationship between the Social Management Plan and the Environmental Management Plan

Table 3: Mitigation and management measures for environmental and social impacts caused by project activities during all project phases[3]

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
Biophysical impacts					
Visual					
VI1: Loss of sense of place affecting local communities due to site clearing and construction activities	X				Construction Management Plan (to be developed) Stakeholder Engagement Plan (Appendix 17)
VI2: Loss of sense of place affecting local communities due to project infrastructure and illumination		X			Project final design by NYA Construction Management Plan (to be developed) Stakeholder Engagement Plan (Appendix 17)
VL3: Dust generation due to earth moving and removal of project infrastructure, affecting the visual character for communities			X		Construction Management Plan (to be developed) Air Quality Control Plan in Chapter 9 Stakeholder Engagement Plan (Appendix 17)
VI4: Re-establishment of baseline visual character due to rehabilitation of the site				X	Construction Management Plan (to be developed) Stakeholder Engagement Plan (Appendix 17)

[3] Note – this table has been developed by SRK Consulting to provide an overview of all impacts for the project. Mitigation measures can be found in Chapter 8, environmental monitoring measures in Chapter 9, and social monitoring measures in Chapter 13.
[4] Key to project phases: C – Construction; O – Operation; DC – Decommissioning and closure; PC – Post-closure

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
and removal of project infrastructure					
Soils, land capability and land use					
SL1: Placement of project infrastructure, resulting in a transient loss of soil resource, and change in soil characteristics	X				Soil Management Plan contained in Chapter 9 Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
SL2: Placement of permanent project infrastructure, resulting in a permanent loss of soil resource, and change in soil characteristics, land capability and land use and capability and land use	X				
SL3: Spillage of chemicals and seepage from waste resulting in permanent loss of soil resource, and change in soil characteristics, land capability and land use	X				Soil Management Plan (Chapter 9) Waste Management Plan (Appendix 15) Emergency Preparedness and Response Plan (Appendix 16) Sustainable Development Plan (Appendix 19)
SL4: Site clearance resulting in a permanent loss of soil resource, and potential change in soil characteristics, land capability and land use as a result of increased erosion	X				Stormwater Management Plan (Chapter 9) Soil Management Plan (Chapter 9) Comprehensive Water Management Plan (to be developed) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
SL5: Chemical spills and release of contact water resulting in permanent loss of soil, and change in soil characteristics, land capability and land use		X			Soil Management Plan (Chapter 9) Waste Management Plan (Appendix 15) Emergency Preparedness and Response Plan (Appendix 16) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
SL6: Operational activities causing increased erosion, resulting in a permanent loss of soil resource, and change in soil characteristics, land capability and land use		X			Stormwater Management Plan (Chapter 9) Soil Management Plan (Chapter 9) Comprehensive Water Management Plan (to be developed) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
SL7: Remediation of contaminated soils and demolition of project infrastructure, resulting in re-establishment of baseline soil characteristics and land capability			X		Stormwater Management Plan (Chapter 9) Soil Management Plan (Chapter 9) Waste Management Plan (Appendix 15) Closure Plan (Chapter 9) Comprehensive Water Management Plan (to be developed) Sustainable Development Plan (Appendix 19)

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
					Stakeholder Engagement Plan (Appendix 17)
SL8: Demolition and restoration of project infrastructure, resulting in re-establishment of baseline soil characteristics and land capability				X	Stormwater Management Plan in Chapter 9 Soil Management Plan in Chapter 9 Waste Management Plan (Appendix 15) Closure Plan in Chapter 9 Comprehensive Water Management Plan (to be developed)
Air Quality					
AQ1: Increase in PM_{10} emissions resulting from land clearing, earthworks, and vehicular movement	X		X		Construction: Construction Management Plan (to be developed) Soil Management Plan in Chapter 9 Occupational Health and Safety Plan (Appendix 12) Closure: Closure Plan in Chapter 9
AQ2: Increase in gas (SO_2, NO_x, CO and VOCs) emissions resulting from vehicle exhaust emission and biomass burning	X				Construction Management Plan (to be developed) Air Quality Management Plan in Chapter 9 GHG Emission Plan (Appendix 14) Waste Management Plan (Appendix 15)
AQ3: PM_{10} emissions due to activities at the quarry and the vehicle entrainment of dust affecting air quality of nearby villages		X			Community Health and Safety Plan (Appendix 13) Air Quality Control Plan in Chapter 9 Framework Resettlement Action Plan (Appendix 18) Stakeholder Engagement Plan (Appendix 17)
AQ4: Dust emission from activities at the cement plant affecting air quality for nearby communities		X			
AQ5: Gas (SO_2, NO_x and CO) emissions from activities at the cement plant affecting air quality for nearby communities		X			
AQ6 : Increase in PM10 emissions resulting from land clearing, earthworks, and vehicular movement			X		Community Health and Safety Plan (Appendix 13) Soil Management Plan in Chapter 9 Closure Plan in Chapter 9 Stakeholder Engagement Plan (Appendix 17)
Greenhouse Gases					
GH1: Increase in greenhouse gas emissions in the area resulting from the cement plant		X			GHG Emission Plan (Appendix 14) Waste Management Plan (Appendix 15)
GH2: Contribution to climate change as a result of greenhouse gas emissions from the project		X			
Water resources					

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
WR1: Chemical contamination of surface water resulting from accidental spills during transportation and handling, and seepage from waste	X		X		Waste Management Plan (Appendix 15) Emergency Preparedness and Response Plan (Appendix 16) Community Health and Safety Plan (Appendix 13) Stakeholder Engagement Plan (Appendix 17)
WR2: Sedimentation of surface water resulting from erosion and runoff from exposed surfaces and roads	X		X		Stormwater Management Plan (Chapter 9) Soil Management Plan (Chapter 9) Comprehensive Water Management Plan (to be developed) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
WR3: Contamination of groundwater resulting from seepage from sewage and other waste	X	X			Stormwater Management Plan in Chapter 9 Waste Management Plan (Appendix 15) Comprehensive Water Management Plan (to be developed) Community Health and Safety Plan (Appendix 13) Stakeholder Engagement Plan (Appendix 17)
WR4: Contaminated stormwater runoff from cement plant, roads and other surfaces affecting surface and groundwater quality		X			Stormwater Management Plan in Chapter 9 Waste Management Plan (Appendix 15) Comprehensive Water Management Plan (to be developed) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
WR5: Discharge of contaminated pit water to surface water resources, affecting downstream users		X			Stormwater Management Plan in Chapter 9 Comprehensive Water Management Plan (still to be developed) Emergency Preparedness and Response Plan (Appendix 16) Sustainable Development Plan (Appendix 19)
WR6: Risk of flooding of project infrastructure due to placement within the 1:100 year floodline		X			Project final design by NYA Stormwater Management Plan in Chapter 9 Waste Management Plan (Appendix 15) Comprehensive Water Management Plan (to be developed) Emergency Preparedness and Response Plan (Appendix 16)
WR7: Dewatering of the quarry resulting in groundwater drawdown and reduced contribution to surface water baseflows and wetlands, affecting users		X			Comprehensive Water Management Plan (to be developed) Community Health and Safety Plan (Appendix 13) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
WR8: Stormwater inflows into the pit, reducing surface water flows and		X			

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
availability to users					
WR9: Raw water abstraction for the project reducing availability to other users		X			
WR10: Seepage from waste affecting surface and groundwater quality		X			
WR11: Wastewater effluent discharge to streams, affecting water quality for downstream users		X			
WR12: Sinkhole formation resulting from dewatering of subsurface cavities, resulting in safety and structural stability risks		X			Project final design by NYA Comprehensive Water Management Plan (to be developed) Emergency Preparedness and Response Plan in Appendix 16
WR13: Chemical contamination of surface water resulting from accidental spills during transportation and handling, and seepage from waste			X		Waste Management Plan (Appendix 15) Emergency Preparedness and Response Plan (Appendix 16) Community Health and Safety Plan (Appendix 13) Stakeholder Engagement Plan (Appendix 17)
WR14: Sedimentation of surface water resulting from erosion and runoff from exposed surfaces and roads			X		Stormwater Management Plan in Chapter 9 Soil Management Plan in Chapter 9 Comprehensive Water Management Plan (to be developed) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
WR15: Contamination of groundwater resulting from seepage from hazardous materials and waste			X		Soil Management Plan in Chapter 9 Waste Management Plan (Appendix 15) Emergency Preparedness and Response Plan (Appendix 16) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
WR16: Pit lake formation due to inflow of ground and surface water, resulting in safety risks to animals and humans, and environmental contamination				X	Emergency Preparedness and Response Plan (Appendix 16) Community Health and Safety Plan (Appendix 13) Occupational Health and Safety Plan (Appendix 12)
Noise and vibration					
NV1: Continuous noise impact on Mbemba Village resulting from night-time construction at the quarry	X				Community Health and Safety Plan (Appendix 13) Occupational Health and Safety Plan (Appendix 12) Stakeholder Engagement Plan (Appendix 17) Resettlement Action Plan (Appendix 18)
NV2: Air-blast noise impact on Mbemba	X				Community Health and Safety Plan (Appendix 13)

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
Village resulting from blasting at the quarry during construction					Occupational Health and Safety Plan (Appendix 12) Stakeholder Engagement Plan (Appendix 17)
NV3: Continuous noise resulting from daytime operations of the quarry, cement plant, haul road and associated infrastructure		X			
NV4: Continuous noise resulting from night-time operations of the cement plant and associated infrastructure		X			
NV5: Air blast pressure and vibration resulting from blasting at the quarry		X			
Ecology and Biodiversity					
EB1: Loss of savannah habitat due to site clearing and earthmoving activities	X				Soil Management Plan in Chapter 9 Stormwater Management Plan in Chapter 9 Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
EB2: Loss of forest habitat due to site clearing and earthmoving activities	X				
EB3: Loss of aquatic habitat due to site clearing and earthmoving activities	X				
EB4: Loss or disturbance of species of special concern due to site clearing and construction activities	X				Construction Management Plan (to be developed) Stakeholder Engagement Plan in Appendix 17
EB5: Loss or degradation of ecological processes due to site clearing and construction activities	X				
EB6: Fragmentation of habitats and ecological processes due to positioning of project infrastructure	X				Project final design by NYA Construction Management Plan (to be developed)
EB7: Modification or degradation of aquatic habitats due to altered hydrological regimes and surface or groundwater quality	X				Construction Management Plan (to be developed) Soil Management Plan in Chapter 9 Stormwater Management Plan in Chapter 9 Stakeholder Engagement Plan (Appendix 17)
EB8: Introduction of alien invasive plants due to site clearing and disturbance of vegetation	X				Construction Management Plan (to be developed)
EB9: Impeded photosynthesis and transpiration rate of plants due to dust generation	X				Construction Management Plan (to be developed) Soil Management Plan in Chapter 9 Traffic Management Plan (to be developed) Air quality Control Plan in Chapter 9
EB10: Loss or disturbance of fauna species of special concern due to		X			Traffic Management Plan (to be developed)

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
collisions and noise disturbance					
EB11: Introduction of alien invasive flora and fauna		X			Measures in Chapter 9
EB12: Increased hunting/poaching of wildlife		X			
EB13: Modification or degradation of aquatic habitats due to pollution or nutrient loading		X			Measures in Chapter 9 Comprehensive Water Management Plan (to be developed)
EB14: Impeded photosynthesis and transpiration rate of plants due to dust generation		X			Soil Management Plan (Chapter 9) Traffic Management Plan (to be developed) Air quality Control Plan (Chapter 9)
EB15: Re-establishment of habitats or creation of new habitats via rehabilitation			X		Closure Plan in Chapter 9
EB16: Introduction of alien invasive flora and fauna			X		Measures in Chapter 9
EB17: Loss or disturbance of fauna species of special concern due to collisions and noise disturbance			X		Traffic Management Plan (to be developed)
EB18: Increased hunting/poaching of wildlife and loss of habitats for crop production			X		Measures in Chapter 9
EB19: Increased hunting/poaching of wildlife and loss of habitats for crop production				X	
Traffic					
T1: Impact of construction related traffic on utilisation capacity on the N-1	X				Traffic Management Plan (to be developed)
T2: Impact of construction related traffic on traffic flow in Matadi	X				
T3: Safety impacts to local communities and other road users due to increased road accident rates during construction	X				Traffic Management Plan (to be developed) Community Health and Safety Plan (Appendix 13) Emergency Preparedness and Response Plan (Appendix 16) Stakeholder Engagement Plan (Appendix 17)
T4: Impact on utilisation capacity on the N-1, affecting other road users		X			Traffic Management Plan (to be developed)
T5: Impact on traffic in Matadi, affecting other road users		X			

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
T6: Increased road accident rates, affecting road safety of other users		X			Traffic Management Plan (to be developed) Community Health and Safety Plan (Appendix 13) Emergency Preparedness and Response Plan (Appendix 16) Stakeholder Engagement Plan (Appendix 17)
Socio-economic impacts					
Population and Demographic movements					
PD1: Influx of potential job seekers into the area and associated risks	X	X			Community Health and Safety Plan (Appendix 13) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
Health and Safety					
HS1: Increased chances of the spread of communicable diseases such as HIV/AIDS and STDs linked to influx of predominantly male job-seekers and workers	X				Community Health and Safety Plan (Appendix 13) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
HS2: Increased pressure on healthcare infrastructure due to project related influx	X				
HS3: Increased risk of accidents and injuries to communities from improved roads and additional traffic	X				Traffic Management Plan (to be developed) Community Health and Safety Plan (Appendix 13) Emergency Preparedness and Response Plan (Appendix 16) Stakeholder Engagement Plan (Appendix 17)
HS4:The visible presence of DRC police within the project area, and their secondment as a subcontractor for the mine security	X				Labour and Human Resources Plan (Appendix 11) Community Health and Safety Plan (Appendix 13) Stakeholder Engagement Plan (Appendix 17)
HS5: Increased chances of the spread of communicable diseases such as HIV/AIDS and STDs linked to the influx of predominantly male jobseekers		X			Community Health and Safety Plan (Appendix 13) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
HS6: Increased pressure on healthcare infrastructure due to project related influx		X			
HS7: Increased risk of accidents and injuries to communities from improved roads and additional traffic		X			Traffic Management Plan (to be developed) Community Health and Safety Plan (Appendix 13) Emergency Preparedness and Response Plan (Appendix 16) Stakeholder Engagement Plan (Appendix 17)
HS8: The visible presence of Congolese police within the project area, and their secondment as a subcontractor for the mine security		X			Labour and Human Resources Plan (Appendix 11) Community Health and Safety Plan (Appendix 13) Stakeholder Engagement Plan (Appendix 17)

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
Land and natural resources					
LN1: Physical displacement of households residing at Yuku Camp Village	X				Resettlement Action Plan (Appendix 18) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
Economic impacts					
EC1: Local and regional benefits resulting from increased Revenue to Government	X	X			Labour and Human Resources Plan (Appendix 11) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
EC2: Stimulation of increased regional investment in the DRC Economy	X				Sustainable Development Plan (Appendix 19)
EC3: Generation of direct, indirect and induced employment and income	X				Labour and Human Resources Plan (Appendix 11) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
EC4: Local and regional benefits resulting from increased Revenue to Government		X			
EC5: Generation of direct, indirect and induced employment and income		X			
EC6: Reduction in project revenue to government, resulting in local economic decline			X		
EC7: Loss of Employment and Income due to retrenchment			X	X	
EC8: Cessation in project revenue to government, resulting in local economic decline				X	
Cultural Heritage Resources					
CH1: Indirect damage to Iron Age archaeological resources through land transformation activities	X				Construction Management Plan (to be developed) Cultural heritage measures in Chapter 9
CH2: Indirect damage to cemeteries through land transformation activities	X				
CH3: Damage to all other identified archaeological and cultural resources through land transformation activities	X				
Ecosystem Services					
ES1: Reduced availability of natural resources and ecosystem services to local communities	X		X	X	Construction Management Plan (to be developed) Soil Management Plan in Chapter 9

Impact	Project phase				Reference to applicable Management Plans in ESIA
	C	O	DC	PC	
ES2: Reduced availability of natural resources and ecosystem services to local communities due to use by the project and impacts on these resources		X			Resettlement Action Plan in Appendix 18 (including livelihoods restoration) Sustainable Development Plan (Appendix 19) Stakeholder Engagement Plan (Appendix 17)
ES3: Reduced quality of natural resources and ecosystem services to local communities due to emissions to air, water or soil			X		
ES4: Reduced quality of natural resources and ecosystem services to local communities due to contamination of water or soil				X	
Health and Safety Risks					
SS1: Blasting, resulting in fly rock		X			Community Health and Safety Plan (Appendix 13) Emergency Preparedness and Response Plan (Appendix 16) Stakeholder Engagement Plan (Appendix 17)
SS2: Community exposure to toxic or hazardous substances		X			
SS3: Fire or explosions due to storage of explosives and use of combustible materials		X			

Recommendations

Table 4: Summary of information gaps and recommended actions by NYA to address them

Information gap	Actions	Timing
Project description		
Infrastructure footprints: SRK has provided high level recommendations for the location of the overburden spoil pile and other facilities on the basis of a preliminary environmental and social sensitivity analysis. The impact assessment has been undertaken on the basis of these recommended locations. NYA has not however confirmed these footprint areas.	Once the footprint locations have been finalised by NYA, elements of the impact assessment will need to be revised to ensure that impacts are relevant to the actual footprint that will be affected by land take. This will in turn affect the following management plans which will need to be updated: • FRAP/RAP • Sustainable development plan	Prior to construction
Project activities/processes: SRK has been unable to quantify the water related impacts for two reasons – NYA has not been in a position to advise on waste water discharges and water use within the process and NYA has not provided design detail on process waste water management facilities – location and sizing. At the same	In the detailed design phase, NYA will need to design its water management facilities. These designs should be informed by and in turn inform the following studies: • Water balance – wet and dry season • Sources of water supply • Floodlines • A hydrogeological model including pit water model	Prior to construction

Information gap	Actions	Timing
time no hydrogeological or hydrological studies had been undertaken ahead of SRK's update and insufficient time was available in this update to address these gaps	The conceptual water management plan should then be updated and detailed into a comprehensive Integrated Water Management Plan. The location of water management facilities will need to be considered in updates to the RAP/FRAP with regards land take.	
Air quality modeling has not been undertaken for this ESIA. Of greatest concern are the air quality impacts associated with upset conditions. It is anticipated that NYA will experience power outages from the national grid (SNEL). The typical frequency of power outages is uncertain, but the environmental and technological implications of frequent shut-downs may require further investigation so as to inform impacts and management around unplanned shutdowns.	Detailed baseline monitoring over a full 12 months needs to be undertaken to inform baseline air quality and assist in predicting routine and upset impacts that require management. A weather station as well as monitoring at the various villages needs to be implemented as soon as possible to inform this exercise and modeling for routine and upset conditions should be undertaken. The results of this assessment should inform: • The Community Health and Safety Plan • The FRAP/RAP • Occupational Health and Safety Plan.	To be completed prior to the end of construction
Outside the scope of the current study, it is anticipated that once the NYA cement plant is operational, co-processing (in the cement plant kiln) of suitable categories of waste from the NYA site could be undertaken. This would most likely require a separate feasibility study. Should this proceed, co-processing will be undertaken in line with best available technology (BAT) and Good International Industry Practice (GIIP) including implementation of the waste hierarchy. It is further expected to reduce greenhouse gas (GHG) emissions from the project, and will be in accordance with multilateral agreements including the Basel Convention. This would not completely replace the requirement for a WMF however, but could considerably reduce the amount of waste going to landfill, as well as the coal fuel requirement of the kiln.	The results of this study, if it is undertaken should inform the Waste Management Plan.	During operations
Currently the haul road is planned to cross the Yuku River and traverse the Yuku Camp Village with resultant impacts associated with water quality, biodiversity and health and safety. SRK has assumed that Yuku Village will be resettled, however this does not address the water and biodiversity impacts associated with the haul road and an alignment upstream of the Yuku River, sufficiently far from the source of the river should be identified and considered.	NYA to decide on the haul road routing. Once a decision has been taken on the routing, the relevant management plans should be updated accordingly. In rerouting the haul road, the health and safety of other communities and stakeholders should still be considered and the FRAP/RAP updated accordingly.	Prior to construction

Information gap	Actions	Timing
Baseline Data		
In terms of GIIP, baseline data collection should be undertaken to cover full seasonal variations. Full seasonal baseline data collection has not been collected for air or water with the resultant inability to accurately predict impacts or develop appropriate management measures. Principle level management is included in the management plans however detailed management measures can only be developed once baseline data and quantified predictions have been undertaken.	Management plans to be updated on the basis of the full seasonal monitoring data and impact predictions. Specifically the following studies will be undertaken A long term monitoring programme need to be undertaken (approximately a year) to monitor flow and chemistry from both the Yuku and Sanzikua Rivers to get a better understanding of the baseline conditions In addition to the existing monitoring stations which were sampled once, the following is proposed: ○ A monitoring point after the confluence of the Yuku and Sazikwa stream, as flow might be impacted on by mining (baseflow reduction); ○ Monitoring points up-gradient within the Sazikwa stream to measure flow and baseline chemistry as the plant may impact on the stream (dirty water run-off) ○ Implement constant monitoring within the pond close to the plant area. It is assumed the hydrogeological study that is currently underway by CREN-K will include run-off estimations and baseline contributions (these components will be impacted on by the open pit mining. - reduced run-off and baseflow contributions to these streams). Analysis of a full spectrum of cations and anions needs to be undertaken for water samples from all monitoring points in streams and hydro-census sampling points. There is a preliminary indication that chrome concentrations (Cr6+) are highly elevated rendering the water not fit human consumption. Gravimetric geophysics investigation be undertaken within the mining footprint area to investigate the occurance of cavities, extent, depth etc. Drill testing holes to intersect such cavities to undertake pumping tests to acquire aquifer parameters (conductivity and storativity values), which can give an indication of underlying aquifer conditions; To measure water levels and take water samples for analysis from these boreholes to establish baseline conditions; The interpolation of water levels from the boreholes drilled and possible water level data to be obtained from villages (hydro-census investigation) will give an indication of groundwater flow directions and potential receptors that could be impacted by proposed mining activities; That a numerical groundwater model be developed which will be used to better quantify groundwater inflows into the open pit (the volume mentioned is not substantiated)	Commence immediately
ECTECH reported that based on the geology of the soil of the area it appears likely that the water will not pose a significant impact to the environment or human health.	This should be verified ahead of construction or through monitoring and mitigation.	Prior to construction

Information gap	Actions	Timing
Policy and management structures		
NYA has a suite of draft environmental and social policies that need to be reviewed, finalised, disclosed, adopted and implemented. The draft plans that have been prepared for NYA assume that organisational structures will be in place to implement those plans.	In order to operationalize the policies NYA will need to: Translate the policies into operational procedures within and environmental and social management system Populate the organisational structure that is outlined in the updated ESMP (Chapter 9) NYA must ensure that, one adopted, the ESMS, policies, procedures and plans are all aligned and all are updated as and when changes to the project and/or legislation and GIIP are made.	Prior to construction
A large portion of the project will be contracted out to contractors.	NYA must ensure that the principles and obligations within the ESMP are translated into codes of practice for contractors to adhere to and that these are incorporated as contractual requirements.	Prior to any contracts going out to tender
Stakeholder engagement and disclosure is a key requirement of GIIP.	The grievance mechanism and the SEP need to be adopted and implemented as soon as possible to ensure appropriate engagement processes and continuity in engagement.	Immediately
Management plans		
RAP/FRAP In the absence of a finalised and detailed project layout, which in turn has affected impact prediction to some extent, it is not possible to develop a resettlement action plan (RAP) that is in sufficient detail for implementation. Further work will be required a the detailed design stage to finalise quantify physical and economic displacement and only at that stage can the framework RAP be developed into a RAP for implementation	NYA to fix a final project layout at detailed design stage. Verification of the exact fields that are affected will need to be done in consultation with affected households and representatives structures at the detailed design phase once infrastructure footprints have been pegged on site. RAP to be developed on the basis of confirmed project description and assets inventory.	Detailed design stage
Outside of the scope of SRK's work, was the development of a detailed construction management plan. This remains a commitment of the ESIA and should be developed ahead of contractors being appointed for the construction phase.	A detailed construction management plan needs to be developed ahead of the confirmation of contractors so that this can be incorporated into contractual requirements. This plan should be based on the ESMP and other relevant management plans.	Prior to construction and ahead of contracts going out to tender
This updated ESIA has not assessed traffic impacts in any relevant detail. The introduction of construction vehicles and the transport of cement out and diesel and coal into the project area as well as haul vehicles will introduce substantial new traffic to the area. Communities in the area do not have much experience of the nature and scale of traffic that will be introduced to the local roads and road safety issues are of concern.	NYA should commission a specialist traffic and road safety specialist study to quantify the impact and develop a detailed traffic road safety management plan that addresses engineering, education and enforcement. This plan should be incorporated into the emergency preparedness and response plan, the community health and safety plan and the community development plan. All personnel and contractors should be contractually required to meet the obligations of this plan.	Prior to construction

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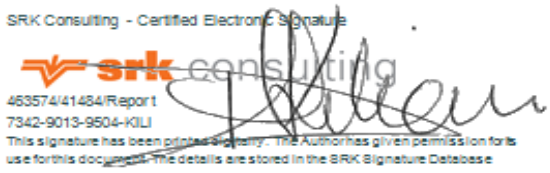

Project Reviewer

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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