



SIMBA CEMENT
NATIONAL CEMENT COMPANY LIMITED

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

SUPPLEMENTAL ENVIRONMENTAL IMPACT ASSESSMENT GREENFIELD CLINKER MANUFACTURE AND LIMESTONE MINING OPERATIONS, MERRUESHI, KAJIADO COUNTY, AND CEMENT GRINDING & CABRO MANUFACTURING OPERATIONS, LUKENYA, MACHAKOS COUNTY KENYA



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PROJECT BACKGROUND

The International Finance Corporation (IFC) proposes to invest in National Cement Company Limited (“NCCL” or the “Company”) to support: 1) the completion of the Company’s cement manufacturing plant near Nairobi; and 2) the construction and operation of a greenfield clinker manufacturing unit near Merrueshi in southeastern Kenya. NCCL trades under the brand “Simba Cement” and currently produces 0.60 million tons per annum (mpta) of blended Portland cement at its Lukenya plant using clinker imported from abroad. NCCL has completed two additional cement-manufacturing lines on the same site, which will increase Company’s installed capacity to 1.65 mpta (the “Project”).

The existing cement manufacturing plant located in Lukenya, is a facility comprised of 3 cement mills (lines) with a production capacity of 4,400tonnes per day and is operated by NCCL.

The proposed clinker production facility and associated quarries described in this statement will be owned and operated by NCCL, part of the Devki Group of Companies.

Devki is a large, Kenyan owned company that produces, delivers and trades in cement, aggregate, concrete for mixture and similar products for the construction industry. It is also engaged in the steel and iron industry. Devki has an excellent reputation for upholding the laws of the countries within which it operates and where possible extends its environmental performance beyond the requirements of those laws. Devki wishes to grow its business in Kenya in the cement industry and has created NCCL to operate the proposed facility.

National Cement Company Limited has been duly established and organized according to Kenyan Legislation. The registered address of the company is Ruiru Town.

The existing cement manufacturing plant facility includes;

1. 3 Cement Mills
2. 1 Crushing Plant (gypsum)
3. 1 Crushing Plant (Pozzolana)
4. 3 Packaging Plants
5. A Cabro Manufacturing Plant

The proposed green-field facility and limestone mining in Merrushi includes:

- The opening of a limestone quarry to supply the major raw materials for the production process.
- An integrated 3, 300 tpd clinker production line to be located in Merrueshi Area in Kajiado County
- The clinker will be used for the manufacture of cement, according to Kenyan and international norms;
- Coal will be used as the main fuel in clinker production.

The limestone quarry including the clinker plant site area will cover approximately 2,200 acres. The total land area leased by NCCL from the Imbirikani Group Ranch is 1,600 acres and total area purchased from private land is 600 acres. Thus, the total area available to NCCL for the development of the project is 2,200 acres. The clinker plant will cover approximately 207 acres.

Justification for Cement Grinding and Clinker Manufacture Plant

The Kenyan economy is growing and it is predicted that there will be an increase in the national building and infrastructure programme. NCCL wish to develop a new clinker manufacture facility to help meet the expected demand for cement. The preferred plant location is rich in the raw materials necessary for the production of clinker.

Project Objective

The objective of the proposed plant is to produce clinker by using available limestone and clay resources, whilst achieving a balance between impacts on the local environment, community needs and economic viability.

Cement manufacturing consists of raw meal, grinding, blending, calcining to form clinker and cement grinding. In short, limestone and other materials containing calcium, silica, aluminum and iron oxides are crushed and milled into the raw meal.

This raw meal is blended and heated in the pre-heater to initiate the dissociation of carbonate to calcium oxide and carbon dioxide. The meal then proceeds to the kiln for heating and reaction between calcium oxide and other elements to form calcium silicates and aluminates at a temperature up to 1450C. The products leave the kiln as a nodular material called clinker. The clinker is inter-ground with the gypsum and other additives like slag to a fine product called cement.

The main benefits that will be derived from the project are:

Up to 1000 jobs will be generated during the construction and operation phases of the project. Due to the skilled nature of the construction process the majority of the workforce will comprise of non-local Kenyan and expatriate worker. However, construction phase jobs will be created that are anticipated to be filled by the local population. In addition, where possible, supplies will be sourced locally which is likely to benefit local business.

During construction stage all unskilled workers will be employed from the local community (This applies to the contractor's also). During the operation stage, in the mining area as well as production area and other operation area all unskilled workers will be employed from the local community. Training and Development of unskilled workers will be undertaken to upgrade them to semi-skilled and skilled category over a period of time.

All these recruitment and labour related commitments will be kept and contractually secured in the supplier contracts too.

The proposed development will generate employment for the duration of the quarry and plant operations, which is anticipated to be in excess 60 years and will generate approximately 300 permanent jobs within the area.

It is envisaged that majority of the employment opportunities (unskilled) that will be provided will be taken up by local communities who may not necessarily be from the Maasai –the majority community in the project area but who are attached to livestock and pastoral livelihood and may not sign up for wage labour. However, efforts will be made to enlist as many willing Maasai as possible.

Appropriate training and education will be provided to local employees to ensure that they have the ability to undertake both the manual and skilled roles required at both clinker plant and quarry sites.

It is considered that a proportion of the materials required during the operation of the proposed development, including food and materials for the employees, are likely to be sourced from the local area, where feasible, which will enhance the economic conditions of the area through increased spending.

The main benefits that will be derived from the project are thus:

1. A reduction in the necessity for the country to import cement from overseas.
2. A source of raw materials near a suitable site of cement production.
3. The ability to export surplus quantities of cement generating foreign revenue.
4. Improvements in the local infrastructure and contribution to the local economy.

Main Parts of the Development

The main characteristics of the project are:

- The opening of a limestone quarry to supply the major raw materials for the production process.
- Transport of large volumes of materials along these routes as well as using the established transport infrastructure. Transport will be along roads, using heavy goods vehicles.
- Associated with the development will be the construction of a power line to connect the quarry site with the main existing power line importing energy into the region. The details of the power line, in particular potential routes are being considered at the time of writing this report. NCCL has proposed to avail power supply for the clinker manufacturing facility and the clinker grinding facility from the Kenya Power and Lighting Company (KPLC) grid through dedicated feeders.
- As regards clinker manufacturing facility, there is an existing 132 kV busbar at Kiboko Sub-station of KPLC situated approximately 32 kms from the proposed site. The dedicated connectivity will be obtained from existing KPLC grid. The

application for temporary power of 1 Mega Volt Ampere for construction requirements has already been made to KPLC. For operation of the facility a quote has already been obtained from KPLC for construction of the dedicated line. Based on the progress of the project, application for the total requirement of 12 to 13 MVA will be made to KPLC.

This report includes the ESMP for the clinker manufacture and limestone mining as well as that of the cement grinding and cabro manufacturing plants, which are already on going. The ESMPs for clinker are for:

1. ***Water Balance; Traffic Planning; Waste Management; Terrestrial Ecology Assessment; Workers Accommodation; and Ambient Air Quality Assessment.***

The ESMP for the cement grinding and cabro manufacturing plant is for

2. ***Noise and Air emissions*** in and around the plant during the operations phase of the NCCL cement plant.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Construction Phase

Ambient Air Quality (AAQ)

Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating	Responsibility
Air quality - dust emissions during construction and ground works	Development of procedures for: Water spraying roads and dusty materials stockpiles Sheeting vehicles carrying dusty materials on leaving the site to prevent materials being blown from the vehicles Speed limits on unmade surfaces on site to limit dust	Dust propagation will be limited to construction area and will not influence local community. However workers should be supplied with dust masks especially in dry days.	Minor adverse	NCCL and Contractor
Emissions from Motorized Construction Machinery (trucks, tippers, excavators)	Regular Service and Maintenance of construction equipment and machinery Purchase of machinery that have low emission levels	Air quality deterioration from motorized machinery will proceed beyond construction phase	Moderate adverse	NCCL and Contractor

Terrestrial Ecology

Dust deposition on leaves leading to loss of vegetation productivity and health Productivity and quality of vegetation for herbivores reduced	Belts of trees to provide local screening Reduce dust emissions at source Asphalt quarry access roads	Some dust emissions at the quarry sites, associated with blasting etc., are inevitable, but emissions and impacts can be kept to an acceptable level by use of latest technologies and best working practices	Minor adverse	NCCL and Contractor
Disturbance of wildlife by noise especially construction related noise from machinery	Reduce at source and use machinery with noise mufflers	There should be some habituation to lower reduced noise levels by some wildlife, but more sensitive species may avoid the project areas	Minor adverse	NCCL and Contractor
Disturbance of wildlife by human presence including hunting and construction activities	Environmental educational programme for construction workers and local community on penalties associated with wildlife hunting	Full compliance is unlikely and some illegal hunting and gathering can be expected.	Minor to Moderate Adverse	NCCL and Contractor
Wildlife "Road-Kills" along main road and access roads during construction	Ecological Survey Ecological Method Statement Road Warning Signs Driver Briefings	With compliance, road-kills should be reduced but some are still inevitable	Minor to Moderate Adverse	NCCL and Contractor
Further land take (habitat loss) for Construction Camp	Conduct RAP studies and Specialist studies on ecological impact and select appropriate sites that would lead to limited habitat loss Rehabilitate areas where	No additional impact since land take would occur anyway at quarry site	Negligible / Nil	NCCL and Contractor

	vegetation is lost after construction			
Destruction of fauna and habitat for fauna (mammals, birds, reptiles, amphibians, invertebrates) as a result of construction activities	Further ecological/fauna survey at appropriate seasons and translocations monitored by the company specialist	In long-term populations may recover on restored sites	Minor adverse	NCCL and Contractor
Increase in exploitative pressures on habitats neighbouring the sites	Conduct and implement "Habitat Survey and Management Study", in close consultation with local communities	With co-operation of local community and project providing alternative source of income, habitats should be improved.	Minor to moderate adverse (depending on implementation)	NCCL and Contractor
Workers Accommodation				
Foreign worker health problems may impact on work and wage payment	Specification by contractor of reasonable sickness benefits and sick leave with pay	Sickness over specified period will affect earnings. Early return to work may damage health	Minor to moderate adverse	NCCL and Contractor
Worker Industrial Emergency	Contracted quality curative treatment in Nairobi for all emergencies. 24 Hour Hospital on site.	Depends on nature of emergency	Minor to moderate adverse	NCCL and Contractor
Foreign worker living conditions and quality of life.	Contractor to provide NCCL with detailed specification of camp layout	Depends on individual worker susceptibility.	Minor to moderate adverse	NCCL and Contractor
Utility and service provision impacts on local villages	Facilities, and utility provision (and disposal) in accordance with identified international standards. NCCL to monitor health and safety and terms	If conditions are poor multitude of issues could arise in camp and spill into local communities.		NCCL and Contractor

	and conditions of employment.			
Disturbance and conflict in camp	In- camp codes of conduct and enforcement of key behaviours	None identified	Minor/moderate adverse	NCCL and Contractor
Disturbance and/or conflict with local population during camp construction	Camp code of conduct upheld by workers and enforced by camp Provision of employment and opportunities to local population to minimize hostility. Liaison committee to identify early issues and their resolution	Some residual impact expected but scale limited by worker free time, and local interaction with camp	Minor/ Moderate adverse	NCCL and Contractor
Opportunities for local procurement during camp construction	NCCL to arrange initial contacts and encourage contractor to maximise local procurement NCCL should provide a trained facilitator to examine business opportunities and issues from contractor and local provider points of view.	Unless NCCL provide financial incentives or contractual requirements to contractor this may be unlikely to happen Poor community relations if community see no commercial benefits from the camp	May vary from negligible to moderate beneficial depending on the effort and incentives provided by all parties	NCCL and Contractor
	NCCL should provide consultant to support business development initiatives and ensure projects are financially sustainable Provision of support by			NCCL and Contractor

	NCCL and /or concessionary terms (not subsidies) by contractor to assist new supply businesses.			
Potential for increased incidence of sexually transferable disease (STD) in local populations and amongst workers during construction	Preventative health awareness campaigns for STDs provided to foreign workers and targeted at key urban locations/ groups. Provision of free condoms in pharmacies and toilets or similar common access facility.	Difficult to identify cause or source of such diseases as this is commonly hidden and poorly reported. However some disease may be spread and curative treatment may be required for the different diseases, in case of HIV this would be of a long term nature	Moderate (possibly severe) adverse	NCCL and Contractor
WATER BALANCE				
Importation of pollutants already present within the materials to be used for filling and site levelling operations	Ensure that pollutants are not present in materials imported onto the site by appropriate selection of source material and chemical analysis if required	Potential for importation of pollutants in the material will be minimized	Minor adverse	NCCL and Contractor
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground, especially in the construction lay-down area, during deliver to the site	Appropriate procedures and protocols to be established and monitored for materials delivery and handling	Potential for accidental release during delivery of materials to the site will be minimized	Minor adverse	NCCL and Contractor
Accidental release of fuels, oils, chemicals, liquid waste, hazardous materials, etc, to the ground, especially in the	All storage areas will have appropriate environmental security measures to prevent	Potential for accidental release of materials during storage on the site will be minimized	Minor adverse	NCCL and Contractor

construction lay- down area, during storage	accidental release to ground			
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground, especially in the construction lay-down area, during transport to the area of use	Appropriate procedures and protocols to be established and monitored for materials transport and handling whilst on the site	Potential for accidental release of materials during transport within and handling on the site will be minimized	Minor adverse	NCCL and Contractor
WASTE MANAGEMENT				
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground during deliver to the construction site	Appropriate procedures and protocols to be established and monitored for materials delivery and handling	Potential for accidental release during delivery of materials to the site will be minimized	Minor adverse	NCCL and Contractor
Accidental release of fuels, oils, chemicals, liquid waste, hazardous materials, etc, to the ground during storage at construction site	All storage areas will have appropriate environmental security measures to prevent accidental release to ground	Potential for accidental release of materials during storage on the site will be minimized	Minor adverse	NCCL and Contractor
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground during transport to the area of use	Appropriate procedures and protocols to be established and monitored for materials transport and handling whilst on the site	Potential for accidental release of materials during transport within and handling on the site will be minimized	Minor adverse	NCCL and Contractor
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground, during use, for example, re-fuelling, maintenance, etc. during construction	Appropriate procedures and protocols to be established and monitored for materials handling and use. Where possible, re-fuelling and maintenance areas will	Potential for accidental release of materials during use will be minimized	Minor adverse	NCCL and Contractor

	include some form of secondary containment			
Accidental release of liquid wastes during removal from site	Appropriate procedures and protocols to be established and monitored for waste materials removal	Potential for accidental release of waste during removal from the site will be minimized	Minor adverse	NCCL and Contractor
Discharge of pollutants in water used for plant, equipment and vehicle washing to ground during the construction	Washing activities will take place on areas with appropriate containment and procedures and protocols will be established and monitored to ensure that the preventative measures are efficient	Potential for accidental release of pollutants to the ground during washing activities will be minimized	Minor adverse	NCCL and Contractor
TRANSPORT PLANNING				
Noise from construction of new plant/quarry	Good site management; Appropriate choice of machinery; Methods of working; Hours of working; Efficient material handling;	Until further details are known, it is not possible to predict whether there may be noise increases at nearby residential properties.	N/A	NCCL and Contractor
Noise from traffic relating to construction using existing roads through local residential areas	Define access routes to the site with the smallest number of properties in proximity to it. Keep vehicle movements to a minimum.	There may be noise increases at residential properties in proximity to the chosen access route.	Minor Adverse	NCCL and Contractor
Increased heavy vehicles traffic both locally and nationally	Unavoidable; prescribe measures and durations for traffic	The traffic has the potential to contribute to congestion and lead to complaints due to noise/vibration	Minor Adverse	

Increased Road Accidents along the Emali-Oloitoktok Road	Install speed bumps, additional traffic signs, increase road safety awareness, enforce speed limits	There may be increased accidents as a result of the project	Minor Adverse	NCCL and Contractor
Destruction of road pavements especially at the point of entry/turn off to quarry plant	Re-design the entry to the quarry plant to accommodate trucks and minimize wear and tear	This will be felt during the construction and operation phase hence requires permanent solution	Minor Adverse	NCCL and Contractor/KeNHA
Dust from camp and accommodation construction traffic	Constant visual vigilance of dust issues throughout the construction phase is necessary. All activities should be assessed for the potential for dust creation prior to their undertaking. Observation of the weather conditions is particularly important. Ensure all the roads within the quarry areas and workers camp are paved Routine sprinkling of water (browsers) on roads within the quarry during construction All trucks transporting coal or limestone and other materials should be covered to reduce dust emission impacts	This will be felt during the construction phase only thus limited to this phase only	Minor Adverse	NCCL and Contractor

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Operation Phase

Ambient Air Quality (AAQ)

Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating	Responsibility
Release of combustion gas emissions from the kiln stack	Primary operational management control techniques.	Local air quality will be well within the WHO guidelines specified for the protection of human health at all relevant locations. On that basis, it is concluded that there will be no adverse health effects in the local population due to the operation of the clinker plant.	Minor adverse	NCCL and Contractor
Release of particulate emissions from the kiln, the clinker cooler and the coal mill.	Bag filters – dust abatement	Local air quality will be virtually unaffected in Merrueshi and will remain well within the WHO guidelines specified for the protection of human health.	Negligible	NCCL and Contractor
Release of dust emissions from the quarry operations.	Use of best practice management techniques during extraction and loading.	It is unlikely that there would be any discernable adverse effect due to dust deposition at any residential properties.	Negligible	NCCL and Contractor
Release of combustion emissions from transport associated with transport of materials to and from the site.	Use of new, efficient vehicles, driver training to minimize emissions (e.g. prevention of over revving, shut off engines when vehicles not in use), rationalization of traffic management system to optimize transport efficiency.	Localized minor effects on air quality at properties very close to certain roads, but increments a very small fraction of air quality criteria.	Negligible	NCCL and Contractor

Use of solid fuels and direct and indirect greenhouse gas emissions	Ensure that combustion and processing is as efficient as possible by appropriate maintenance activities.	Emissions of greenhouse gases	Moderate Adverse	NCCL and Contractor
AIR EMISSION MONITORING				
Emissions to air from main stack	Constant monitoring of the key parameters and spot sampling of secondary parameters. Monitoring equipment and methods shall be in accordance with: The guidelines set out in the IFC's EHS Guidelines for Cement and Limestone Manufacturing.	NCCL	Throughout the operation of the plant from commissioning to closure of the plant.	NCCL and Contractor
	The daily averaged air emissions from the main stack shall not exceed the following primary limits (mg/Nm³): Particulate Matter: 30 SO₂: 400 NO_x: 600 The operator shall also observe the limits for secondary parameters (HCl, hydrogen fluoride, dioxins-furans etc) as stated in the	NCCL	Throughout the operation of the plant from commissioning to closure of the plant.	NCCL and Contractor
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	IFC's EHS Guidelines.			
	Consideration of the necessity for installation of abatement equipment significant emissions from the cement plant. The operator is required to present a report, which considers the emissions from the installation against the benchmarks, the potential reduction of local air quality as a result of the emissions and the impact on sensitive receptors. The assessment should also take into consideration the proposed future operations of the plant, particularly the main fuel to be used.	NCCL	The report should be submitted to the IFC within three years of start up of the cement plant.	NCCL and Contractor
Emissions from other parts of the installation	Dust Emissions from clinker cooling, cement grinding etc. shall not exceed 50 mg/Nm	NCCL	Throughout the operation of the plant from commissioning to closure of the plant.	NCCL and Contractor
Fugitive emissions to air	Constant vigilance and regular visual assessment of dust emissions.	NCCL	Throughout the operation of the plant from commissioning to closure of the plant.	
Terrestrial Ecology				

Dust deposition on leaves leading to loss of vegetation productivity and health Productivity and quality of vegetation for herbivores reduced	Belts of trees to provide local screening Reduce dust emissions at source Asphalt quarry access roads	Some dust emissions at the quarry sites, associated with blasting etc., are inevitable, but emissions and impacts can be kept to an acceptable level by use of latest technologies and best working practices	Minor adverse	NCCL and Contractor
Disturbance of wildlife by noise	Reduce at source	There should be some habituation to lower reduced noise levels by some wildlife, but more sensitive species may avoid the project areas	Minor adverse	NCCL and Contractor
Disturbance of wildlife by operation light during mining and clinker production; the plant will operate on a 24 hour basis	Use of lights with height of 15 metres with 500watts BUT focused on the quarry pits only and not elsewhere will minimize this impact. Flood lights for security will be dim and set up at angles facing the plant area only.	There should be some habituation to human presence by some wildlife, but more sensitive species may avoid the project areas	Minor to Moderate Adverse	Reduce at source
Disturbance of wildlife by human presence and activities	Environmental educational programme	Full compliance is unlikely and some illegal hunting and gathering can be expected. There should be some habituation to human presence by some wildlife, but more sensitive species may avoid the project areas	Minor to Moderate Adverse	NCCL and Contractor
Wildlife "Road-Kills" along access roads	Ecological Survey Ecological Method Statement Road Warning Signs Driver Briefings	With compliance, road-kills should be reduced but some are still inevitable		NCCL and Contractor
Destruction of fauna and habitat for fauna (mammals, birds, reptiles, amphibians,	Further ecological/fauna survey at appropriate seasons and translocations	In long-term populations may recover on restored sites	Minor adverse	NCCL and Contractor

invertebrates)	monitored by the company specialist			
Increase in exploitative pressures on habitats neighbouring the sites	Conduct and implement "Habitat Survey and Management Study", in close consultation with local communities	With co-operation of local community and project providing alternative source of income, habitats should be improved.	Minor to moderate adverse (depending on implementation)	NCCL and Contractor
Workers Accommodation				
Increased Employment (positive change)	Measures to maximise local employment and improve local skill base recommended. Local recruitment of young people currently being trained outside the area Enhanced apprenticeship/ training for some local people whose skills could be improved Positive selection and prioritisation of employment of PAP's Identification of targets of local people to be employed by skills level Publication of local employment targets in local newsletter. Recruitment policy to	This depends on skills of the young people and interest to return to home area, and on the opportunity offered by NCCL and targets set.	Major beneficial	NCCL and Contractor
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	extend in future to limited sponsorship BSc (or equivalent) for workers /local people children			
Increased tax and budget (positive change)	Assistance to villages to formulate projects and strengthen advocacy if requested by Liaison committee. Money from improved budget can be used to realize these objectives. NCCL may be prevailed on to offer skills training for improved planning and project formulation	Increased budget for Kajiado County Residual impact will depend on effectiveness of allocation process in favour of affected villages. A poor process would cause conflict/ discontent	Major beneficial	NCCL and Contractor
Electric and other infrastructure improvements (neutral or positive if realized)	None identified. This will be a “windfall” benefit (or benefit external to the project) if it occurs.		Neutral/Minor beneficial	NCCL and Contractor
Loss or reduction of livelihoods for: Lime Producers (negligible /minor adverse) Graziers (minor adverse)	Confirmation of potential impact on animal nutrition and impacts on production and budgetary implications’ by grassland specialist/livestock productionist following pasture (and livestock) inspection and assessment of stocking density and energy requirements. Confirmation of earnings from herbs to be obtained	PAP’s have in the main identified a preference for employment rather than other forms of compensation. No household will loose their livelihood, and the income from employment (full or part time) of one or more household members, or alternative compensation, should be sufficient to compensate for expected reductions in the affected activities.	Neutral/minor beneficial	NCCL and Contractor

	from wholesaler records, or by base line study. Prioritization of employment or other appropriate form of compensation for each affected household. NCCL to consider feasibility of job share schemes, and gender sensitive arrangements (e.g. for child care arrangements). Annual monitoring of change in activities and incomes related to lime burning and grazing herds as well as other dynamic changes in activities and incomes from employment by NCCL cement to be monitored annually during construction and in the first years of operation. Reporting to investors and via CSR report and Liaison forum. Specific attention to be given to vulnerable households.			
Extended and Improved Road	Regulations relating to	Improved opportunities should be	Minor to	NCCL and

and implications for local economy (minor/moderate beneficial)	roadside and commercial activities to be adhered to by business persons and enforced. Monitoring of health, road safety issues. Curative and preventive action to be taken if issues identified by monitoring.	seen in increased opportunities and wealth of village. It may be difficult to apportion this only to the new road or cement works given the current increasingly dynamic economic environment. Residual impacts of noise and dust for local residents near the road and indirectly affected.	moderate adverse	Contractor
Loss of land and property for households and compensation (minor beneficial / minor adverse)	An appropriate compensation plan should be developed and agreed. See separate compensation plan framework document.	PAP's should incur no negative residual impact. The assessment should include <u>all</u> applicable entitlements Monitoring process to review and report.	Negligible/ minor beneficial	NCCL and Contractor
Hazards associated with roads from main intersection to the quarry plant.	With regards to identified 'high' risk - Design measures to ensure landslips/falling rocks do not cause accidents - Inclusions of pedestrian walkways and crossings - Planned access and parking. In addition measures to manage cyclists and equestrians shall be incorporated. Risk of accident shall be	Some residual impact is expected but should be limited by implementation of aforementioned mitigation measures.	Moderate adverse – possibly severe adverse if there is disregarded for safety issues by the road users.	NCCL and Contractor

	reduced by implementation of education (road safety awareness) programmes and liaison with the local communities as well as driver training programmes and implementation of near-miss/accident reporting procedures. As part of the exercise proposed closed silo lorry lease agreements and contractual terms should be reviewed.			
Roadside residents health and quality of life	Risk assessment to cover these aspects and identify mitigation. Health records of dust related disease to be maintained by local health workers. Quality of life questionnaire to monitor noise and disturbance Further mitigation to be decided on basis of noted impacts via monitoring.	Depends on both cases a) Effectiveness of monitoring undertaken b) Corrective measures taken – depends on severity of case e.g. treatment may not solve the problem – extreme health issue may require re housing	Minor/moderate adverse	NCCL and Contractor
Noise from camp	Ensure construction traffic	No specific limits at present. The aim is	Throughout the	Contractor/NCCL

accommodation and traffic	only uses pre-determined routes to access the sites.	that there shall be no noise nuisance.	construction phase but particularly when undertaking activities or handling materials which may lead to dust creation problems.	
Dust from camp accommodation and traffic	Constant visual vigilance of dust issues throughout the construction phase is necessary. All activities should be assessed for the potential for dust creation prior to their undertaking. Observation of the weather conditions is particularly important.	No specific limits. No dust nuisance shall be created.	Throughout the construction phase but particularly when undertaking activities or handling materials which may lead to dust creation problems.	Contractor/NCCL
Solid waste from camp and accommodation operation activities	Visual inspection of waste storage, collection and disposal areas. Records to be maintained of inspections. Ensure the disposal of all solid wastes in pre-designated sites Undertake recycling/re-use of wastes like plastic, metal etc.	Monthly inspections. Suitable preventive and corrective action to be taken if required	Minor to moderate adverse	Contractor/NCCL

	to reduce the waste generation			
Waste Effluent from camp and accommodation operation activities	Ensure that the proposed effluent treatment plant is of an appropriate specification to prevent significant impact to the receiving water way. When details of the effluent treatment plant are available the operator is required to submit full details of the water treatment plant (including its management requirements) the expected loads, the quality of emissions, the emission point, the quality of the receiving water and the potential impact on that water.	As soon as the design of the effluent treatment plant is available and before it is commissioned for use during the construction phase of the rest of the development	Minor to moderate adverse	Contractor/NCCL
WATER BALANCE				
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground, during use, for example, re-fuelling, maintenance, etc.	Appropriate procedures and protocols to be established and monitored for materials handling and use. Where possible, re- fuelling and maintenance areas will include some form of secondary containment	Potential for accidental release of materials during use will be minimized	Minor adverse	Contractor/NCCL
Accidental release of liquid wastes during removal from site	Appropriate procedures and protocols to be established and monitored for waste materials removal	Potential for accidental release of waste during removal from the site will be minimized	Minor adverse	Contractor/NCCL
Accidental discharge of	Sanitary waste will not be	None	Negligible	Contractor/NCCL
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sanitary wastewater to ground and groundwater from the workers camp	discharged to the ground instead septic tanks will be constructed at the workers camp and clinker site			
Contamination of local water ways (Merrueshi River) from proposed effluent plant discharge	Ensure that the plant complies with local and international standards and guidelines. Final effluent should have no significant negative impact on the receiving water. The plant should be designed so as to be able to cope with the load of the full construction camp. Septic tanks (lined) are proposed for all sources generating sanitary waste.	Potential for release of harmful of effluent if the facility is underspecified or not managed correctly.	Minor adverse	Contractor/NCCL
Discharge of pollutants in water used for plant, equipment and vehicle washing to ground	Washing activities will take place on areas with appropriate containment and procedures and protocols will be established and monitored to ensure that the preventative measures are efficient	Potential for accidental release of pollutants to the ground during washing activities will be minimized	Minor adverse	Contractor/NCCL
Increase of sediment load in natural aquatic receptors resulted from direct runoff disposal	- Minimisation of excavations face during construction - Temporary drainage grooves and sedimentation ponds for surface runoff collection	None	Negligible	Contractor/NCCL
Natural aquatic receptors degradation due to direct	- Construction of appropriate septic tanks and	None	Negligible	Contractor/NCCL

disposal of domestic type wastewater	wastewater treatment facility.			
Groundwater contamination from leakage of polluting substances	Usage of non-hazardous construction materials for human health and environmental protection. Storage of potential polluting materials in appropriate areas, including secondary containment.	None	Negligible	Contractor/NCCL
Increase of sediment content in surface waters due to fugitive dust dispersion.	<u>For quarries:</u> - Quarrying face will be kept minimal. - Gradual rehabilitation (through landscaping and planting) of the locations where extraction works have been completed. - Stormwater management through peripheral ditches and settlement pond.	None	Negligible	Contractor/NCCL
Pollution of surface water due to release of harmful/untreated sewage.	Septic tanks will cope with the demands during construction and operational phase. No hazardous liquids will	None	Negligible	Contractor/NCCL

	be released in to the septic tanks.			
Soil Erosion	<u>For quarries:</u> - Gradual rehabilitation of locations where extraction	Soil erosion will be limited on-site the quarries.	Minor/Adverse	Contractor/NCCL
Ground and Groundwater contamination.	<u>For clinker plant and quarries:</u> - Secondary containment for potential polluting materials. - Any contaminated land removal and disposal to appropriate hazardous waste sites.	Potential contamination will be limited on-site.	Minor/Adverse	Contractor/NCCL
Groundwater depletion.	<u>For clinker plant and quarries:</u> - Surface water abstraction to cover process water demand is not viewed as an option, as existing groundwater reserves are considered adequate. - Controlled water abstraction through boreholes located on-site.	Existing groundwater reserves exploitation rate for water supply purposes, exceeds by far water requirements for clinker production.	Negligible	Contractor/NCCL

WASTE MANAGEMENT				
Release of combustion gas emissions from the kiln stack	Primary operational management control techniques.	Local air quality will be well within the Kenyan and WHO limits and specified guidelines for the protection of human health at all relevant locations. On that basis, it is concluded that there will be no adverse health effects in the local population due to the operation of the plant.	Not significant	Contractor/NCCL
Release of particulate emissions from the kiln, the clinker cooler and the coal mill.	Bag filters and electro precipitator – dust abatement.	Local air quality will be within the WHO limits and specified guidelines for the protection of human health.	Negligible	Contractor/NCCL
Release of dust emissions from the quarry operations.	Use of best practice management techniques during extraction and loading.	It is unlikely that there would be any discernable adverse effect due to dust deposition at any residential properties.	Negligible	Contractor/NCCL
Release of combustion emissions from transport associated with transport of materials to and from the site.	Use of new, efficient vehicles, driver training to minimize emissions (e.g. prevention of over revving, shut off engines when vehicles not in use), rationalization of traffic management system to optimize transport efficiency.	Localized minor effects on air quality at properties very close to certain roads, but increments a very small fraction of air quality criteria.	Negligible	Contractor/NCCL
Increase of sediment content in surface waters due to fugitive dust dispersion.	For quarry plant: Storm water management through ditches and/or gutters and settlement ponds. For quarries: Quarrying face will be kept minimal. Gradual rehabilitation (through landscaping and planting) of the locations where	None	Negligible	Contractor/NCCL

	extraction works have been completed. Storm water management through peripheral ditches and settlement pond.			
Degradation of surface waters quality due to process water direct disposal or leakage of polluting materials.	For clinker plant: Process water circulation is closed circuit including settlement tank for treatment. Storage of fuels for clinker production in enclosed storage area. Tidying the plant on regular basis with mechanical sweepers removing dust collected on the streets and gutters. Thorough washing of surfaces in case of polluting materials spillages and further processing of collected washings as special waste. For quarries: Appropriate collection and transportation of potential polluting materials (e.g. spent oils, lubricants, etc.)	None	Negligible	Contractor/NCCL
Pollution of surface water due to release of harmful/untreated sewage.	The septic tank treatment system will be peak for peak demand during construction phase and therefore will cope with the demands Contractor/NCCL during operational phase. No	None	Negligible	Contractor/NCCL

	hazardous liquids will be released in to the septic tank treatment system.			
Soil Erosion	For quarries: Gradual rehabilitation of locations where extraction works have been completed.	Soil erosion will be limited on-site the quarries.	Minor adverse	Contractor/NCCL
Ground and Groundwater contamination.	For quarries: Secondary containment for potential polluting materials. Any contaminated land removal and disposal to appropriate hazardous waste sites.	Potential contamination will be limited on-site.	Minor adverse	Contractor/NCCL
Accidental release of fuels, oils, chemicals, hazardous materials, etc, to the ground during deliver to the site	Appropriate procedures and protocols to be established and monitored for materials delivery and handling	Potential for accidental release during delivery of materials to the site will be minimized	Minor adverse	Contractor/NCCL
Accidental release of fuels, oils, chemicals, liquid waste, hazardous materials, etc, to the ground during storage	All storage areas will have appropriate environmental security measures to prevent accidental release to ground			Contractor/NCCL
Storage of solid and liquid wastes	Inspection of all waste storage areas to ensure appropriate segregation and containment	Potential releases into the environment.	Minor Adverse	Contractor/NCCL
Use of solid fuels and direct and indirect greenhouse gas emissions	Ensure that combustion and processing is as efficient as possible by appropriate maintenance activities.	Emissions of greenhouse gases	Minor Adverse	Contractor/NCCL
Waste management	Arrangement of all solid waste management licences and permits Establishment of waste management	Waste management will be covered by internal procedures and will be regulated through local state regulations. Increased quantity of	Minor Adverse	Contractor/NCCL Contractor/NCCL

	disposal/recycling techniques and appropriate choice of contractor Establishment of filter dust handling procedures and choice of the contractors Hazardous waste disposal techniques to be established Review of waste minimization and recycling options for all wastes	waste will be disposed of off site. Increase in recycling/reuse of waste generated		
Waste Tyres Disposal	Disposal of Waste Tyres in accordance with the Environmental Management and Coordination (Waste Tyres Management) Regulation, 2013 in Kenya	This is a long term problem expected through out the project construction and operation phase	Minor Adverse	Contractor/NCCL
Mercury Wastes From Light Bulbs	Project will purchase Compact Fluorescent Bulbs (CFLs), which have no mercury hence minimizing mercury related impacts during disposal.	This is a long term problem expected through out the project construction and operation phase	Minor Adverse	Contractor/NCCL
Used Batteries	Disposal of used batteries will be through contracting of waste companies and providers who collect and recycle used batteries in Nairobi.	This is a long term problem expected through out the project construction and operation phase	Minor Adverse	Contractor/NCCL
TRANSPORT PLANNING				
Noise from construction of new plant/quarry	Good site management; Appropriate choice of machinery;	Until further details are known, it is not possible to predict whether there may be noise increases at nearby	N/A	Contractor/NCCL
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	Methods of working; Hours of working; Efficient material handling;	residential properties.		
Noise from traffic relating to construction using existing roads through local residential areas	Define access routes to the site with the smallest number of properties in proximity to it. Keep vehicle movements to a minimum.	There may be noise increases at residential properties in proximity to the chosen access route.	Minor Adverse	Contractor/NCCL
Increased heavy vehicles traffic both locally and nationally	Unavoidable; prescribe measures and durations for traffic	The traffic has the potential to contribute to congestion and lead to complaints due to noise/vibration	Minor Adverse	Contractor/NCCL
Increased Road Accidents along the Emali-Oloitoktok Road	Install speed bumps, additional traffic signs, increase road safety awareness, enforce speed limits	There may be increased accidents as a result of the project	Minor Adverse	Contractor/NCCL
Destruction of road pavements especially at the point of entry/turn off to quarry plant	Re-design the entry to the quarry plant to accommodate trucks and minimize wear and tear		Minor Adverse	Contractor/NCCL
HIV/AIDS and communicable disease spread as a result of truckers waiting to load goods over a period of time	Initiate HIV/AIDS education and awareness and provide for example condoms	There may be increase in prostitution in the area targeting truck drivers hence becoming a hotspot	Moderate adverse	Contractor/NCCL/ MoH
Dust from camp and accommodation construction traffic	Constant visual vigilance of dust issues throughout the construction phase is necessary. All activities should be assessed for the		Minor Adverse	Contractor/NCCL

	potential for dust creation prior to their undertaking. Observation of the weather conditions is particularly important. Ensure all the roads within the quarry areas and workers camp are paved Routine sprinkling of water (browsers) on roads within the quarry during construction All trucks transporting coal or limestone and other materials should be covered to reduce dust emission impacts			
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Noise Emissions

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN –LUKENYA CEMENT GRINDING PLANT

Activity/Emission Source	Impact (s)	Mitigation Measure (s)	Monitoring	Responsibility/Schedule
Truck traffic carrying raw materials and finished products in and out of the plant	Truck Traffic Noise within the plant and surrounding environment	Noise Emission Measurements within the IFC Limits for Noise	Periodic monitoring of noise levels	NCCL; Through out plant operation until decommissioning
	Occupation Health Impacts to workers within the plant especially hearing related problems	Provide ear muffs to all workers on site Replace ear muff and goggles frequently as prescribed and whenever they are damaged Conduct frequent health check ups for all workers especially for hearing related problems	Limited occurrence of hearing related problems from workers Availability of workers using ear muff via observation	NCCL; Through out plant operation until decommissioning
Crushing mills for gypsum and pozzolana	Noise emissions from crushing mills	Partially enclose the mills to reduce the noise emitted to the external environment Provide ear muffs to all workers on site Replace ear muff and goggles frequently as prescribed and whenever they are damaged	Periodic (Quarterly) monitoring of the emissions (undertake noise emission measurements) at each mill Limited occurrence of hearing related problems from workers Availability of workers using ear muff via observation	NCCL; Through out plant operation until decommissioning

		Conduct frequent health check ups for all workers especially for hearing related problems Limit the duration of workers exposure to the mills to 8 hours		
Storage of Clinker (Clinker Dump Hopper)	Noise Emission during dumping of clinker	Partially enclose the mills to reduce the noise emitted to the external environment Provide ear muffs to all workers on site Replace ear muff and goggles frequently as prescribed and whenever they are damaged Conduct frequent health check ups for all workers especially for hearing related problems Limit the duration of workers exposure to the mills to 8 hours Staff working in areas of high noise levels should undergo training and regular hearing checks.	Establish a Noise Monitoring Programme Noise levels in operational areas of the plant should be measured and damage to hearing arising from high noise levels ascertained Periodic (Quarterly) monitoring of the emissions (undertake noise emission measurements) at each mill Limited occurrence of hearing related problems from workers Availability of workers using ear muff via observation	NCCL; Through out plant operation until decommissioning
Packaging of Cement (3 Packaging Plants)	Noise Emission during dumping of clinker	Provide ear muffs to all workers on site Replace ear muff and goggles frequently as prescribed and whenever they are damaged	Noise Monitoring programme. Noise levels in operational areas of the plant should be measured, and the risk of damage	NCCL; Through out plant operation until decommissioning

		Conduct frequent health check ups for all workers especially for hearing related problems Limit the duration of workers exposure to the mills to 8 hours Staff working in areas of high noise levels should undergo training and regular hearing checks.	to hearing arising from high noise levels. Periodic (Quarterly) monitoring of the emissions (undertake noise emission measurements) at each mill Limited occurrence of hearing related problems from workers Availability of workers using ear muff via observation	
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Ambient Air Emissions

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN –LUKENYA CEMENT GRINDING PLANT

Activity/Emission Source	Impact (s)	Mitigation Measure (s)	Monitoring	Responsibility/Schedule
Truck traffic carrying raw materials and finished products in and out of the plant	Fugitive dust emissions – Particulate Matter within the plant and surrounding environment	Pave the entire plant site Water spraying of roads and dusty materials stockpiles All trucks carrying products/materials into and out of the plant must be containerized/covered Speed limits on unmade surfaces on site to limit dust Landscape the site-planting trees	Concentration and intensity of observable fugitive dust Extent to which the plant is paved Constant vigilance and visual assessment of dust emissions Evidence of frequent water spraying of stockpiles Evidence of containerized trucks within the plant Availability of speed limit signs within the plant site	NCCL; Through out plant operation until decommissioning
	Occupation Health Impacts to workers within the plant (respiratory and eye related diseases and infections)	Provide dust masks and goggles to all workers on site Replace dust masks and goggles frequently as prescribed and whenever they are damaged	Limited occurrence of respiratory and eye health related infections from workers Availability of workers using dust masks and	NCCL; NCCL; Through out plant operation until decommissioning

		Conduct frequent health check ups for all workers especially for respiratory and eye related infections	goggles via observation	
Crushing mills for gypsum and pozzolana	Fugitive dust emissions – Particulate Matter within the plant and surrounding environment	2 Bag Filters installed in each of the crushing areas Landscape the site-planting trees	Periodic (Quarterly) monitoring of the air emissions (undertake air emission measurements) at each bag filter installed to determine if they are functioning effectively Install real time air emission monitoring equipment (long run) to detect degree of emissions from each source in relation to the WHO/IFC standards	NCCL; Through out plant operation until decommissioning
	Occupation Health Impacts to workers within the plant (respiratory and eye related diseases and infections)	Provide dust masks and goggles to all workers on site Replace dust masks and goggles frequently as prescribed and whenever they are damaged Conduct frequent health check ups for all workers especially for respiratory and eye related infections	Limited occurrence of respiratory and eye health related infections from workers Availability of workers using dust masks and goggles via observation	NCCL: Through out plant operation until decommissioning
Storage of Clinker (Clinker Dump Hopper)	Fugitive dust emissions during dumping of clinker	Bag Filter installed Landscape the site-planting trees	Periodic (Quarterly) monitoring of the air emissions (undertake air emission measurements)	NCCL

			at each bag filter installed to determine if they are functioning effectively Install real time air emission monitoring equipment (long run) to detect degree of emissions from each source in relation to the WHO/IFC standards	
	Occupation Health Impacts to workers within the plant (respiratory and eye related diseases and infections)	Provide dust masks and goggles to all workers on site Replace dust masks and goggles frequently as prescribed and whenever they are damaged Conduct frequent health check ups for all workers especially for respiratory and eye related infections	Limited occurrence of respiratory and eye health related infections from workers Availability of workers using dust masks and goggles via observation	NCCL; Through out plant operation until decommissioning
Storage of cement in Silos (3 Silos)	Fugitive dust emissions	Bag Filters installed on top of each of the 3 silos on top of each of the 3 silos Landscape the site-planting trees	Periodic (Quarterly) monitoring of the air emissions (undertake air emission measurements) at each bag filter installed to determine if they are functioning effectively Install real time air emission monitoring equipment (long run) to detect degree of emissions from each	NCCL; Through out plant operation until decommissioning

			source in relation to the WHO/IFC standards	
	Occupation Health Impacts to workers within the plant (respiratory and eye related diseases and infections)	Provide dust masks and goggles to all workers on site Replace dust masks and goggles frequently as prescribed and whenever they are damaged Conduct frequent health check ups for all workers especially for respiratory and eye related infections	Limited occurrence of respiratory and eye health related infections from workers Availability of workers using dust masks and goggles via observation	NCCL; Through out plant operation until decommissioning
Packaging of Cement (3 Packaging Plants)	Fugitive dust emissions during packing of cement products	Bag Filters installed (centralized) in each packing plant Landscape the site-planting trees	Periodic (Quarterly) monitoring of the air emissions (undertake air emission measurements) at each bag filter installed to determine if they are functioning effectively Install real time air emission monitoring equipment (long run) to detect degree of emissions from each source in relation to the WHO/IFC standards	NCCL; Through out plant operation until decommissioning
	Occupation Health Impacts to workers within the plant (respiratory and eye related diseases and infections)	Provide dust masks and goggles to all workers on site Replace dust masks and goggles frequently as prescribed and whenever they are damaged	Limited occurrence of respiratory and eye health related infections from workers Availability of workers using dust masks and	NCCL; Through out plant operation until decommissioning

		Conduct frequent health check ups for all workers especially for respiratory and eye related infections	goggles via observation	
Manufacture of Cabro Blocks	Fugitive dust emissions during construction of plant	Ensure all trucks in and out of plant construction area are covered Ensure all stock piles are covered Provide construction workers with PPE including dust masks and goggles	Observable trucks in and out of plant – containerized Observable watering/spraying to reduce dust in construction site Observable workers with adequate PPE for mitigating dust emission impacts Limited observable dust emission in the site	NCCL; Through out plant operation until decommissioning