ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR UPGRADATION OF NATIONAL CEMENT COMPANY LIMITED KALOLENI, RABAI SUB-COUNTY, KILIFI COUNTY

MAY 2021

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General Information

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ACRONYMS

AIDS	- Acquired Immuno Deficiency Syndrome
AoI	- Area of Influence
BOD	- Biochemical Oxygen Demand
C-ESMP	- Construction Environment and Social Management Plan
CBD	- Convention on Biological Diversity
CBOs	- Community Based Organisations
CCVT	- Coupling Capacitor Voltage Transformers
CDF	- Constituency Development Fund
CEC	- County Executive Committee
CEDAW	- Convention on the Elimination of All Forms of Discrimination Against Women
CIA	- Cumulative impact assessment
CIDP	- County Integrated Development Plan
CLOs	- Community Liaison Officers
CMS	- Convention on Migratory Species
COD	- Chemical Oxygen Demand
ECD	- Early Childhood Development
EE	- Energy Efficiency
EHS	- Environmental Health and Safety
EMCA	- Environmental Management and Coordination Act
EMF	- Electromagnetic Field
ENSO	- El Nino/Southern Oscillation
EPRP	- Emergency Prevention and Response Plan
ESIA	- Environmental and Social Impact Assessment
ESMP	- Environmental and Social Management Plan
FGDs	- Focus Group Discussions
FPE	- Free Primary Education
GBV	- Gender Based Violence
GDC	- Geothermal Development Company
GDP	- Gross Domestic Product
GHG	- Greenhouse Gas
GIIP	- Good International Industry Practice
GoK	- Government of Kenya
GWP	- Global Warming Potential
HIV	- Human Immuno Virus
HR	- Human Resources
HVDC	- High-Voltage Direct Current
IBA	- Important Bird Area
ICTZ	- Intertropical Convergence Zone
IFC	- International Finance Corporation
ILO	- International Labor Organization
KALRO	- Kenya Agricultural Research Organization
KCC	- Kenya Cooperative Creameries
KFS	- Kenya Forest Service
KNBS	- Kenya National Bureau of Statistics

KPLC	- Kenya Power and Lighting Company
KTBH	- Kenya Top Bar Hive
KWFT	- Kenya Women Finance Trust
LCPDP	- Least Cost Power Development Plan
LDV	- Light Duty Vehicles
LPG	- Liquid Petroleum Gas
MIR	- Minimum Internal Requirements
MOEP	- Ministry of Energy and Petroleum
MVA	- Mega Volt Amp
MW	- Megawatts
NBSAP	- National Biodiversity Strategy and Action Plan
NEC	- National Environmental Council
NEMA	- National Environment Management Authority
NG-CDF	- National Government Constituency Development Fund
NGOs	- Non-Governmental Organizations
NOX	- Oxides of Nitrogen
OHTL	- Overhead Transmission Line
OPGW	- Optical Ground Wire
OSRP	- Oil Spill Response Plan
PAHs	- Project Affected Households
PAPs	- Project Affected Persons
PCB	- Printed Circuit Board
PCB	- Polychlorinated Biphenyls
PDO	- Project Development Objective
PM	- Particulate Matter
PPE	- Personal Protective Equipment
RAP	- Resettlement Action Plan
RoW	- Right of Way
RPF	- Resettlement Policy Framework
RPM	- Respirable Particulate Matter
RTI	- Respiratory Tract Infections
RVWSB	- Rift Valley Water Services Board
SEA	- Sexual Exploitation and Abuse
SEP	- Stakeholder Engagement Plan
SF6	- Sulfur Hexafluoride
SGBV	- Sexual and Gender Based Violence
SGR	- Standard Gauge Railway
SMEP	- Small and Micro Enterprise Program
SOX	- Sulphur Oxides
STDs	- Sexually Transmitted Diseases
TVETA	- Technical Vocational Education and Training Authority
VAC	- Violence against Children
VEC	- Valued Environmental and Social Components
VMGF	- Vulnerable and Marginalized Groups Framework
WB	- World Bank
WHO	- World Health Organization

EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) Study Report presents an assessment of the potential environmental and social impacts associated with the proposed **National Cement Company Limited (NCCL)** Kaloleni plant upgradation ('the Project') to ensure that environmental and social aspects are diligently considered and managed during the Project lifecycle. This Environmental and Social Impact Assessment (ESIA) Study report has been prepared by **EMC Consultants Limited** for National Cement Company Limited (NCCL) (Proponent). NCCL acquired on 15th October 2019 the Kaloleni Cement plant from Athi River Mining (ARM). The plant was in running condition with abysmal performance. There were many shortcomings in terms of stable operation and sustainable production of 1,500 tonnes per day (TPD) clinker and 700 TPD cement grinding.

PROJECT PROPONENT

NCCL is the largest indigenous cement manufacturer as of 2018 in Kenya and was established in 2008. It is a subsidiary of the Devki Group of Companies, an industrial and manufacturing conglomerate with headquarters in Kenya and operating subsidiaries in Kenya and Uganda. NCCL began cement production in 2010 and currently has 3 plants in Kenya (NCCL Lukenya, NCCL Emali and NCCL Nakuru) and recently acquired from Athi River Mining Limited (ARM) two plants in Kenya located in Athi River in Machakos County and Kaloleni in Kilifi County. It also owns 100% of Simba Cement Uganda Limited (NCCL Tororo) a cement factory in a Ugandan town of Tororo. The NCCL plant in Kaloleni (formerly ARM Cement Ltd) is an integrated cement plant which started operation in 1996 for clinkerization and cement grinding and bagging. The Project is currently running at half capacity due to facility intended upgrade activities. The Project is a clinkerization and grinding plant and includes supporting facilities (office blocks, staff colony, water treatment plant, ponds, and warehouses) and 3 quarries (i.e., limestone, iron ore quarries) in Chauringo, Pangani and Kenya lead mines all in Kilifi County.

PROJECT LOCATION

The plant is located in Mariakani, Kilifi County, Kenya. The plant is on an 81-hectare land, which is owned by National Cement Company Limited. It is off Mazeras-Kaloleni on C111 Road at Coordinate: Lat: 3°50'46 and 40"S, Lon: 39°37'59.92"E and approximately 70 km from Mombasa town. The plant surrounding is predominantly agricultural.

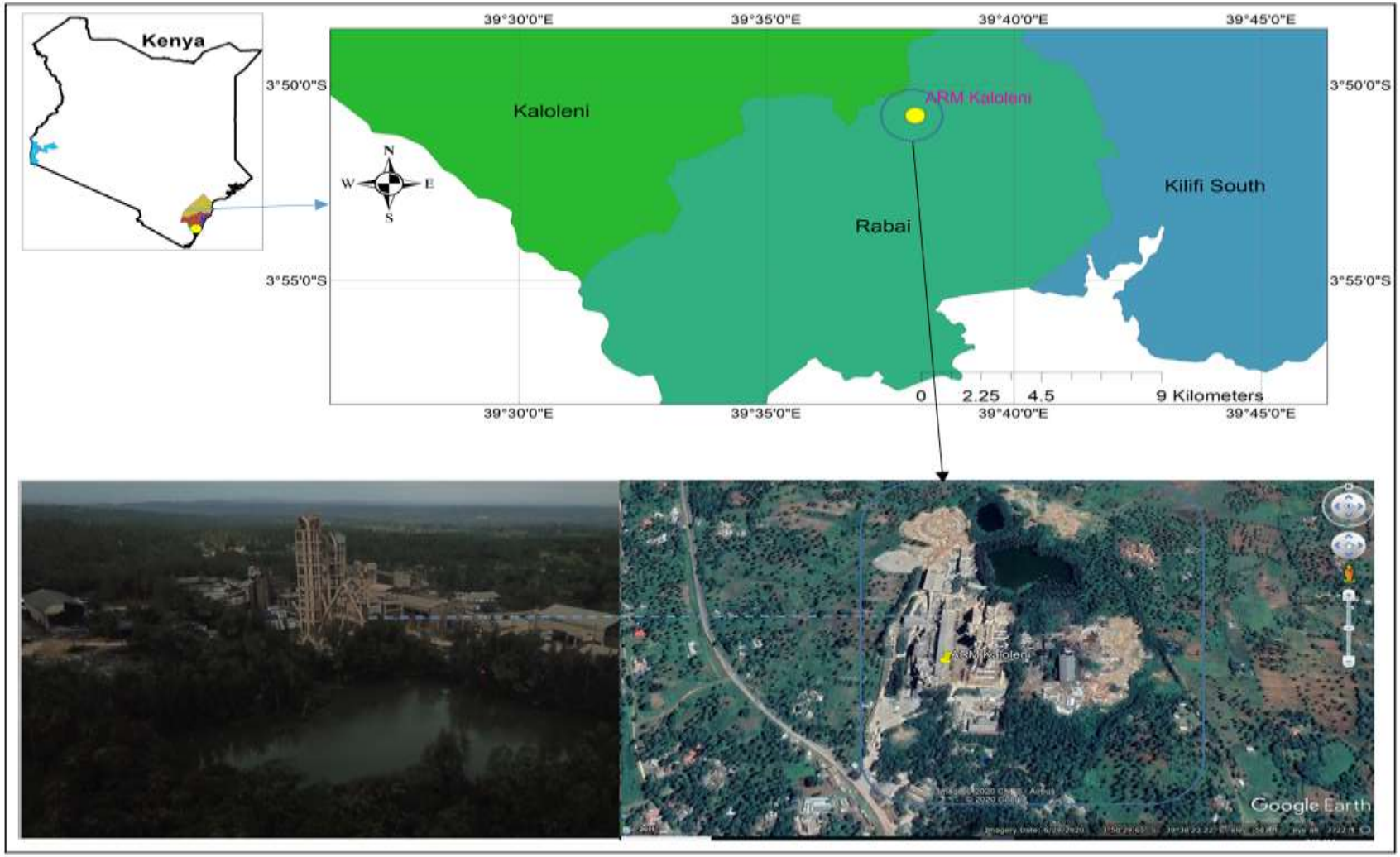


Figure 0-1: Map of Project Location

JUSTIFICATION FOR PLANT UPGRADE

Upon acquisition of the Athi River Mining assets in Kaloleni by NCCL, the plant was assessed for its under-par performance by a team of experts for process and electrical and instrumentation. The technical report noted that:

a) There was only 1 crusher of 150 tonnes per hour (TPH) capacity, which was used to crush limestone and additives. This capacity is very low for producing clinker up to 1,500 TPD. Actual capacity that needs upgradation should be 250 TPH for limestone and 100 TPH for additives crushing.
b) There is no proper stockpile like stacker reclaimer. Only point stacking is being done in a single heap and the material is required to be handled by heavy earth moving equipment like dozers and pay loaders.
c) Generation of lots of fugitive dust, because of open storage yards and material handling by heavy earth moving equipment used for feeding limestone and additives to raw mills.
d) Raw mills are being operated with lower capacity than rated, due to badly worn-out internals and improper hot air duct routings. It was also not safe for any personnel to enter the mills for maintenance during kiln operation, due to improper hot air ducts and without safety interlocks.
e) The preheater cyclones are without proper measuring instruments. No proper provision of air blasters in the preheater system at strategic locations. This leads to potential risk of burns due to hot raw meal, if the cyclones and feed pipes jam/blocks.
f) The clinkerisation unit rarely runs continuously for 24 hours in a single day throughout the year. The equipment availability is found 60% only and were very unreliable. There were no safety interlocks, the automation was outdated and was very unreliable. The feeders were unsafe and were prone to electric flashes. There were no proper protection resulting in motors windings burning regularly.
g) The kiln piers concrete foundation was oscillating with lateral and horizontal movement. The kiln was damaged and buckled at many places due to frequent red spots occurring because of poor refractory condition. The kiln is having crack under the middle tire and does not run true to its axis, resulting in oscillation during operation.
h) The quality of clinker with frequent stops was substandard allowing limited addition of pozzalona for PPC grade cement.
i) The cooler is of very old generation and is damaged to an extent of grate supports bend, displacement of grates allowing clinker to fall and resulting in improper cooling of hot clinker from kiln. The heat recuperation was very low resulting in high consumption of coal. The drives frequently trip without indicating any reasons in the CCR for operator.
j) The transport system under cooler is deep bucket conveyor which was in bad condition and highly unreliable with regular severing of links.
k) Coal mill runs at reduced capacity because of damaged/ abnormally worn-out internals. It does not start from CCR as it was supposed to be. It is started

locally requiring perfect co-ordination between electrical and operation personnel. No proper safety interlocks are available.

l) The inert gas system in the coal mill circuit was not automatic. There was always a potential danger of fine coal catching fire which is uncontrollable and can be fatal.

m) Under par performing, outdated open circuit multiple units of cement mills of low capacities. The system was locally operated by control desk and are not automated, thereby losing the advantage of increased output, enhanced productivity and uniform quality.

With above conditions the plant was consuming specific power of more than 100 KWh/ton clinkerisation. The specific thermal energy consumption was very high between 1050 to 1150 kcal/kg clinkers resulting in more coal consumption.

The upgrade of the plant will result in:

a) Safe and healthy working conditions for all.
b) Fugitive dust generation elimination for clean environment
c) Stack emission level controlled to international standards
d) Better performing and reliable equipment allowing working personnel to work safely
e) Full automation for hassle free working condition
f) Elimination of fire hazards occurring in coal grinding and storage section by installing CO gas analysers and automatic inert gas system with all safety interlocks.
g) Elimination of fire hazards through electrical short circuits and faults by having Intelligent MCCS and latest protective relay systems.
h) Achieve lower specific power consumption of 70KWh/ ton of clinker, thereby reducing the load on the Kenya Power and Lighting Company Limited (KPLC) lines, which will be able to cater to more users.
i) Achieve specific thermal energy consumption of 800Kcal/kg clinker reducing coal consumption.

JUSTIFICATION FOR ESIA STUDY

The upgrade of the plant to increase efficiency and performance will require demolition and re-construction of new structures including silos, crushers, kilns etc. The construction will include civil and mechanical works which are likely to have adverse environmental and socio-economic impacts hence the need for undertaking ESIA study in order to predict the adverse impacts and develop mitigation measures.

ESIA STUDY OBJECTIVES

The purpose of this study was to undertake an Environmental and Social Impact Assessment (ESIA) study for the NCCL Kaloleni Cement Plant Upgradation. The ESIA study has been developed in compliance with the Environmental and Social Impact Assessment/Audit Regulation, 2003. The purpose of an ESIA is to provide information to regulators, the public and other stakeholders to aid the decision-making process. The objectives of the ESIA are to:

- Define the scope of the project and the potential interactions of project activities with the environment (bio-physical and socio-economic).
- Identify relevant national and international legislation, standards and guidelines and to ensure that they are considered at all stages of project development.
- Provide a description of the proposed project activities and the existing environmental and social conditions that the project activities may interact with.
- Predict, describe and assess impacts that may result from project activities and identify mitigation measures and management actions to avoid, reduce, remedy or compensate for significant adverse effects and, where practicable, to maximize potential positive impacts and opportunities.
- Provide a plan for implementation of mitigation measures and management of residual impacts as well as methods for monitoring the effectiveness of the plan.

ESIA METHODOLOGY AND APPROACH

The study has also been guided by the requirements of the EIA Regulations set out in terms of the Environment Management and Coordination Act, 1999 and (amendment) 2015. The approach taken in this study is guided by the principles of integrated environmental management. The approach is therefore guided by the principles of transparency which is aimed at encouraging decision making. The underpinning principles of integrated environmental management are:

- Informed decision making.
- Accountability for information on which decisions are made.
- Consultation with stakeholders.
- Due consideration of feasible alternatives.
- An attempt to mitigate negative impacts and enhance positive impacts associated with the proposed project.
- An attempt to ensure that social costs of the development proposals are outweighed by the social benefits.
- Regard to individual rights and obligations.
- Compliance with these principles during all stages of planning, implementation and decommissioning of the proposed development; and
- Opportunities for public and specialist input in the decision-making process.

a) Literature Review

Numerous literatures were reviewed as part of the ESIA study and included policy and legal related secondary data as well as non-statutory literature. The principal national legislation governing issues of environmental concern in Kenya is the Environmental Management and Coordination 1999 and Environmental Management and Coordination (Amended) Act of 2015 typically referred to as EMCA. EMCA calls for Environmental Impact assessment (EIA) (under Section 58) to guide the implementation of environmentally sound decisions and empowers stakeholders to participate in sustainable management of the natural resources. Projects likely to cause environmental impacts require that an environmental impact assessment study to be carried out. It is under this provision that the current study has been undertaken. Other legislation adhered to during this study are the Environmental Impact Assessment and Audit Regulations 2003; Waste Management Regulations 2006; Water Quality Regulations 2006; Noise and Excessive

Vibration Pollution Control Regulations 2009 (Legal Notice 61), Air quality Regulations 2009, Water Act (2016), Constitution of Kenya (2010), Public Health Act (CAP. 242), Employment Act (2007), Children's Act (2012), Sexual Offences Act (2006), Traffic Act (Chapter 403) among others.

b) Field Site Surveys and Stakeholder Consultations

Field site surveys formed part of the preparation of the ESIA report. The main objective of this activity was to carry out on-site field assessments of the expected effects of the project on the physical, biological and socio-economic environment. During these site surveys, consultations with key informants and the project affected persons and other interested stakeholders were conducted using a variety of appropriate tools. Direct observation was also used as a technique.

PROJECT ACTIVITIES

The proposed upgrade works entail construction and include the following activities shown in **table 0-1** below. It is expected that it will take approximately 12 months from the commencement of the project to the time of full production. It is anticipated that the plant will be operational by mid-2022. Construction and operation activities will comprise the following.

Table 0-1: Summary Construction Activities

Works	Description
Civil Works	A closed clinker tank of 15000 MT capacity will be constructed for protection of product against weather. It will have mechanised clinker reclaiming system avoiding the use of heavy earth moving equipment. The covered storage facility will avoid the fugitive dust.
	A new silo of 4000 MT capacity will be built in addition to the existing 1000 MT silo to facilitate more storage capacity in line with the production.
	With the increase in cement production capacity due to more addition of Pozzalona, the present cement Packer machine and the trucks loading system is not sufficient. Additional line of packing with ROTO packer and auto truck loaders will be installed to meet the demand. With the addition of the new packer the total rated capacity of the cement packing will be 180TPH.
Mechancial Works	The crushers for limestone crushing of apt capacities (250TPH) with proper dust suppression system will be installed with screens for optimal operation and output. The existing crushers will be utilised for additives crushing.
	Covered stockpiles for limestone and additives with mechanised stacking and reclaimer system will be installed. It minimises to large extent the use of heavy vehicles like dozers and pay loaders, bare minimal emission of carbon to the atmosphere and generation of fugitive dust. This system

	will allow safe movement of personnel and avoids risk of damage to the equipment.
	PGNA and blend expert will be installed in line for better homogeneous quality of raw mix, which is key to the production of quality clinker. With control over quality the utilisation of correct grade and quantity of raw material is possible. It thereby increases the life of mines and conservation of natural wealth.
	Latest weigh feeders with reliable metering will be installed in place of existing unreliable system.
	New generation low power, high throughput roller press will be installed which will substantially reduce the power consumption. It will have full automation and all safety interlocks for safe working of personnel and also the machinery will be reliable and be available for production.
	The transport system will be enhanced by retro fitting many transport equipment like belt conveyors, elevators, air slides, screw conveyors.
	Damaged kiln will be replaced with new kiln. The concrete kiln piers will be strengthened and re structured if required. New latest inlet and outlet seals will be fixed to kiln ends for better sealing and lower fuel consumption.
	Installation of close circuit cement mill with the hot air provision from cooler will help produce cement of highest grade with less energy consumption. With this the cement production capacity of this unit will increase with the same clinker production.
	The present coal dump yard with hopper filling with use of dozer will be replaced with linear stockpile and mechanised reclaimer system.
	The present material handling with grab cranes will be decommissioned and it will be replaced with mechanised reclaimer. Fugitive dust while handling with grab cranes will be totally eliminated.
Electrical and Instrumentation Works	All the hot air ducts will be properly insulated for waste heat recovery.
	The dust collection equipment like bag filters will be re-furbished and insulated for keeping the emission levels within the norms.
	The O_2 and CO analysers will be installed online in preheater for control over fuel consumption. All the required measuring instruments like draft and temperature will be provided with PID looping for auto control of the process. Air blasters of correct size will be positioned in strategic location to avoid chutes and cyclone blockages which are potential risks of hot

	burns and fatalities. Complete overhauling and re-furbishing of preheater will be done for safe and reliable operations.
	New generation high thermal recuperation efficiency, zero fall through cooler will be installed in place of old generation conventional cooler. This will give better heat recovery and reduce substantially the thermal energy wastage, ultimately resulting in lower coal consumption and less heat release to the environment. The hot air from cooler will be connected to cement mills for drying of Pozzalona. By doing this the waste heat recovery from the cooler is to the tune of 80-85%. This will also enable us to lower the load on the electrostatic separators.
	Installation of online CO analysers and reliable temperature measuring instruments with automation and PID looping and also appropriately sized Inert gas system will eliminate completely the fire hazard which can be uncontrollable and fatal.
	Re-routing of hot air duct such that the hot air is drawn from preheater exhaust gases (less oxygen levels) instead of cooler vent gases (rich oxygen). This will eliminate the chance of instant ignition of fine coal and stop potential fire Hazards in coal mill circuit.
	To dispatch the clinker to our grinding units automatic clinker bulk loading facility with weigh platform will be installed.
	The re-engineering of vent systems with proper sizing of ducting will ensure no dust emission at various working points, resulting in healthy working conditions.
	Introduction of Intelligent Motor Control Centre (IMCC) will remove the failures of electrical equipment. Installation of online gas analysers and the opacity meter in the stacks will have perfect control on the emission and keep them with in allowed pollution control norms.

Table 0-2. Summary Operation and Decomisisoning Phase

Operation Phase	**Activities**
Quarrying	Blasting and excavation of limestone and transporting from the existing mines to the plant.
Clinkerization	Production of clinker
Cement grinding, bagging and dispatch	Mixing of clinker, pozzolana, gypsum and other additing and grinding to generate cement which is bagged and dispatched into the market.
Decomisisoning Phase	
Civil works	Demolition of structures
Mechanical and electrical works	Demolition of electrical and mechanical installments

Instrumentation	Demolition of instrumentation installments
Site restoration	Undertaking works to restore and rehabilitate the site.

PROJECT AREA ENVIRONMENTAL AND SOCIAL BASELINE

Climate

The pattern of rainfall in Kaloleni is bimodal. The long rains fall from April to July, with a peak in May. The short rains, on the other hand, fall from October and November. The average annual rainfall varies between 900mm and 1,100mm due to the effects of monsoon winds and the topography with marked decrease in intensity to the hinterland. It is generally hot and humid all the year round. The annual temperature ranges between 21° C and 30°C. The lowest temperature is experienced during the long rainy seasons. Average relative humidity along the coastal belt is 65% but decreases towards the hinterland.

Topography and Elevation

Kaloleni falls at the Foot Plateau and has distinct low range of sandstone hills and ranges between 150m to 450m high. These hills include Simba, Kiwava, Daka, Wacha, Gaabo, Jibana, Mazeras and Mwangea. The Nyika plateau that rises from 100m to 340m above sea level and occupies about two thirds of the County area covers the lower lying ground along the western side of the County. The plateau is less populated with a thin vegetation cover, shallow depressions and gently undulating terrain. This is an arid and semi-arid zone, which is suitable for ranching.

Geology

The geology in Kaloleni sub county area is wholly of sedimentary origin and range in age from Triassic to Recent; they fall naturally into three well-marked divisions.

- Cainozoic rocks,
- Jurassic rocks and
- Duruma sandstone series.

Agro-Ecological Zones

Kaloleni falls within the division of the Kilifi County i.e., five Agro-Ecological Zones (AEZ), which define areas that have similar characteristics such as annual mean temperatures, vegetation and humidity. For Kaloleni, the zones are: -

- Livestock-Millet Zone: The zone is of lower agriculture potential with precipitation of 700 – 900mm. The area is suitable for dry land farming especially drought tolerant crops and livestock ranching.
- Lowland Ranching: It varies in altitude of 90-300m with mean annual temperature of 27^0 C and annual precipitation of 350-700mm. Major activities within this zone include ranching and wildlife.

Flora and Fauna

The project surrounding area is characterized by brush and thicket characteristic of a low land dry forest in the coastal region. This vegetation zone is mainly cultivated with cashewnuts, mangoes, sugar cane coconuts and food crops and is mainly grassland. The major animals in the area include various snake species, millipedes and centipedes and lizards. However, the project site in itself is devoid of major vegetation because it is an

industrial site with several concrete infrastructure in place. The sites that have no concrete structures have vegetation that is undisturbed including trees, grasses etc.

PUBLIC CONSULTATIONS

Stakeholders were identified, mapped and consulted as part of the ESIA study in line with the NEMA's EIA/EA regulations (2003) which require public consultations during ESIA preparation. The consultations targeted communities who were in the project Area of Influcence (AoI) and hence likely to be direcly or indirectly affected adversely by the project. Consultations also targeted key institutions in the national and county governments as well as civil society organsiations who were identified to have a stake or interest in the project. Questionnaires were prepared and administered to the public identified during mapping of stakeholders. Stakeholder consultations were carried out between 12th-14th December 2020. The key issues and concerns emanating from the consultations are highlighted below and were incorporated in the ESIA in relation to mitigation measures.

- Waste management during construction
- Community health and safety during construction and operation
- Noise pollution during construction and operation
- Air emission impacts during construction and operation

Respondents acknowledged that the project would have some positive impacts which they enumerated as below:

- Create more job opportunities to the local community
- More revenue to the national and the county government
- Increased economic status of the area
- Minimization of crime as majority of youths will get busy in work

Beneficial Impacts

The major beneficial long-term impact of the project will be during the construction and operational phase and will include: -

Table 0-3. Summary Beneficial Impacts

Beneficial Impacts	
Expected impact on poverty alleviation	With the implementation of the project will provide the community wth job opportunities directly and also will boost businesses around the project area
Local material supplies	It is expected that the project will generate new income revenues for the local population across the Country in harvesting and transportation of sands, ballast, stones, concrete/wooden poles and gravel. The new income revenues received will create demand for other goods and services causing a trickledown effect to the entire economy.
Improved standard of living	Access to stable and reliable income will change the standard of living of the people.

Adverse Impacts and Mitigation Measures

The potential negative impacts during construction, operation and decommissioning are generally short-term, reversible impacts which can be reduced or eliminated by appropriate construction mitigation and application of best practice in construction and operation of Cement Plant. Many of the adverse impacts will only occur within the construction site footprint. Table 0-4 illustrates the potential impact along with what the impact significance of the impact is before and after proposed mitigation measures. Mitigation measures that are included in this report are commitments which will be implemented by NCCL (including subcontractors). The Environmental and Social Management Plan (ESMP) details roles and responsibilities that will be assumed by all the responsible agencies during project implementation phase. NCCL has already acknowledged its commitments in this regard.

Table 0-4. Summary of the results of the Impact Assessment

Environmental / social variable	Project activities/impacts	Phase	Predicted significance	
			Before mitigation	With mitigation
Air quality	Plant emissions	Construction/operation	Moderate	Negligible
	Road traffic exhaust emissions	Construction/operation	Negligible	Negligible
	Dust and PM_{10} from unpaved roads during construction and decommissioning	Construction/operation	Moderate	Negligible
Noise emissions	Noise from construction and decommissioning activities	Construction/Decommissioning	Negligible	Negligible
	Noise from plant operations	Construction/Decommissioning	Minor	Negligible
Soil erosion	Loss of soil resources due to erosion	Construction/Decommissioning	Minor	Negligible to minor
Surface and subsurface water	Availability and quality of water resources	Construction/Decommissioning	Minor	Negligible to minor
Flora and vegetation	Disturbance to vegetation	Construction/Decommissioning	Minor	Negligible
Fauna	Disturbance to fauna species and degradation to environment during construction	Construction/Decommissioning	Minor	Negligible
Solid and liquid waste	Release to environment	Construction/Decommissioning	Moderate	Minor
Access to infrastructure	Disruption to traffic and transportation	Construction/Decommissioning	Moderate	Minor
Landscape and visual amenity	Deterioration of visual amenity	Construction/Decommissioning	Negligible	Negligible
Workers health and safety management	Effects of workers health and safety and labour rights	Construction/Decommissioning	Moderate	Minor
Community health and safety	Community safety (road accidents, tresspass,)	Construction/Decommissioning	Moderate	Minor
	Environmental health (noise and air)	Construction/Decommissioning	Moderate	Minor
Unplanned events	Reduction in local soil/ground water quality	Construction/Decommissioning	Minor	Negligible
Economy and employment	Local employment opportunities, capacity building and economic development	Construction/Decommissioning	Moderate	Positive

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This ESIA includes an ESMP which details the mitigation measures, environmental monitoring activities, institutional responsibilities, and environmental management capacity building. The relevant ESMP provisions are included in bid documents for contractors. During construction, the project management team will closely monitor the works contractors' environmental performance and overall ESMP implementation.

Construction Environment and Social Management Plan

For an effective integration of environmental and social safeguards into the project implementation the Contractor will need to adopt this ESMP and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance. The environmental supervision will also adopt the C-ESMP. The C-ESMP is an upgraded ESMP illustrating realities of the project works to be prepared by the Contractor. The Contractor is expected to finalize the work plan and upon approval, list the works items and for each item present practical actions that will be undertaken to realize achievement of the ESMP. The actions on works items should address environmental and social aspects associated with the works and in line with guidelines from the ESMP. Based on these ESMP outline, the Contractor will be instructed to develop a Construction Environment and Social Management Plan (C-ESMP) for each component of the project and submit these plans to NCCL.

NCCL Project Management Team

The project implementation arrangements have been established and the proponent has appointed the NCCL project implementation team including:

- Project Manager
- Environmentalist
- Community Liaison Officer

The core functions of the team will be to coordinate and facilitate oversight for technical, environmental and social safeguards, health and safety and social risks supervision.

Project Supervision Engineer

The Project supervision engineer will be required to recruit a qualified environmental and social expert who will be charged with the responsibilities of supervision, review of site reports, preparation of monthly progress reports, prepare and issue appropriate instructions to the Contractor and monitor ESMP implementation.

Contractor

The Contractor will ensure that the established mitigation measures are integrated and implemented throughout the project works as per the C-ESMP. The Contractor will internalize the C-ESMP, prepare monthly progress reports and implement instructions issued by the Supervision Consultant. The Contractor, therefore, will engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the counterpart personnel for the supervision expert.

National Environment Management Authority

The National Environment Management Authority (NEMA) is responsible for ensuring environmental compliance in the country and has offices in Kilifi County with staffing who will further ensure that the ESMP is implemented as part of their mandate, functions and responsibilities. NEMA will undertake surveillance on the project implementation and review compliance performance based on the supervision monitoring reports.

CONCLUSION

The anticipated benefits of the construction and operation of the Project are immense. It is quite evident that the construction, installation and operation of the proposed upgradation will have more positive than the negative impacts at the project site including creation of employment, economic growth, optimum utilization of the land, etc., hence maximum returns, availing building and construction materials for the country, improved economy, increase in revenue base to the project proponent, tax to County and National Governments. However, although the project is highly regarded in terms of positive impacts, it is anticipated that there will be negative impacts such as those listed in the above table. Since the impacts associated with the capacity increase have been identified, it is our recommendation that the project be allowed to go on provided the mitigation measures outlined in this ESIA report are adhered to and the ESMP is implemented.

1 INTRODUCTION

1.1 Project Background

This document is an Environmental and Social Impact Assessment (ESIA) for National Cement Company Limited (NCCL) Kaloleni plant upgradation project. Athi River Mining (Kaloleni cement plant) was taken over by National Cement Company Limited (NCCL) on 15th October 2019. The plant was in running condition with abysmal performance. There were many shortcomings in terms of stable operation and sustainable production of 1,500 tonnes per day (TPD) clinker and 700 TPD cement grinding. This Environmental and Social Impact Assessment (ESIA) report has been prepared for the upgradation of NCCL integrated Cement Plant in Kaloleni, Kilifi County.

1.2 Project Proponent

NCCL is the largest indigenous cement manufacturer as of 2018 in Kenya and was established in 2008. It is a subsidiary of the Devki Group of Companies, an industrial and manufacturing conglomerate with headquarters in Kenya and operating subsidiaries in Kenya and Uganda. NCCL began cement production in 2010 and currently has 3 plants in Kenya (NCCL Lukenya, NCCL Emali and NCCL Nakuru) and recently acquired from Athi River Mining Limited (ARM) two plants in Kenya located in Athi River in Machakos County and Kaloleni in Kilifi County. It also owns 100% of Simba Cement Uganda Limited (NCCL Tororo) a cement factory in a Ugandan town of Tororo. The NCCL plant in Kaloleni (formerly ARM Cement Ltd) is an integrated cement plant which started operation in 1996 for clinkerization and cement grinding and bagging. The Project is currently running at half capacity due to facility intended upgrade activities. The Project is a clinkerization and grinding plant and includes supporting facilities (office blocks, staff colony, water treatment plant, ponds, and warehouses) and 3 quarries (i.e., limestone, iron ore quarries) in Chauringo, Pangani and Kenya lead mines all in Kilifi County.

1.3 Project Upgrade Justification

Upon acquisition of the Athi River Mining assets in Kaloleni by NCCL, the plant was assessed for its under-par performance by a team of experts for process and electrical and instrumentation. The technical report noted that:

- There was only 1 crusher of 150 toones per hour (TPH) capacity, which was used to crush limestone and additives. This capacity is very low for producing clinker up to 1,500 TPD. Actual capacity that needs upgradation should be 250 TPH for limestone and 100 TPH for additives crushing.
- There is no proper stockpile like stacker reclaimer. Only point stacking is being done in a single heap and the material is required to be handled by heavy earth moving equipment like dozers and pay loaders.
- Generation of lots of fugitive dust, because of open storage yards and material handling by heavy earth moving equipment used for feeding limestone and additives to raw mills.
- Raw mills are being operated with lower capacity than rated, due to badly worn-out internals and improper hot air duct routings. It was also not safe for any personnel to enter the mills for maintenance during kiln operation, due to improper hot air ducts and without safety interlocks.

- The preheater cyclones are without proper measuring instruments. No proper provision of air blasters in the preheater system at strategic locations. This leads to potential risk of burns due to hot Raw meal, if the cyclones and feed pipes jam/blocks.
- The clinkerisation unit rarely runs continuously for 24 hours in a single day throughout the year. The equipment availability is found 60% only and were very unreliable. There were no safety interlocks, the automation was outdated and was very unreliable. The feeders were unsafe and were prone to electric flashes. There were no proper protection resulting in motors windings burning regularly.
- The kiln piers concrete foundation was oscillating with lateral and horizontal movement. The kiln was damaged and buckled at many places due to frequent red spots occurring because of poor refractory condition. The kiln is having crack under the middle tire and does not run true to its axis, resulting in oscillation during operation.
- The quality of clinker with frequent stops was sub-standard allowing limited addition of Pozzalona for PPC grade cement.
- The cooler is of very old generation and is damaged to an extent of grate supports bend, displacement of grates allowing clinker to fall and resulting in improper cooling of hot clinker from kiln. The heat recuperation was very low resulting in high consumption of coal. The drives frequently trip without indicating any reasons in the CCR for operator.
- The transport system under cooler is deep bucket conveyor which was in bad condition and highly unreliable with regular severing of links.
- Coal mill runs at reduced capacity because of damaged/ abnormally worn-out internals. It does not start from CCR as it was supposed to be. It is started locally requiring perfect co-ordination between electrical and operation personnel. No proper safety interlocks are available.
- The inert gas system in the coal mill circuit was not automatic. There was always a potential danger of fine coal catching fire which is uncontrollable and can be fatal.
- Under par performing, outdated open circuit multiple units of cement mills of low capacities. The system was locally operated by control desk and are not automated, thereby losing the advantage of increased output, enhanced productivity and uniform quality.

Most of the equipment were in bad state and were on the verge of failing. With above conditions the plant was consuming specific power of more than 100 KWh/ton clinkerisation. The specific thermal energy consumption was very high between 1050 to 1150 kcal/kg clinkers resulting in more coal consumption.

1.4 Project Upgrade Benefits

The above unsafe working condition with unreliable structures, open storage yards and material handling by heavy earth moving equipment generating fugitive dust and restricting safe movement of workers and material, potential chance of hot burns and fire accidents, due to non-availability of safety interlocks and proper automation, regular equipment

failures, motor burning etc., prompted the management to take a decision not to run the plant in this condition which is a threat to human safety, environment and health and instead undertake upgradation. The upgrade activities include construction and operation of the upgraded plant (the "Project"), which has been proposed to address the need to solve inefficiencies of the old aquired plant and result in: -

a) Safe and healthy working conditions for all.
b) Fugitive dust generation elimination for clean environment
c) Stack emission level controlled to international standards
d) Better performing and reliable equipment allowing working personnel to work safely
e) Full automation for hassle free working condition
f) Elimination of fire hazards occurring in coal grinding and storage section by installing CO gas analysers and automatic inert gas system with all safety interlocks.
g) Elimination of fire hazards through electrical short circuits and faults by having Intelligent MCCS and latest protective relay systems.
h) Achieve lower specific power consumption of 70KWh/ ton of clinker, thereby reducing the load on the Kenya Power and Lighting Company Limited (KPLC) lines, which will be able to cater to more users.
i) Achieve specific thermal energy consumption of 800Kcal/kg clinker reducing coal consumption.

1.5 ESIA Study Justification

The upgrade of the plant to increase efficiency and performance will require demolition and re-construction of new structures including silos, kilns, raw mills, cyclones among others. The construction will include civil and mechanical works which are likely to have adverse environmental and socio-economic impacts hence the need for undertaking ESIA study in order to predict the adverse impacts and develop mitigation measures.

1.6 ESIA Study Objectives

The purpose of this study was to undertake an Environmental and Social Impact Assessment (ESIA) study for the NCCL Kaloleni Cement Plant Upgradation. The ESIA study has been developed in compliance with the Environmental and Social Impact Assessment/Audit Regulation, 2003. The purpose of an ESIA is to provide information to regulators, the public and other stakeholders to aid the decision-making process. The objectives of the ESIA are to:

- Define the scope of the project and the potential interactions of project activities with the environment (bio-physical and socio-economic).
- Identify relevant national and international legislation, standards and guidelines and to ensure that they are considered at all stages of project development.
- Provide a description of the proposed project activities and the existing environmental and social conditions that the project activities may interact with.
- Predict, describe and assess impacts that may result from project activities and identify mitigation measures and management actions to avoid, reduce, remedy or

compensate for significant adverse effects and, where practicable, to maximize potential positive impacts and opportunities.

- Provide a plan for implementation of mitigation measures and management of residual impacts as well as methods for monitoring the effectiveness of the plan.

1.7 Report Structure

In order to provide clear presentation of the ESIA procedures including their results, conclusions and recommendations, this report is structured as follows:

1. **Chapter 1. Project Introduction.** The chapter introduces the Project by providing details of its location, scope, owner and developer.
2. **Chapter 2. ESIA Methodology**. This chapter provides an overview of the overall process of environmental and social impact assessment and applicability of the international methodology for the ESIA procedure. The chapter further addresses definitions of key terms; identification of potential environmental and social impacts (through consultation and scoping process); description of the criteria used to determine the significance of impacts for various environmental and social topics; and how mitigation measures are considered within the assessment process.
3. **Chapter 3. Project Description.** This chapter describes the background and phasing of the Project, including descriptions of the main and auxiliary facilities, infrastructure, associated facilities, as well as definition of the Project boundaries in the form of the Project area of influence.
4. **Chapter 4. Policy Legal and Institutional Framework.** This chapter provides an overview of the national legal framework, within which the Project is to be developed and implemented. Environmental and social legal requirements of the Republic of Kenya is considered.
5. **Chapter 5. Baseline Environmental and Socio-Economic Conditions.** The existing environmental and socio-economic baseline is described and characterized in this chapter.
6. **Chapter 6. Stakeholder Engagement**. This chapter describes the stakeholder engagement process adopted by the Project. It describes the results of consultation activities undertaken earlier and as part of the ESIA process. It also provides stakeholder identification.
7. **Chapter 7. Analysis of Project Alternatives.** The key process solutions are presented as they are seen at the current stage of planning, alongside with considered alternatives and justification of the preferred alternative.
8. **Chapter 8. Assessment of Potential Risks and Impacts**. This chapter presents the assessment of potential environmental and socio-economic impacts, including identification of mitigation measures and monitoring requirements. Impacts of the Project are assessed for each component of the environment. Impacts during the Project implementation are assessed on a topic-by-topic basis.
9. **Chapter 9. Environmental and Social Management.** This chapter describes the approaches to environmental and social management across all Project activities and recommends the management procedures and plans to be adopted to ensure compliance with the applicable legal requirements throughout the life of the Project.

10. **Chapter 10. Conclusion** provides summary of the key significant impacts, mitigations and monitoring, as well as recommendations for further studies to remove uncertainties.

2 ESIA APPROACH AND METHODOLOGY

2.1 ESIA Approach

The Project ESIA is intended to provide an accurate and comprehensive assessment of adverse impacts, benefits and potential risks of the planned operations, and develop prevention, mitigation and remediation measures for the identified environmental and social impacts, as well as the approaches to monitor and control them. This chapter provides a structured description of the ESIA methodology including:

- Main stages of ESIA process
- ESIA scoping
- Baseline studies
- Impact identification and evaluation of significance; and
- Mitigation measures.

The ESIA study is informed by the relevant survey reports, environmental impact assessments, design and other documentation which have been prepared so far for the Project components and associated activities, as well as scientific publications, statutory reports, etc. listed in more detail in the reference chapter of this report. Specific recommendations are to be prepared as part of the ESIA process for implementation of management, mitigation and remediation measures, additional studies, as well as approaches to monitoring and control, in order to make sure that Project activities are fully compliant with the applicable requirements (refer to chapter 3) at all stages of its life cycle.

2.2 ESIA Process

To ensure a robust and comprehensive impact assessment, the ESIA process is structured around a series of progressive and iterative stages (Figure 2-1). Stakeholders, entities and individuals responsible for development/implementation of the Project design, the ESIA team provide inputs to these stages. Public engagement is maintained at all stages of the ESIA process. This ESIA shall cover all required stages: from scoping, stakeholder identification and consultations, review of alternatives, identification and assessment of benefits and adverse impacts of the Project, to development of mitigation and remediation measures, and proposals for the control and monitoring to be undertaken.

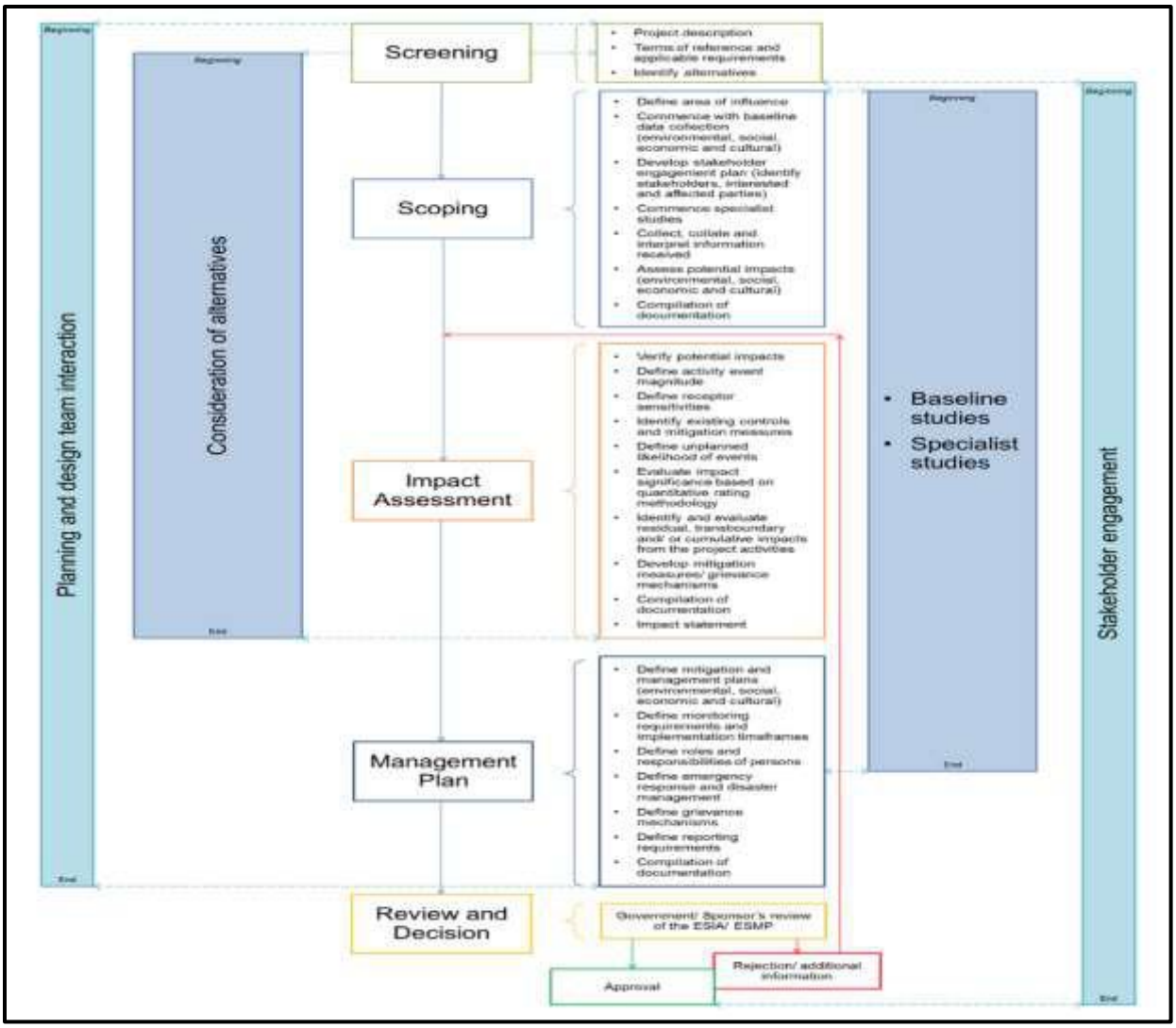


Figure 2-1: ESIA Process

2.3 ESIA Scoping

Scoping of studies to be conducted for assessment of the Project impacts is a vital element of ESIA preparation. Scoping is the process of determining the content and extent of the matters that should be covered in the ESIA and associated documentation as well as identifies methods for assessment of impacts. The scoping process is intended to identify the types of the environmental and social impacts to be examined and documented by the ESIA, considering the most significant potential aspects and risks. The main objectives at the scoping stage are:

- Preliminary review (screening) of documents provided by the client regarding proposed operations and potential alternatives.
- Collection and high-level analysis of the available information of the environmental and social conditions at the Project site and wider area, and identification of the most sensitive (vulnerable) receptors.
- Identification of the applicable local and international requirements and standards.
- Identification of similar projects for benchmarking of the proposed operations.

- Preliminary identification of stakeholders and initial consultations with them; and
- Initial identification of the Project impacts.

2.4 Baseline Studies

Baseline studies are primarily undertaken at two key stages, i.e., scoping and impact assessment. However, as shown in **Figure 2-1**, they are an ongoing activity throughout the ESIA Process. During scoping work, relatively 'high-level' baseline data are required to assist identification of likely gaps and key impacts to be considered in more detail at later stages. Where gaps are identified between available baseline data and data required for the ESIA at the scoping stage, then additional surveys or studies are undertaken to collect the required data. The work included desk-based studies and the site visit conducted by environmental and social teams of EMC Consultants. It is important to ensure that receptors are identified and analysed, and their sensitivity is determined during scoping and baseline studies. Receptors are environmental and social components that may be affected, adversely or beneficially by the proposed operations. Three high-level categories of receptors can be identified:

- Environmental (such as air quality, water bodies, landscapes, terrestrial soils, marine sediments, etc.)
- Biodiversity and biological resources (such as habitats, species and ecosystem services); and
- Social (such as residents of local communities, businesses, land and other resource users, cultural heritage resources).

Details of receptor categorization and the approach to assessment of their sensitivity to identified impacts are provided in **Section 2.5.6.**

2.5 Impact Identification and Evaluation of Significance

2.5.1 Identification of Impacts

The following approach supports identification of environmental, social and cumulative impacts:

- Review of previous studies, surveys, impact assessments, and environmental monitoring data in the proposed location area (the plant and associated facilities within the scope of the Project.
- Review of the design documentation, including potential alternatives, as well as characteristics of the proposed operations (separately for construction, operation, decommissioning) and associated activities which may cause environmental, social and human health impacts.
- Consideration of the local area development plans and strategic development programmes for the region.
- Review of applicable national and international requirements and standards.
- Stakeholder consultation, including their input to identification, mitigation and control of Project impacts. Stakeholder engagement should be initiated early in the Project, to ensure open access to all relevant information.
- "Source-Path-Receptor" Analysis. Potentially significant social and environmental impacts are also identified by structured analysis of potential sources of impacts,

ways they can impact the environment and human health (e.g., direct impact or transport of pollution emissions/discharges in the environment), and sensitivity of potentially affected receptors.

Potential impacts on individual components of the environment are identified for all phases of the planned operations, and their magnitude is assessed.

2.5.2 Project Implementation Phases

A phase of any project is a period of time when certain activities are implemented that collectively shape a stage in the Project life cycle. The following phases are considered by the ESIA Report:

- Construction.
- Commissioning.
- Operation; and
- Decommissioning (including demolition/dismantling).

2.5.3 General Approach to Impact Assessment

An impact is any change to an environmental or social (including community health and safety) receptor, whether direct or indirect, expected to result from the construction, operation and decommissioning of a proposed Project. Impacts on individual receptors may be negative (adverse) or positive (beneficial). The actions undertaken to determine and evaluate the significance of potential project impacts is illustrated in figure 2-2 and involves four key steps:

- **Prediction:** What will happen to the status of specific receptors as a consequence of this Project (direction, extent, duration, reversibility)?
- **Evaluation of significance:** How significant is the impact? What is its relative significance when compared to other impacts?
- **Mitigation:** If there are impacts of concern (adverse), can anything be done to avoid, minimise, or offset the impacts? Or to enhance potential beneficial impacts? and
- **Residual impact assessment:** After mitigation, are the impacts still of concern?

If yes, the process needs to be repeated at least once before the 'final' determination of residual impact significance occurs. A residual impact is the impact that remains following the application of mitigation measures. Once mitigation and enhancement measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures

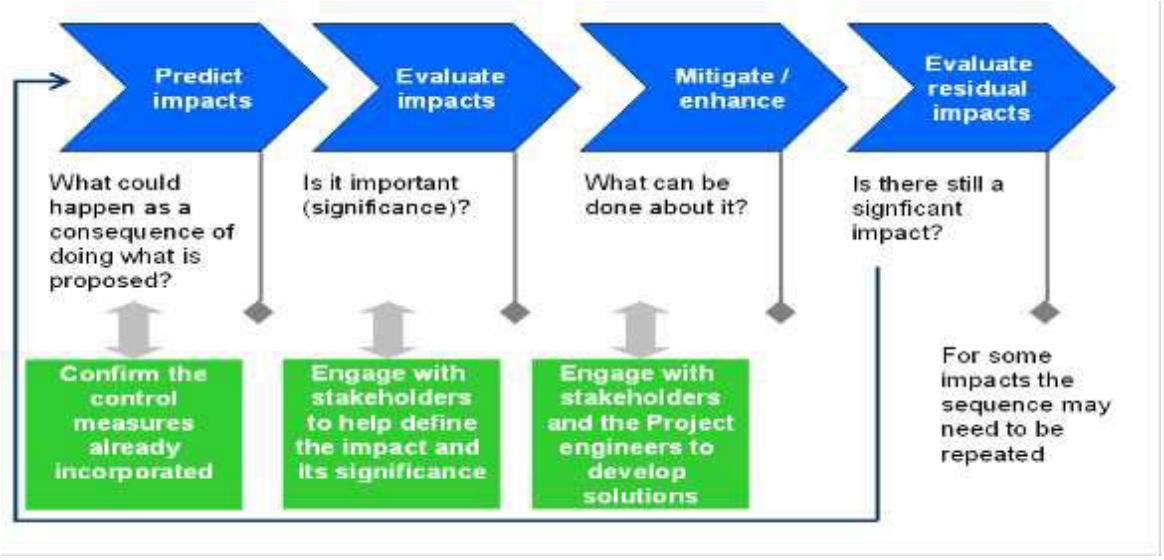


Figure 2-2: Impact Evaluation Process

2.5.4 Prediction

Impact prediction involves determining the magnitude or extent of a change or changes in the status of a receptor or linked receptors resulting from the planned operations, through application of forecast models, analysis of experience of similar operations, or environmental science. Impact prediction provides valuable information to determine the broader characteristics of impacts.

2.5.5 Impact Types

Impacts can be divided into types, and also exhibit a number of characteristics. The degree to which an impact may be managed or modified by the mitigation measures is dependent upon the impact type and its characteristics. **Table 2-1** provides definitions of key impact types. All of these impact types exhibit certain characteristics in terms of:

- Reversibility
- Extent
- Duration
- Frequency

Table 2-1: Classification of Project Impacts

Classification of Impacts	Definition	Characteristics
By overall effect	Beneficial	Impacts expected to result in positive changes at the identified receptors
	Adverse	Impacts expected to result in negative changes at the identified receptors
By origin	Direct	An impact that results from a direct interaction between a planned activity and the receiving environment (receptors)
	Indirect	An impact that follows on from the primary interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., increased demand for resource as a result of workforce drift to the area of planned

		activities from other regions, or feedback effects in ecosystems affected by direct impacts)
By the nature of secondary effects	Cumulative	Project impacts which may be amplified if combined with impacts caused by third party operations (projects) on the same resources and/or receptors

Cumulative impacts include impacts on the receptors identified for the Project, as well as other existing, planned or reasonably defined projects (in the studied area) and activities which are not directly related to the Project and its associated facilities. The approach to assessment of cumulative impacts is provided in **Section 2.6.**

2.5.6 Evaluation of Significance: Planned Events

Impacts significance is assessed in this Report using the qualitative, and where possible quantitative methods applicable for major project ESIAs. The quantitative methods provide an outlook of the measurable changes induced by the Project, based on available design documentation or experience of similar facilities. Quantitative assessment of the Project impacts on receptors can be also provided using the official Kenyan methodologies for estimation of potential damage which may be caused by specific impacts. The qualitative methods are based on expert estimations, experience of other projects of similar nature and scale, and follow a structured format to produce consistent and logical projections. It should be noted that environmental impacts are sometimes difficult to evaluate in quantitative terms, due to their intangible nature (e.g., emotional impacts or sensitivity), or due to interrelation of the change and specific local situation (e.g., scale of migrant inflow compared to the baseline population).

The impacts are assessed in a structured and coordinated manner throughout the ESIA process. The approach adopted enables attribution of potential impacts to specific environmental and social aspects. For adverse impacts, significance is assigned based on determining impact magnitude and receptor sensitivity, after which mitigation is identified depending on impact characteristics. Beneficial impacts are identified, assessed and evaluated, making use of impact magnitude (as per the guidance below), but not receptor sensitivity. Instead, beneficial impacts are described and evaluated based on available data, alignment with government policies/targets, stakeholder inputs and professional expert judgement. Measures to enhance them will be identified to try to maximize the expected benefits. The magnitude of an impact is a measure of the scale of a change from baseline conditions for a receptor. This measure of change can be described by considering the following criteria in combination:

- **Reversibility:** Restoration of the pre-impact status of a receptor.
- **Extent:** Spatial extent (e.g., pollution dispersion or habitat impacted) or population/ community extent; and
- **Duration:** Period of time over which an impact will interact with a receptor. This factor may also cover the frequency and regularity criteria, or they can be considered separately.

The magnitude of each impact is assessed using the above criteria and the characteristics provided in **Table 2-2.**

Table 2-2: Description of Impact Criteria

Criterion	Description	Definition
Reversibility	Irreversible	Impacts that cause a permanent change in the affected receptor
	Reversible	Restoration of the pre-impact status of a receptor due to mitigation/reinstatement measures and/or natural recovery. Duration of an impact and a subsequent recovery period should be considered
Extent (spatial)	Site	Within the boundaries of land and water area allocated for the Project and associated use-restricted zones (sanitary protection, security, etc.)
	Local	Within the boundaries of local municipality
	Regional	Within the boundaries of a region, territory, republic
	National	Impacts that affect more than one region or constituent entities of Kenya's water flows/bodies of national significance
	Transboundary	Impacts that affect receptors beyond the boundaries of the country in which the project is located and producing transboundary/ global effects (e.g., impacts of greenhouse gas emissions)
Duration	Short-term irregular or occasional	Impacts caused by short-term single or recurrent events
	Mid-term regular or associated with a phase of activities	Impacts with duration equal or nearly equal to that of certain activity or a phase of the planned operations
	Long-term	Impacts with duration equal or comparable to the Project lifetime. Impacts of this category may cease after completion of Project activities

Assessment of duration of an impact also considers its frequency (e.g., single, rare, periodic, and constant) for a more detailed characterization of duration of time when impact is felt. All characteristics listed above are factored into the assessment of impact magnitude. **Table 2-3** provides generic criteria to be used to determine the impact magnitude. Taking the results derived from the previous step a decision can be made on impact magnitude (negligible, low, moderate, high). Discipline specific criteria have been determined if appropriate and presented in **Chapters 8 and 9,** respectively.

Table 2-3: Impact Magnitude

Impact	Criteria
Negligible	No persistent discernible impact. The change is essentially indistinguishable from natural background variation.
Minor	Limited impacts that can be identified by the available means of monitoring, with no effect on functions of ecosystems and communities **Extent:** Local **Duration:** Short / medium term **Reversibility:** Reversible
Moderate	Noticeable impacts which may result in quantitative changes in ecosystems, however without their quality transformation, and without loss (partial or complete) of their natural functions. **Extent:** Local/regional **Duration**: Medium/long term **Reversibility:** Reversible/irreversible

Major	Prominent impacts that may result in temporary or permanent transformation of ecosystems, with loss of their functions, and transformation of communities' lifestyle and quality. **Extent**: Regional/national/transboundary **Duration:** Medium/long term **Reversibility**: Reversible/irreversible

Once the respective magnitudes of each impact have been allocated the next step is to determine receptor sensitivity. Receptor sensitivity is based on two components: the degree to which a receptor is resilient to a change and the value attributed to the receptor by stakeholders or applicable regulations/policies. Receptor resilience takes into consideration not only activity-receptor-impact pathways, but also the characteristics of a receptor that might make it more or less resilient to change. As such, a receptor can be considered as existing within a spectrum of 'vulnerable' to 'resilient'. Receptor value considers importance represented by conservation status, socio-cultural importance and/or economic value. Certain receptors are deemed to be of greater importance than other receptors.

The final step is to combine the impact magnitude and receptor sensitivity results to determine impact significance in relation to its receptors. For known (planned) impacts, significance is determined by their intensity, based on the impact magnitude and sensitivity of the receptor. For example, an impact of low magnitude affecting a receptor of moderate sensitivity is an impact of low/moderate significance (the actual significance determination -low or moderate-in this case can be made by the ESIA team) or an impact of high magnitude affecting a receptor of moderate sensitivity results in an impact of high significance. **Table 2-4** provides an account of the key features (definitions) of each of the impact significance classifications (from Not Significant to High); specifically linking them to need for mitigation measures.

Table 2-4: Impact Significance Matrix

		Receptor Sensitivity			
		Negligible	**Low**	**Moderate**	**High**
Impact Magnitude	Negligible	Not Significant	Not Significant	Not Significant	Not Significant / Low35
	Minor	Not Significant	Low	Low / Moderate	Moderate
	Moderate	Not Significant	Low / Moderate	Moderate	High
	Major	Low	Moderate	High	High

Definitions of the above significance ranks adopted in international ESIA practice are provided in **Table 2-5.**

Table 2-5: Project Impacts Ranking By Significance

Impact Significance	Description
Negligible	Impacts are expected to be indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not a concern of the decision-making process.
Low	Impacts with a "Low" significance are expected to be noticeable changes to baseline conditions, beyond natural variation, however well below the applicable standards (e.g., environmental quality standards, and are not expected to cause hardship, degradation, or impair the function and value of receptor. These impacts warrant the attention of decision-makers and should be avoided or mitigated where practicable.
Moderate	Impacts with a "Moderate" significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of a receptor, although the overall function and value of a receptor is not disrupted. These impacts must be mitigated to avoid or reduce the impact.
High	Impacts with a "High" significance are likely to disrupt the function and value of a receptor and may have broader systemic consequences (e.g., ecosystem or social well-being). They may also result in a failure to maintain adverse effects within the permissible regulatory levels. These impacts are a priority for mandatory mitigation to avoid or reduce the significance of the impact.

This method is applied at least twice: to both pre- and post-mitigation scenarios for all impacts identified. In general, residual impacts classed as "Not Significant" or "Low Significance" are not considered to be of concern for the assessment. For adverse impacts of "Moderate" and "High" significance, an iterative process is undertaken to further investigate opportunities for mitigation, according to the hierarchy above. Where the significance cannot be further reduced, an explanation is provided of why further reduction is not practicable. Monitoring may be required to confirm the measures used to mitigate adverse impacts are working properly and that the impact is not worse than predicted. Monitoring requirements are presented in **Chapters 8 and 9.**

2.5.7 Risks and Unplanned Events

Where there is uncertainty about occurrence of an event (e.g., intrinsically occasional event during normal operation and/or where impacts are caused by unplanned/emergency situations), the magnitude of risk associated with such event is determined as a function of its occurrence probability and intensity of potential impact. Probability criteria applicable to this ESIA are described below **(Table 2-6).** They are set for the whole ESIA process and are equally applicable to all types of impact.

Table 2-6: Risk Occurrence Criteria

Likelihood	Qualitative assessment of impact / event probability
High	Impacts/events which are observed in the sector (studied operations or region) and reoccur more than once a week
Moderate	Impacts/events regularly observed in the sector and region, including seasonal cycling, which can be considered as very likely for the design lifetime of the planned operations
Low	Impacts/events which are rarely observed in the sector and region, or regularly observed in other sectors. These would generally occur 1 to 2 times per year

Not significant	Impacts/events that have never been observed in a wider range of sectors or in the region. Impact/event which can be considered as unlikely for the design lifetime of the proposed operations

Table 2-7: General Risk/Event Occurrence Risk Criteria

	Impact intensity			
	Not significant	**Low**	**Moderate**	**High**
High	Insignificant	Medium / Minor	Medium / high	Critical
Moderate	Insignificant	Minor	Medium	High
Low	Insignificant	Minor	Medium / minor	Medium / high
Not significant	Insignificant	Insignificant	Minor	Medium

Unplanned events will often result in a high impact significance, even with mitigation/remedial measures in place e.g., oil spills. In such cases, not only the specific measures must be in place to manage an unplanned event, but the probability has to be minimised to levels seen to represent good industry practice. In this table, unplanned events with high residual impact significance would need to be minimized to extremely unlikely ("Improbable") events. Sometimes, if such events can be assessed quantitatively, a special analysis of risks is required to define numeric value of the event probability. In this case the probability value should be less than $1x10^{6}$.

2.6 Impact Mitigation

Mitigation measures are developed as necessary or appropriate to minimize the risk intensity and/or impact probability, and therefore make the impact or risk less significant. Assessment of significance of potential impact/risk has been assessed during the ESIA process based on potential and residual impacts, using the criteria mentioned in Section 2.5.6. As part of the ESIA process, when adverse impacts are identified, measures for mitigation, minimization and control of risks, and monitoring of residual impacts are developed (as necessary or appropriate). A residual impact is the impact that remains following the application of mitigation measures. The process of identifying design controls and mitigation measures must follow the sequence of the mitigation hierarchy (**Figure 2-3**) which is widely regarded as the best practice approach to managing impacts. First, efforts are made to avoid or prevent, then minimize or reduce adverse impacts. If the impact cannot be fully avoided by application of design controls, they are supplemented by further engineering measures for minimization and mitigation of the adverse impacts. These measures are supplemented by additional mitigation measures to be applied through the effective management of project-related activities during construction, operation and de-commissioning. Any remaining residual impacts are then addressed via mitigation measures such as restoration and remediation (e.g., at the end of construction) and/or offsetting and compensation. The measures are developed and implemented in the same order as they are listed above.

Figure 2-3: Mitigation Hierarchy

Development of mitigation measures will be primarily focused on minimization of the impacts of "High" significance. However, where possible and appropriate, mitigations are also proposed for the impacts of "Moderate" and "Low" significance, in order to reduce environmental and social effects/risks to the lowest level.

2.6.1 Presentation of ESIA Results

The table below contains a form of a summary table which is designed to provide a visual presentation of the environmental and social impact assessment, including types of activities, impacts and their receptors, description of mitigations and assessment of the residual impact. A key to the alphabetical symbols of stages of the Plant Project, receptors sensitivity, impact significance and risk category is provided under the summary table form.

Table 2-8: Evaluation of impact significance: a form of a summary table

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating

Table 2-9: Impact Parameter

Parameter	Abbreviation	Description	Parameter	Abbreviation	Description
Stage	C	Construction	Risk	Cr	Critical
	O	Operation		H	High
	Cm	Commissioning		M	Medium
	DCm	Decommissioning		Mr	Minor
Recipient Sensitivity	H	High		I	Insignificant
	M	Moderate	Impact Significance	H	High
	L	Low		M	Moderate
	N	Negligible		L	Low
Sign	P	Positive		N	Insignificant
	N	Negative			

3 PROJECT DESCRIPTION

3.1 Project Location

The plant is located in Kaloleni Sub County in Kilifi County, Kenya. The plant is on an 81-hectare land, which is owned by National Cement Company Limited. It is off Mazeras-Kaloleni on C111 Road at Coordinate: Lat: 3°50'46 and 40"S, Lon: 39°37'59.92"E and approximately 70km from Mombasa town. The plant surrounding is predominantly agricultural.

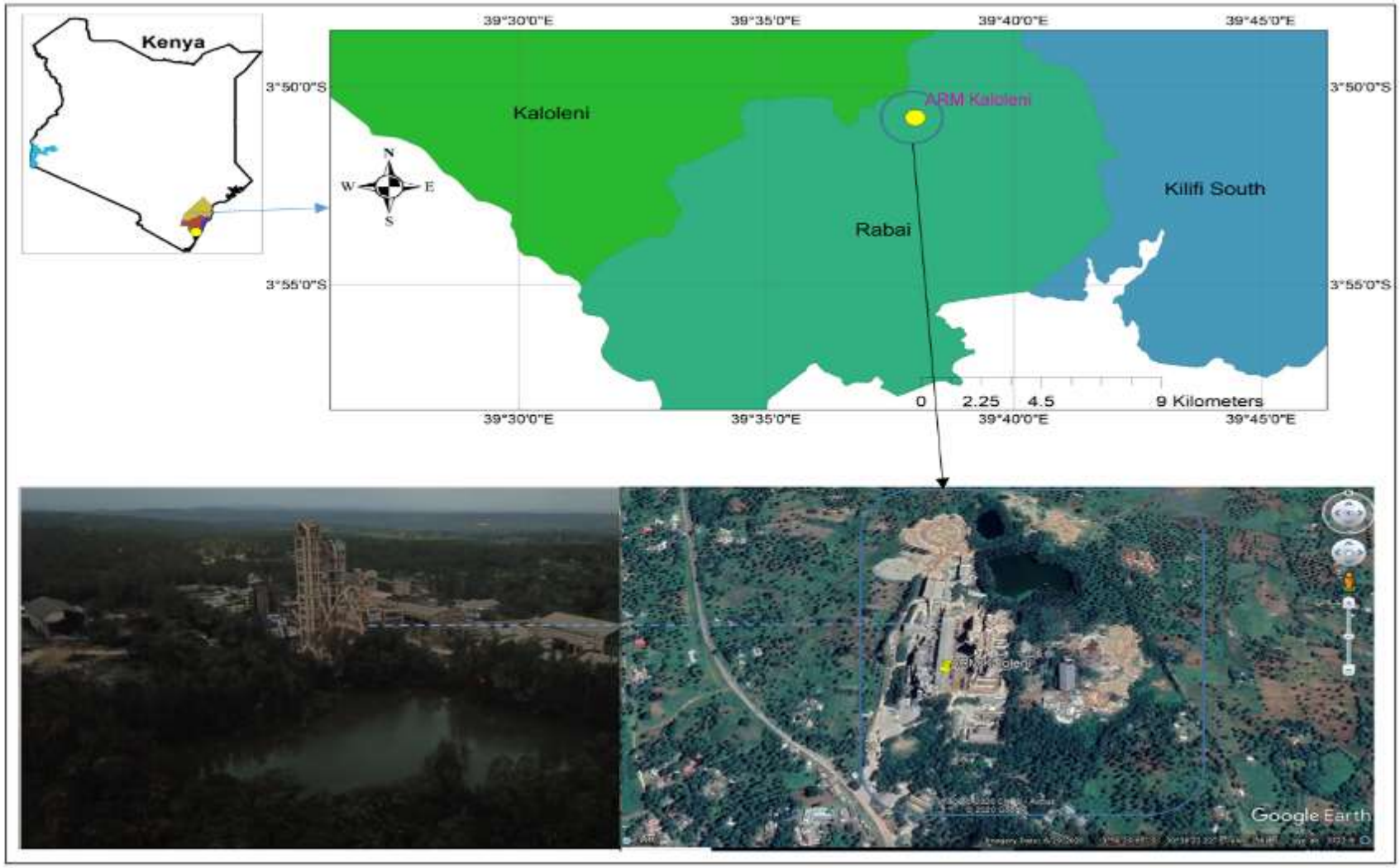


Figure 3-1: Project Site

3.2 Project Upgradation Aspects

The following changes will be made to the exisiting plant as part of the initiative to upgrade the facility and bolster its performance. These activities will be in the form of:

- Civil works
- Mechanical works
- Electrical works and instrumentation

Table 3-1: Project Upgrade Works and Aspects

Works	Description
Civil	A closed clinker tank of 15,000 MT capacity will be constructed for protection of product against weather. It will have mechanised clinker reclaiming system avoiding the use of heavy earth moving equipment. The covered storage facility will avoid the fugitive dust.
	A new silo of 4000 MT capacity will be built in addition to the existing 1000 MT silo to facilitate more storage capacity in line with the production.
	With the increase in cement production capacity due to more addition of Pozzalona, the present cement Packer machine and the trucks loading system is not sufficient. Additional line of packing with ROTO packer and auto truck loaders will be installed to meet the demand. With the addition of the new packer the total rated capacity of the cement packing will be 180TPH.
Mechancial	The crushers for limestone crushing of apt capacities (250TPH) with proper dust suppression system will be installed with screens for optimal operation and output. The existing crushers will be utilised for additives crushing.
	Covered stockpiles for limestone and additives with mechanised stacking and reclaimer system will be installed. It minimises to large extent the use of heavy vehicles like dozers and pay loaders, bare minimal emission of carbon to the atmosphere and generation of fugitive dust. This system will allow safe movement of personnel and avoids risk of damage to the equipment.
	PGNA and blend expert will be installed in line for better homogeneous quality of raw mix, which is key to the production of quality clinker. With control over quality the utilisation of correct grade and quantity of raw material is possible. It thereby increases the life of mines and conservation of natural wealth.
	Latest weigh feeders with reliable metering will be installed in place of existing unreliable system.
	New generation low power, high throughput roller press will be installed which will substantially reduce the power consumption. It will have full automation and all safety interlocks for safe working of personnel and also the machinery will be reliable and be available for production.
	The transport system will be enhanced by retro fitting many transport equipment like belt conveyors, elevators, air slides, screw conveyors.

	Damaged kiln will be replaced with new kiln. The concrete kiln piers will be strengthened and re structured if required. New latest inlet and outlet seals will be fixed to kiln ends for better sealing and lower fuel consumption.
	Installation of close circuit cement mill with the hot air provision from cooler will help produce cement of highest grade with less energy consumption. With this the cement production capacity of this unit will increase with the same clinker production.
	The present coal dump yard with hopper filling with use of dozer will be replaced with linear stockpile and mechanised reclaimer system.
	The present material handling with grab cranes will be decommissioned and it will be replaced with mechanised reclaimer. Fugitive dust while handling with grab cranes will be totally eliminated.
Electrical and Instrumentation	All the hot air ducts will be properly insulated for waste heat recovery.
	The dust collection equipment like bag filters will be refurbished and insulated for keeping the emission levels within the norms.
	The O_2 and CO analysers will be installed online in preheater for control over fuel consumption. All the required measuring instruments like draft and temperature will be provided with PID looping for auto control of the process. Air blasters of correct size will be positioned in strategic location to avoid chutes and cyclone blockages which are potential risks of hot burns and fatalities. Complete overhauling and re-furbishing of preheater will be done for safe and reliable operations.
	New generation high thermal recuperation efficiency, zero fall through cooler will be installed in place of old generation conventional cooler. This will give better heat recovery and reduce substantially the thermal energy wastage, ultimately resulting in lower coal consumption and less heat release to the environment. The hot air from cooler will be connected to cement mills for drying of Pozzalona. By doing this the waste heat recovery from the cooler is to the tune of 80-85%. This will also enable us to lower the load on the electrostatic separators.
	Installation of online CO analysers and reliable temperature measuring instruments with automation and PID looping and also appropriately sized inert gas system will eliminate completely the fire hazard which can be uncontrollable and fatal.
	Re-routing of hot air duct such that the hot air is drawn from preheater exhaust gases (less oxygen levels) instead of cooler vent gases (rich oxygen). This will eliminate the chance of instant ignition of fine coal and stop potential fire Hazards in coal mill circuit.
	To dispatch the clinker to our grinding units automatic clinker bulk loading facility with weigh platform will be installed.
	The re-engineering of vent systems with proper sizing of ducting will ensure no dust emission at various working points, resulting in healthy working conditions.

	Introduction of Intelligent Motor Control Centre (IMCC) will remove the failures of electrical equipment. Installation of online gas analysers and the opacity meter in the stacks will have perfect control on the emission and keep them with in allowed pollution control norms.

Figure 3-2. Plant Layout

Figure 3-3

Figure 3-4.Project Site Photo

3.3 Project Phase Activities

3.3.1 Planning (Pre-Construction Phase)

Activities during the planning (pre-construction) phase will include:

- Design of the plant
- Plant profile
- Operational design

3.3.2 Construction Phase Activities

There will be several activities during the construction of the upgraded plant as outlined below.

3.3.2.1 Excavation and Foundation Works

At the proposed project site, excavation works will be carried out to set up foundation for the various structures that will be upgraded. This will involve the use of heavy earthmoving machinery such as tractors and bulldozers.

3.3.2.2 Concrete Works

The construction of the foundations, structural frames, pavements, drainage systems, among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include concrete mixing, plastering, slab construction, construction of foundations, and erection of structural frames and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mixers.

3.3.2.3 Mechanical, Electrical and Instrumentation Works

Mechanical, electrical and instrumentation work during construction of the proposed development will include installation of the equipments (mechanically), installation of electrical gadgets and instrumentation works. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

3.3.2.4 Restoration and Site Rehabilitation

Site reinstatement and rehabilitation will be undertaken for each component of the construction phase, which include the following activities:

- Removal of excess building material, spoil material and waste.
- Repairing any damage caused as part of the construction activities.
- Reinstating existing access roads (where applicable).
- Replacing topsoil and planting indigenous grass (where necessary);
- Levelling the ground
- Dismantling the temporary accesses; and
- Repairing any infrastructure that was damaged during the work (roads, fences, etc.).

3.3.2.5 Landscaping

To improve the aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping. This will include establishment of flower gardens and flourishing grass lawns and will involve replenishment of the topsoil. It is noteworthy

that the proponent will use plant species that are available locally preferably indigenous ones for landscaping. The proponent has already has over 5,000 tree seedlings that will be planted around the facility once the project construction phase is completed.

3.4 Raw Materials and Construction Equipment

The following equipment and materials will be required for use during the construction phase of the plant. It is expected that construction materials like cement, concrete, gravel, water, aggregate etc. will be sourced from local suppliers and will not require the need for opening up material sites (quarries, borrow pits etc.). Other equipment including machinery, electrical wires etc. will be sourced locally or internationally.

Table 3-2: Material and Equipment

Equipment	Source
Trucks	Local suppliers
Excavators	Local suppliers
Cement	Local suppliers
Sand	Local suppliers
Concrete	Local suppliers
Aggregate	Local suppliers
Water	Local suppliers

3.4.1 Material Transportation

As some construction equipment and materials will be probably sourced outside Kenya, sea shipping or air shipping will be used to transport the equipment to the country. Once construction equipment and materials are present in Kenya, terrestrial shipping (road transport) will be used to convey the equipment to site from Mombasa to the project site. A Traffic Management Plan will be developed by contractor to manage impacts associated with transportation of equipment from the port to project sites.

3.5 Construction Waste Materials

3.5.1 Effluent Waste

Construction effluent waste will emanate from the existing staff quarters where workers will stay (already established). Wastewater will also emanate from activities related to washing/cleaning of equipment and vehicles. During operation, effluent waste is going to be minimal and will emanate from the cement operation activities.

3.5.2 Solid Waste

Construction waste will comprise general domestic waste from the existing staff quarters where workers will stay (already established) including sanitary and food waste, office waste, organic material, small volumes of wastes arising from mobile plant, chiefly waste lubricating oil and packing materials (e.g., crates). Human waste will also emanate from the isting staff quarters. Construction solid wastes will include among others:

- Used electrical wires
- Cement waste
- Construction packaging materials (cement bags, packaging wastes,)
- Construction debris (broken glass, wood, scrap metals) etc

No significant solid waste streams are expected during operations apart from where domestic wastes will be generated from workers. Operation waste will comprise general domestic waste including sanitary and food waste, office waste, small volumes of wastes arising from chiefly waste lubricating oil and packing materials (e.g. crates). Wastes from repairs and maintenance activities will include among others:

- Used electrical wires
- Cement waste
- Packaging materials

Contractors will be required to provide a **Site Waste Management Plan** which will include details on waste minimization, recycling and disposal of the waste streams. The requirements of this plan will be implemented on site as required. With respect to the control of 'litter' on site, all such waste will be collected and stored within sealed containers within the site compound and serviced by a NEMA licensed waste carrier. No disposal of litter will be permitted at other locations. All forms of wastes generated during the construction, operation and decommissioning phases will be disposed of in compliance with waste regulations in Kenya (Legal Notice 121: Environment Management and Coordination (Waste Management) Regulations, 2006).

3.5.3 Used Oils

Used oil will be generated during the construction and operation phases of the project. All construction plant will be in good condition with no excessive emissions of exhaust, oil, fuel or coolants. Plant operators will check machines daily for oil/fuel leaks and take appropriate remedial action. All re-fuelling will be by an approved mobile fuel bowser using a suitable pump and hose. Absorbent material (spill kits) will be available on site and will be deployed to contain drips and small spillages. All other fuels, oils and potential contaminants will be stored within the site compound in secure, fit for purpose containers within bunded containment as appropriate.

3.5.4 Gaseous Emissions

The use of motorised equipment during construction will generate gaseous emissions in the project area of influence. Motorised vehicles and equipment including trucks, excavators etc will generate among others SOx, NOx and PM10. Dust will also be generated by movement of motorised vehicles. The gaseous emissions during the operation phase are not significant but will also include SOx, NOx and PM10 that will be generated by operation and maintenance vehicular teams. During the decommissioning phase, the several trucks will be required to transport wastes generated through the decommissioning phase to appropriate waste disposal sites. These vehicles will consume diesel and produce air emissions as a waste. Secondly, through servicing of these trucks, used oils will be generated which are hazardous wastes.

3.5.5 Noise Emissions

The use of motorised equipment during construction will generate noise emissions in the project area of influence. Motorised vehicles and equipment including trucks, excavators etc will generate noise during construction, operation and decommissioning phases of the

project. Construction phase noise levels will be generated by construction plant and equipment such as excavators, lifting equipment, dumper trucks, compressors, generators, etc. Construction plant and equipment will be maintained in accordance with the preventive maintenance schedules indicated in the manufacturer's instructions to ensure that such equipment does not produce excessive noise and vibration. Noise emisisons during operation will emanate from the cement production process including the clinkerisation process as well as cement grinding process. Source of noise will include crusher, mills, roller press as well as truck movement in and out of the plant.

3.5.6 Operation Phase Activities

During the life of the project, NCCL would perform routine, periodic maintenance and emergency repairs to the plant. NCCL will have responsibility to operate the plant and will ensure that it's in good and efficient working condition. NCCL typically conducts routine inspection of the plants. Plant inspection are essential to determine where maintenance is needed and ensure the continued reliability of the production process.

3.5.6.1 Cement Manufacturing Process

Two cement production methods exist worldwide, the dry process and the wet process. In the latter, raw materials are mixed and ground with water to form "raw slurry", while in the "dry process", the raw materials are dried and ground together in defined and well-controlled proportions to produce a "raw meal". The main differences between the two processes is in the water content of the raw materials (ranging from 3% for hard limestone to over 20% for soft limestone such as chalk), energy and power consumption rates, and length of the kiln system.

On average, wet process operations use 34 percent more energy per ton of production than dry process operations (US EPA, 2007). Fuel consumption is higher in the wet process, ranging between 1300-1600 Kcal/kg of clinker compared to 750 - 950 Kcal/Kg of clinker in the dry process. Power consumption, however, is lower in the wet process, with 110 - 115 KWh of energy consumed per ton of cement compared with 120-125 KWh/ton of cement in the dry process. The "dry process" for cement production is proposed since it's already in use by the existing line due to its favorable environmental performance particularly with regards to its lower water consumption. As a further refinement and development of the adopted dry process, NCCL will fit air suspension preheaters with pre-calciners which ensure complete calcining of the raw mix before it enters the kiln. A detailed description of the cement manufacturing processes is provided below. The processes mainly consist of:

- Quarrying (drilling and blasting)
- Crushing and pre-homogenisation of limestone and additives.
- Milling, homogenisation and storage of raw materials.
- Preheating, kilning and Heating system.
- Clinker cooling, transport and storage.
- Cement grinding; and
- Cement storage, packing and dispatch.

3.5.6.1.1 Quarrying

The mining method for exploiting the limestone is quarry mining with fully mechanized operations comprising of drilling, blasting, loading and transportation by road to the crushing site. The excavated limestone will be transported from the mine face to the crusher by off-road dump trucks. Crushed limestone will then be transported via conveyor belts to the cement factory. Conveyor belts will be covered to reduce fugitive dust emissions during transportation.

3.5.6.1.2 Crushing and Pre-homogenisation of Limestone and Additives

Currently there is only one crusher of 150 TPH capacities, which was used to crush limestone and additives. This capacity is very low for producing clinker up to 1500TPD. The actual capacity should be 250 TPH for limestone and 100 TPH for additives crushing. The crushed limestone will be transported to the cement factory via conveyor belts. For the pre-homogenizing and storage of raw materials, a circular bridge scraper (CBS) store is proposed and designed for continuous stacking in a ring-shaped pile. The material enters the store on a rubber belt conveyor and is discharged into a centrally positioned inlet hopper on the stacker jib. The belt conveyor will be covered as part of NCCL commitment to adopting Best Management Practices for fugitive dust abatement. A Side Scraper (SS) store is proposed for the storage of corrective materials and additives (sand and Pozzolana). The SS store operates according to the cone shell method. This type of store is used for free flowing, non-sticky materials which do not necessitate homogenizing.

3.5.6.1.3 Milling, Homogenisation and Storage of Raw Materials

For the grinding of raw materials an ATOX roller mill for, grinding takes place inside the mill between the rotating table and the three cylindrical rollers connected by a centre yoke. The airflow through the mill carries the ground raw meal up to the separator for separation. Coarse material collected from the separator is returned to the grinding table for further grinding, while finished raw meal leaves the mill along with the exhaust gases and is then fed to the raw meal silo with a capacity of 4,000MT. Blending of raw meal is achieved by extracting from three different outlets at a time and which are changed at regular intervals. This method of controlling the extraction helps achieve a well-balanced and homogenized raw meal by allowing the latter to mix with the different “layers” in the silo.

3.5.6.1.4 Preheating, Kilning and Heating System

For clinkerisation, the pre-calcining burning system, consisting of a double string 5-stage cyclone preheater (80˚C–1000˚C) with precalciner is planned. A rotary kiln with a daily output of 15,000MT of clinker will be installed. The heat consumption for making clinker will be about 730kCal/kg clinker. The excess heat from the system will be used to dry raw meals as part of NCCL’s strategy to minimize fuel consumption. In the pre-calciner, calcining i.e., decarbonation of calcium carbonate of the raw meal is carried out in seconds with a decomposition rate of CaCO3 exceeding 92%. A number of phases (Alite, Belite, Aluminate, and Ferrite) are formed in the clinker feed before the proper burning zone is reached. However, these intermediate phases are not found in the final clinker minerals due to their dissociation in the burning zone. Kilning is considered the last stage in converting the raw mixture into Clinker. During this stage, the raw mixture is heated from 1000 to 1450 degree Celsius, breaking the bonds of the raw elements and calcium enters a chemical reaction with Aluminum, Silica and Iron Oxides. All exhaust gas released from

the raw mill and kiln circuit is handled by the Gas Conditioning Tower (GCT) and Electro-Static Precipitators (ESP) in charge of de-dusting operations. Upon filtering, dust emissions would be reduced to a maximum of 50 mg/Nm^3.

3.5.6.1.5 Clinker Cooling, Transport and Storage

For clinker cooling, clinker directly from the cooler will be at maximum of 80˚C. The cooler ensures a uniform distribution of the hot clinker on the bed. Good penetrability of the bed provides thorough gas/solid heat exchange, raises the tertiary air temperature, and improves heat recovery. The cooler is provided with a hammer crusher in the outlet and excess air is de-dusted in an ESP. In order to protect the electrostatic precipitator against excessive temperatures during upset conditions the cooler is provided with a water injection system. Hot abrasive clinker is conveyed by deep-drawn pan conveyors to the top of clinker storage. A new silo of 4000 MT capacity will be built in addition to the existing 1000MT capacity silo to facilitate more storage capacity in line with the production. Clinker is extracted from the bottom of the storage, by discharge gates and transported to the cement mill department by heat resistant rubber belt conveyors.

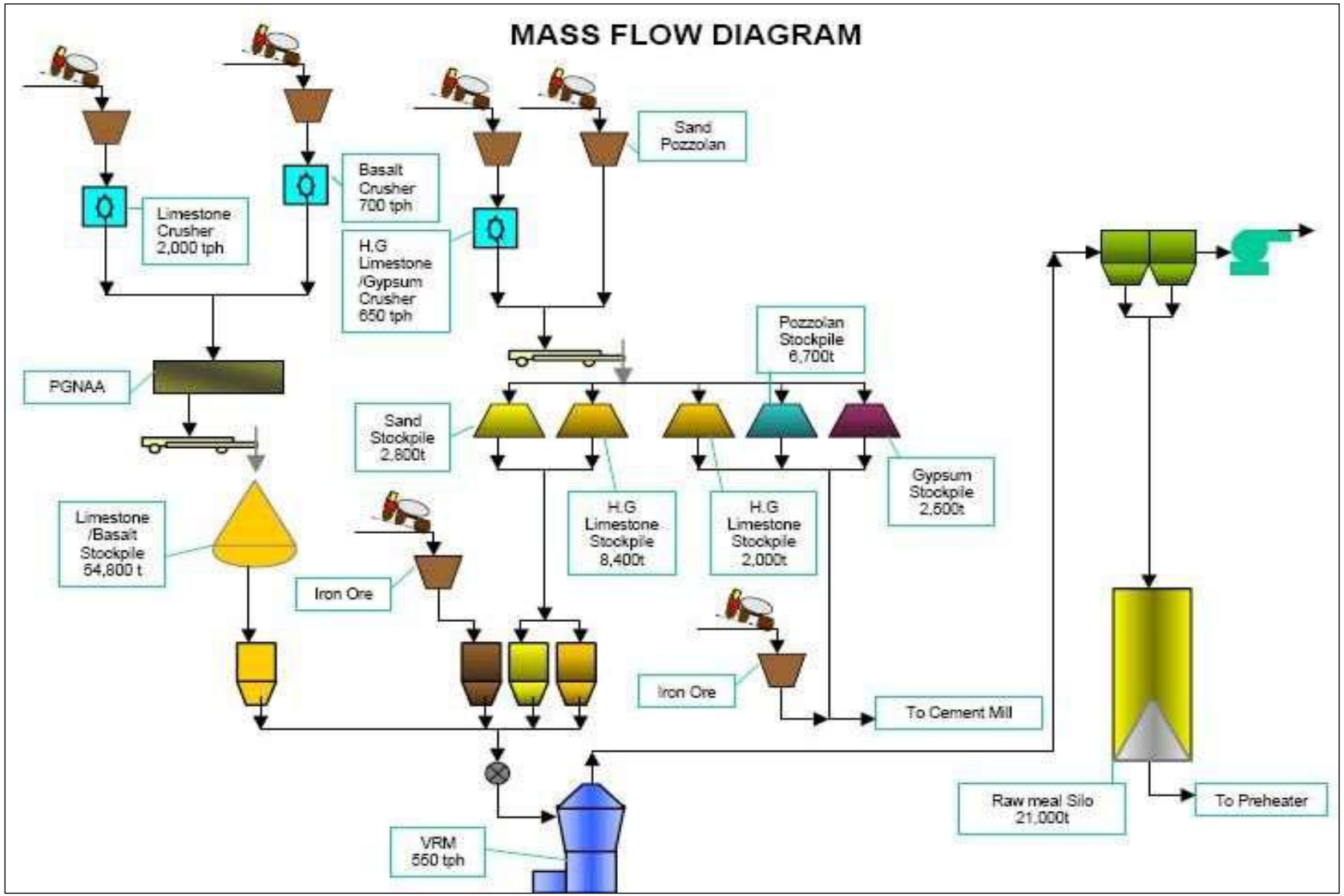
3.5.6.1.6 Cement Grinding

Cement grinding is carried out in a vertical roller mill with a production capacity of 1500TPD, in order to achieve the desired setting qualities in the finished product, some proportion of pozzolana is added to the clinker and the mixture is finely ground to form the finished cement powder. The milling process is operated in a sealed system whereby sorting of cement grains is carried out according to their sizes using air. Materials that are not milled to the desirable size are transported back to the mill feed. The finished product is collected in bag filters and transported to the cement silos.

3.5.6.1.7 Cement Storage, Packing and Dispatch

The proposed plant is designed to accommodate Continuous Flow Storage (CFI) cement silos allowing therefore filling and extracting of cement. The packing plant shall encompass packing lines with individual capacities of 120 tons/hour. The cement is to be transported via a bucket elevator to a vibration screen above the packing machine. The latter is a rotary type with spouts. Each filling spout is equipped with its own vertical shaft impeller and an individual electronic weighing control system. The packing machine is equipped with dust collecting hoppers, screens and a discharge belt conveyor, and a bag filter for de-dusting the packing line.

Figure 3-5: Mass Production



3.5.7 Raw Materials and Fuels

3.5.7.1 Sourcing for Limestone

Three quarry sites limestone will be explored during the project lifetime. The total surface area Chauringo 38 ha, Pangani 8 ha and Kenya lead mines (size not established). The land is on plot number 112/MBWAKA and are owned by NCCL.

3.5.7.2 Corrective Materials & Cement Additives

Sand is to be used as a corrective material in the mix design, making up about 5.5% of the raw meal, cement additives, gypsum and pozollana will be used by NCCL Kaloleni at 5% and 20-25% respectively.

Table 3-3: Operation Phase Resources

Material	Source
Solvents and Oils Fuel (diesel)	Local supplier
Coal	Imported
Water	Site water pan

3.5.7.3 Fuel Type and Source

The main fuel source for the cement plant's kiln and calciner operation is a mixture of low sulphur (low volatile) bitumen coal and pet coke. The bitumen coal characteristics are presented in **Table 3-4.** The cement plant has been designed to burn coal or heavy fuel oil (HFO). The coal which is specified for the performance guarantees has the following characteristics:

Table 3-4. Characteristics of Fuels

	Characteristics of coal	Characteristics of HFO
Ash Content	15% (max)	-
Volatile Matter	30% (max)	-
LHV	6430 kcal/kg (min)	9500 kcal/kg (min)
Sulphur Content	1% (max)	4.5 % (max)

3.5.8 Resources and Utilities

3.5.8.1 Electricity

Electricity will be needed during for construction and also for lighting at night during construction and in the workers camp during the construction etc. During operation phase, project will require electricity operations. Two main power sources will be used during the life of the project. During the construction phase, KPLC through the existing substation will supply electricity to the plant site and associated facilities/units the two generators will only be used upon power blackout. Upon operation, the cement plant will require a power demand from the 33KVA KPLC station from Rabai.

3.5.8.2 Water

During the construction stage, contractor teams will require water for use during construction works (concrete mixing, slab, washing vehicles) as well as for drinking by the

construction workers. During operation phase, the water use requirements will be low and required by the staff and periodically if required in maintenance works e.g., repairs on foundations that may need concrete mixing etc. The total water demand for the entire project during operation is estimated to be 100 M^3/Hr. The largest water consumption division of the project will be in the cement production and for daily domestic water usage. NCCL Kaloleni envisages the use of the existing water pan for provision of water in plant construction and up gradation.

Table 3-5: Anticipated Construction and Operation Water Demand

Phase	Facility	Description of water requirement	Daily consumption Rate
Construction	Quarries (Limestone)	No anticipated quarrying operations	None
	Clinker plant	**Domestic purposes** Water supply for construction workers	20 m3/day
		Construction purposes cement mixing, dust suppression and vehicle wash down	100 m3/day
Operation	Quarries (Limestone)	Operations such as water spraying for dust control, and rock crushing activities	100 m3/hr
	Clinker plant	Water supply for workers	
		Cooling purposes	

3.5.8.3 Laboratory

A laboratory is already operating for testing of raw material, clinker and cement for physical and chemical parameters. The test are dry tests using modern equipment and therefore requires minimal use of chemicals.

3.5.9 Construction Staff

It is typical for this kind of construction to have a mix of skilled, semi-skilled and unskilled workers as part of the workforce. Whereas the contractor will be at liberty to hire workers as per skills required, he/she will be encouraged to source for workers from the local community as much as possible. This will reduce instances of negative impacts related to labour influx, Gender Based Violence (GBV) as well as provide jobs and income to the local community. The contractor (s) will be required to develop in a consultative manner **Local Labor Recruitment Plan** (to guide recruitment of construction workers.

3.6 Decommissioning Phase Activities

The decommissioning procedure will be provided as part of the maintenance manual during handover of the completed Project. NCCL, as per its policies will comply with the decommissioning process as per EMCA and international best practices. The decommissioning procedure will include site specific rehabilitation plans for the footprint

of the project and will be executed by the NCCL. The decommissioning activities will include: -

Decommissioning Activities

- Dismantling the plant equipments
- Dismantling the foundations
- Rehabilitation of the disturbed areas including quarries

4 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter sets out the standards to which the legal, policy and administrative framework within which the Project will be developed. It identifies the applicable lender requirements and national standards. The proponent through this ESIA will conform to the Kenyan legislative and regulatory framework and the Good Industry International Practice safeguards.

4.1 National Policies and Legislation

Table 4-1: Summary of National Policies

Policy	Description
National Environment Policy, 2013	The goal of the policy is to ensure a better quality of life for present and future generations through sustainable management and use of the environment and natural resources. The objectives of the Policy are inter alia to: • Provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and natural resources. • Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources; and • Ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods. Some of the guiding principles in the implementation of the policy include: • Environmental Right: Every person in Kenya has a right to a clean and healthy environment and a duty to safeguard and enhance the environment. • Right to Development: The right to development will be exercised taking into consideration sustainability, resource efficiency and economic, social and environmental needs. • Sustainable Resource Use: Environmental resources will be utilized in a manner that does not compromise the quality and value of the resource or decrease the carrying capacity of supporting ecosystems; and • Public Participation: A coordinated and participatory approach to environmental protection and management will be enhanced to ensure that the relevant government agencies, county governments, private sector, civil society and communities are involved in planning, implementation and decision-making processes.
Economic Recovery for Wealth and Employment Creation Strategy, 2006	The overall goal of the strategy is to ensure clear improvement in the social and economic wellbeing of all Kenyans; thereby giving Kenyans a better deal in their lives, and in their struggle to build a modern and prosperous nation. The key areas covered in the strategy are: • Expanding and improving infrastructure. • Reforms in trade and industry. • Reforms in forestry. • Affordable shelter and housing. • Developing arid and semi-arid lands; and • Safeguarding environment and natural resources.
Gender Policy, 2011	The overall goal of this Policy is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya.

HIV/AIDS Policy, 2009	In summary, the policy provides a mechanism for: • Setting Minimum Internal Requirements (MIR) for managing HIV and AIDS. • Establishing and promoting programs to ensure non-discrimination and non- stigmatization of the infected. • Contributing to national efforts to minimize the spread and mitigate against the impact of HIV and AIDS. • Ensuring adequate allocation of resources to HIV and AIDS interventions; and • Guiding human resource managers and employees on their rights and obligations regarding HIV and AIDS.
Energy Policy	The Energy Policy seeks to ensure an adequate, quality, cost effective and affordable supply of energy to meet development needs, while protecting and conserving the environment, with a bias towards the exploitation of green energy.
National Policy on Gender and Development 2000	The policy framework is geared towards ensuring gender equality and women empowerment in the social, economic, political and cultural spheres as envisaged in the Constitution.
Environment and Sustainable Development Policy, Sessional Paper No. 6 of 1999	This Policy aims to harmonize environmental and developmental goals for sustainability. It also provides comprehensive guidelines and strategies for government action on the environment and development.
The Kenya National Climate Change Response Strategy	The vision of the Strategy is for a prosperous and climate change resilient Kenya. The mission is to strengthen and focus nationwide actions towards climate change adaption and greenhouse gas (GHG) emission mitigation. The following measures are proposed to counter potential threats to the energy sector in Kenya: -Accelerate the development of geothermal energy -Accelerate the development of green energy including wind, solar and renewable biomass; and -Energy efficiency.
The National Water Policy 2012	The Policy is built on the achievements of the sector reform commenced with the Water Act and based on the sector principles lined out in the National Water Policy 1999. On water resources management, the policy seeks the management of water resources along natural catchment/basin boundaries following the Integrated Water Resource Management approach. It aims to ensure a comprehensive framework for promoting optimal, sustainable, and equitable development and use of water resources for livelihoods of Kenyans.

Table 4-2. Summary of National Legislations

Legislation	Provisions	Relevance to the Project
The Constitution of Kenya (2010)	Article 69 provides for protection and conservation of the environment and ensuring ecologically sustainable development and use of natural resources. Mandates the State to: -Establish systems of environmental impact assessment, environmental audit and monitoring of the environment.	Constitutional requirements on right to a clean and healthy environment, protection of the environment, consultation, public participation and access to information will be adhered to by NCCL and its contractors during the project phases (construction, operation and decommissioning).

	- eliminate processes and activities that are likely to endanger the environment. - Encourage public participation in the management, protection and conservation of the environment; and Article 42 accords every person the right to a clean and healthy environment and where this is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.	
Environmental Management and Coordination Act, Cap 387.	Part V, VI and VII provide for protection and conservation of the environment, environmental impact assessment, and environmental auditing and monitoring.	NCCL in complying with this statute has prepared ESIA study report.
Environmental (Impact Assessment and Audit) Regulations, 2003	Part II, III and IV provide for the procedure for carrying out Environmental Impact Assessment (EIA) and Environmental Audit (EA). Part V provides for the carrying out of an environmental audit study following commencement of project operations.	NCCL in complying with this statute has prepared ESIA study report in accordance with this regulation. An initial environmental audit should also be carried out in the first year of operation of the cement plant.
Environmental Management and Co-ordination (Water Quality) Regulations, 2006	Part II-V provide for the protection of ground and surface water resources. Part II provides the water quality standards for sources of domestic water.	During construction and operation, NCCL and its contractors are required to comply with the water quality regulations in terms of effluent discharge and will obtain effluent discharge licenses/permits as necessary and guided by regulation.
Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	Section 3 (1) prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. The First Schedule provides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential.	During construction and operation, NCCL and its contractors are required to comply with this regulation in terms of noise and excessive vibration control and will obtain licenses as necessary and guided by regulation. Sound level limits as per the regulations to be observed during construction and operations.

Environmental Management and Co-ordination (Waste Management) Regulations, 2006	Part III-VII provide standards for handling, transportation and disposal of various types of wastes including hazardous wastes. Sections 4, 5 and 6 provide for waste minimization or cleaner production, waste segregation, recycling or composting. Section 7 provides for licensing of vehicle transporting waste. Section 10 provides for the licensing of waste disposal facilities.	During construction and operation, NCCL and its contractors are required to comply with this regulation in terms of waste management and will obtain or engaged licensed entities to manage wastes from its activities as necessary and guided by regulation.
Environmental Management and Coordination (Air Quality) Regulations, 2014	The First Schedule provides for ambient air quality tolerance limits. Section 5 prohibits air pollution in a manner that exceed specified levels. Section 16 provides for installation of air pollution control systems where pollutants emitted exceed specified limits. Section 22 provides for the control of fugitive emissions within property boundary. Section 25 provides for the control of vehicular emissions. Section 29 provides for prevention of dispersion of visible particulate matter or dust from any material being transported. Part IX provides for acquisition of an emission license.	During construction and operation, NCCL and its contractors are required to comply with this regulation in terms of air quality and will obtain licenses as necessary and guided by regulation.
Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources, and Benefit Sharing) Regulations, 2006.	Section 4 (1) provides that; 1. A person shall not engage in any activity that may- a. have an adverse impact on any ecosystem; b. lead to the introduction of any exotic species; c. lead to unsustainable use of natural resources,	NCCL has prepared ESIA to determine the impacts of the project on biological diversity in accordance with this regulation and mitigation measures to conserve biological diversity are outlined in the ESIA.

	Without an Environmental Impact Assessment License issued by NEMA.	
Physical planning and land use Act 2019	Under Section 3 of the Act, the law provides for norms and principles in physical planning and land use which include the requirement that planning takes into account new approaches such as transit-oriented development, mixed land-uses, planning for public transport and non-motorized transport among others to achieve sustainable development and more efficient use of natural resources, be inclusive and take into consideration the culture and heritage of people concerned; and that development activities be planned in a manner that integrates economic, social and environmental needs of present and future generations.	The proponent will take into account these norms and principles in particular new approaches such as transit-oriented development, mixed land-uses, planning for public transport and non-motorized transport among others to achieve sustainable development and more efficient use of natural resources.
The Water Act No. 43 of 2016 revised 2017	Section 3 outlines the objectives of the Act as to provide for the regulation, management and development of water resources and water and sewerage services.	The implementation of the project should conform to sound integrated water resource management practices
The Public Health Act (Cap 242)	Section 115 provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans. Section 126 provides that the relevant local authority shall take all lawful, necessary and reasonably practicable measures -: - for preventing any pollution dangerous to health of any supply of water which the public within its jurisdiction has a right to use and does use for drinking or domestic purposes (whether such supply is derived from sources within or beyond its jurisdiction); and - for purifying any such supply which has become so polluted, and to take measures (including, if necessary, proceedings at law) against any person so polluting any such supply or polluting any stream so as to be a nuisance or danger to health.	Project activities during construction could lead to public health impacts and project must comply with the requirements of the Public Health Act.
Occupational Safety and Health Act (OSHA), 2007	-Section 6 provides for the safety, health and welfare of workers and all persons lawfully present at workplaces.	Construction sites require registration as a workplace;

	Part V provides for the registration of workplaces. Part VII outlines safety requirements in use of machinery to prevent accidents and injuries.	
The Work Injury Benefits Act, 2007	Part V provides for compensation to employees for work related injuries and disease contracted in the course of their employment and for connected purposes. Key sections of the Act include the obligations of employers; right to compensation; reporting of accidents; compensation; occupational diseases; medical aid etc.	Construction of the proposed plant upgradation will have potential to cause injuries/ health hazards to construction workers.
The Energy Act, 2019	The Energy Act, 2019 has made several amendments to the repealed Energy Act, 2006. Its objective is to consolidate the laws relating to energy, to properly delineate the functions of the national and devolved levels of government in relation to energy, to provide for the exploitation of renewable energy sources, to regulate midstream and downstream petroleum and coal activity and for the supply and use of electricity and other forms of electricity.	The project will be implemented in accordance with the regulatory requirements of the Act, including acquiring a generation license from the Energy and Petroleum Regulatory Authority. The project will comply with the Energy Regulatory Commission requirements.
HIV And Aids Prevention and Control Act No. 14 Of 2006 Revised in 2012	The Act provides for measures for the prevention, management and control of HIV and AIDS. Part III-V of the Act are dedicated the protection and promotion of public health and for the appropriate treatment, counseling, support and care of persons infected or at risk of HIV and AIDS infection.	The Contractor shall prepare a project implementation plan that contains a comprehensive Program for: • Regular sensitization of all workers on HIV Aids and other Sexually Transmitted Diseases • Providing workers with condoms
Sexual Offences Act, 2006	-This Act of Parliament makes provision about sexual offences and aims at prevention and the protection of all persons from harm from unlawful sexual acts. Section 15, 17 and 18 focuses mainly on sexual offenses on minors (children).	The contractor is obligated to put in place mechanisms which are necessary or expedient in order to achieve or promote the objects of this Act, including for instance, a sexual harassment policy.
Children Act, 2001	-This Act of Parliament provides safeguards for the rights and welfare of the child including the right to parental care, non-discrimination, education, religion, health care and protection from child labour and armed conflict, among others.	The contractor under this Project will be required to comply with provisions of the Act during Project implementation by ensuring that measures are in place to prevent violation of children's rights particularly protection from child labour.

	Under Section 4 (2) the Act requires that in all actions concerning children, the best interests of the child shall be a primary consideration.	No child will be employed in the project as per the act.
Climate Change Act 2016	Under Section 3 of the Act, the objectives of the Act include to provide for a regulatory framework for enhanced response to climate change; to provide for mechanism and measures to achieve low carbon climate development, and for connected purposes	The contractor under this Project will be required to comply with provisions of the Act during Project implementation
Employment Act, 2007	-This Act of Parliament prohibits discrimination in labour relations under section 5, sexual harassment under section 6, forced labour under section 4 and child labour in section 52. Section 6 (2) obligates all employers with twenty or more employees to issue a policy statement on sexual harassment.	The contractor will be guided by the provisions of this Act on matters touching on equality of opportunities in employment, terms of service, age limit and prevention of sexual harassment in the workplace.
Kenya Roads Act No. 2 of 2007	Part II provides for the establishment of the Roads Authorities.	Permits will be sought from the relevant roads authorities in cases where road is affected
Public Roads and Roads of Access Act (Cap. 399)	Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent landowners seeking permission to construct the respective roads.	During the construction phase of the project, access to the site areas will be required for the construction vehicles. Where existing roads do not exist, the Proponent shall seek permission from the appropriate authorities to create such access during the construction phase.
Occupiers Liability Act (Cap. 34)	Rules of Common Law regulates the duty which an occupier of premises owes to his visitors in respect of danger and risk due to the state of the premises or to things omitted or attributes an affliction on his/her health to a toxic material in the premises.	The Proponent shall endeavor to ensure that the management of health and safety issues is of high priority during the operational phase of the project.
Building Code	This law recognizes the county governments as the leading planning agencies mandating the potential developers to submit development applications for approval. The county governments will approve or reject plans if they do or don't comply with the law, respectively.	In the construction of the plant, NCCL will adhere to the Building Code.

4.1.1 National Air Quality Emission Standards

In undertaking the construction activities described above, the Contractor will comply with the following national regulatory air quality standards. Regular monitoring to determine compliance will be done by the supervision consultant and corrective/mitigation measures applied where necessary.

Table 4-3: Ambient Air Quality Tolerance Limits

Pollutant	Time Weighted Average			
		Industrial Area	Residential, Rural & Other Area	Controlled Areas
Sulphur oxides (SOX);	Annual Average	80 ug/m^3	60 ug/m^3	15 ug/m^3
	24 hours	125 ug/m^3	80 ug/m^3	30 ug/m^3
	Annual Average		0.019 ppm/50ug/m^3	
	Month Average			
	24 Hours		0.048ppm /125ug/m^3	
	Instant Peak		500 ug/m^3	
	Instant Peak (10 min)		0.191 ppm	
Oxides of Nitrogen (NOX);	Annual Average	80 ug/m^3	60 ug/m^3	15 ug/m^3
	24 hours	150 ug/m^3	80 ug/m^3	30 ug/m^3
	Annual Average		0.2 ppm	
	Month Average		0.3 ppm	
	24 Hours		0.4 ppm	
	One Hour		0.8 ppm	
	Instant Peak		1.4 ppm	
Nitrogen Dioxide	Annual Average	150 ug/m^3	0.05 ppm	
	Month Average		0.08 ppm	
	24 Hours	100 ug/m^3	0.1 ppm	
	One Hour		0.2 ppm	
	Instant Peak		0.5 ppm	
Suspended Particulate Matter	Annual Average	360 ug/m^3	140 ug/m^3	70 ug/m^3
	24 hours	500 ug/m^3	200 ug/m^3	100 ug/m^3
	Annual Average		100 ug/m^3	
	24 hours		180 ug/m^3	
Respirable Particulate Matter (<10□m) (RPM)	Annual Average	70 ug/m^3	50 ug/m^3	50 ug/m^3
	24 hours	150 ug/Nm^3	100 ug/Nm^3	75 ug/Nm^3
PM2.5	Annual Average	35 ug/m^3		
	24 hours	75 ug/m^3		
Lead (Pb)	Annual Average	1.0 ug/Nm^3	0.75 ug/Nm^3	0.50 ug/m^3
	24 hours	1.5 ug/m^3	1.00 ug/m^3	0.75 ug/m^3
	Month Average		2.5	
Carbon monoxide (CO)/ carbon dioxide (CO_2)	8 hours	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3
	1 hour	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3
Hydrogen sulphide	24 hours	150ug/m^3		

Pollutant	Time Weighted Average			
		Industrial Area	Residential, Rural & Other Area	Controlled Areas
	instant Peak	700ppb		
Total VOC	24 hours	600 ug/m^3		

Source - NEMA

Table 4-4: National Air Quality Standards for General Pollutants

Pollutant	Time Weighted Average	Property Boundary
Particulate matter (PM)	Annual Average	50 ug/m^3
	24 hours	70 ug/m^3
Oxides of Nitrogen (NOX);	Annual Average	80 ug/m^3
	24 hours	150 ug/m^3
Sulphur oxides (SOX);	Annual Average	50 ug/m^3
	24 hours	125 ug/m^3
Hydrogen Sulphide	24 hours	50 ug/m3
Lead (Pb)	Annual/24 hours	0.5 – 2.0ug/m^3
Ammonia	24 hours	100 ug/m^3

Source-NEMA

4.1.2 National Noise Emission Guidelines

In undertaking the construction activities described above, the Contractor will comply with the following national regulatory air quality standards. Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.

Table 4-5: National Noise Guidelines

Zone	Maximum Noise level limits dB (A)		Time Frame
	Day	Night	
Places of worship	30	25	Day time: 6.01a.m – 8.00p.m Night time: 8.01p.m – 6. 00p.m
Residential: 1. Indoors 2. Outdoors	 35 40	 25 25	
Mixed Residential (inclusive of Entertainment and commercial places)	55	45	
Commercial	70	70	
Silent arena	30	25	

Source - NEMA

Table 4-6: Noise levels for different areas and facilities

Facility	Maximum Noise level limits dB (A)		Time Frame
	Day	Night	

Health facilities, Educational Centres and homes of disabled	60	35	Day time: 6.01am- 10.00pm Night time: 10.01pm – 6.00am
Residential	60	35	
Industrial	85	65	
Commercial	75	50	

Source - NEMA

Table 4-7: Noise levels from a factory or a workshop (Continuous or intermittent noise)

dB(A)	Daily	Weekly
85	8 hours	40 hours
88	4 hours	20 hours
91	2 hours	10 hours
94	1 minute	5 hours
97	30 minutes	2.5 hours
100	15 minutes	1.25 hours
103	7.5	37.5 minutes
106	3.75	18.75 minutes
109	1.875 minutes	9.375 minutes

Source – NEMA

N/B: Noise levels should not exceed a level of

I. Factory/Workshops 85 dB (A)
II. Offices 50 dB (A)
III. Factory/Workshop Compound 75 dB (A)

Table 4-8: Maximum Permissible Noise level for Impact or Impulsive Noise

Sound Level dB(A) Max	Permitted impulses per day
140	100
130	1,000
120	10,000

Source-NEMA

4.1.3 National Water Quality Standards

The contractor will comply with the following national regulatory wastewater and effluent discharge standards. Regular monitoring to determine compliance will be done by the contractor and corrective/mitigation measures applied where necessary.

Table 4-9: National Wastewater Discharge Standards

Parameters	Maximum levels permissible
Suspended solids (mg/L)	250
Total dissolved solids (mg/L)	2000
Temperature ^{0}C	20 -35
pH	6-9
Oil and Grease (mg/L)	where conventional treatment shall be used - 10
Oil and Grease (mg/L)	where ponds is a final treatment method - 5
Ammonia Nitrogen (mg/L)	20

Parameters	Maximum levels permissible
Substances with an obnoxious smell	Shall not be discharged into the sewers
Biological Oxygen Demand BOD_5 days at 20°C (mg/L)	500
	1000
Chemical Oxygen Demand COD (mg/L)	0.02
Arsenic (mg/L)	0.05
Mercury (mg/L)	1.0
Lead (mg/L)	0.5
Cadmium (mg/L)	0.05
Chromium VI (mg/L)	2.0
Chromium (Total) (mg/L)	1.0
Copper (mg/L)	5.0
Zinc (mg/L)	0.2
Selenium (mg/L)	3.0
Nickel (mg/L)	20
Nitrates (mg/L)	30
Phosphates (mg/L)	2
Cyanide Total (mg/L)	2
Sulphide (mg/L)	10
Phenols (mg/L)	15
Detergents (mg/L)	40 Hazen units
Colour Less than	(nd)
Alkyl Mercury Not Detectable	4.0
Free and saline Ammonia as N (mg/L)	Nil
Calcium Carbide	Nil
Chloroform	Nil
Inflammable solvents	Nil
Radioactive residues	Nil
Degreasing solvents of mono-di-trichloroethylene type	

Source-NEMA

4.2 International Conventions

Relevant international agreements, treaties and conventions that have a social and/or environmental aspect, to which Kenya is a signatory or has acceded to/ratified and which will guide project implementation, are detailed in **Table 4-10** below:

Table 4-10: International Conventions

Convention	Objective
African Convention for the Conservation of Nature and Natural Resources (2003)	The objectives of the ACCNNR have been considered in this ESIA.
Convention on Biological Diversity (1992)	The objectives of the CBD have been considered in this ESIA.
Convention on the Conservation of Migratory Species of Wild Animals	This ESIA has taken into account any potential impacts on migratory species.
Convention on Wetlands of International Importance especially Waterfowl Habitat (Ramsar Convention, 1971)	This ESIA has taken into account any potential impacts on wetlands.

Convention	Objective
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998)	The objectives of the Rotterdam Convention should be considered when developing plans and programs for the management of relevant hazardous chemicals and pesticides.
Worst Forms of Child Labour Convention, 1999(No. 182)	Ensure that employment policies include prohibitions on the employment of children and that such polices are adhered to.

4.3 Institutional Frameworks

4.3.1 The National Environment Council

The National Environmental Council (the Council) is responsible for policy formulation and directions for the purposes of the Act. The Council also sets national goals and objectives and determines policies and priorities for the protection of the environment.

4.3.2 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.

4.3.2.1 The Standards and Enforcement Review Committee

In addition to NEMA, EMCA provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC).

4.3.3 The National Environmental Complaints Committee

The Act (EMCA) has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community

4.3.4 The County Environmental Committee

County Environmental Action Plan Committee is charged with the responsibility of preparing a provincial environmental Action based on the county environmental plan. The county Environmental action plans are further compiled at the national level.

4.3.5 Directorate of Occupational Health and Safety

The institution will be task for registration of the construction site as a workplace and enforcing compliance with Occupational Health and Safety Regulations at the construction site.

5 ENVIRONMENTAL AND SOCIAL BASELINE

This chapter provides a description of the current baseline conditions in the Project Area of Influence (AoI). The baseline characteristics of the biophysical and socio-economic conditions are used as the basis of prediction of possible effects and also to monitor changes during construction and operation.

5.1 Bio-Physical Environment

5.1.1 Location and Size

Kaloleni is a small Town located in Kilifi County, about 50 km North of Mombasa City Centre. Kaloleni Town is 55km from Kilifi Town, 24km from Mazeras Town and 19km from Mariakani Town. The roads to Kilifi from both Mazeras and Mariakani merge at Kaloleni then proceed to Kilifi. The Town is concentrated around this junction and along the Kaloleni-Kilifi Road. Figure 5-1 below is a map of Kilifi County with the project site.

5.1.2 Climatic Condition

The annual temperatures in the county range between 21^0 C and 30^0 C in the coastal belt and between 30^0 C and 34^0 C in the hinterland. The county experiences relatively low wind speeds ranging between 4.8 km/hr and 12 Km/hr. The pattern of rainfall in Kaloleni is bimodal. The long rains fall from April to July, with a peak in May. The short rains, on the other hand, fall from October and November. The average annual rainfall varies between 900 mm and 1,100 mm due to the effects of monsoon winds and the topography with marked decrease in intensity to the hinterland. It is generally hot and humid all the year round. The annual temperature ranges between 21°C and 30°C. The lowest temperature is experienced during the long rainy seasons. Average relative humidity along the coastal belt is 65% but decreases towards the hinterland.

5.1.2.1 Baseline Ambient Environmental Measurements

Tables 5-1 to 5-8 below are the results of ambient air and noise measurements and soil sampling conducted to understand the baseline situation of the project area specifically in areas with sensitive receptors that may be affected by the project construction activities.

5.1.2.1.1 Ambient Air Emission Measurements

Table 5-1: Ambient Air Emission: Air Quality Data – PM10

Location	**Proxy**	**PM10** ($\mu g/m^3$)	**WHO** AQG	**EMCA** (Air Qual. Reg. 2014)
HR Offices	MP1	18	50 $\mu g/m^3$ 24hrs	50 $\mu g/m^3$ 24hrs
Main store	MP2	27		
Weighbridge	MP3	31		
Mill Area	MP4	36		
Laboratory	MP5	20		

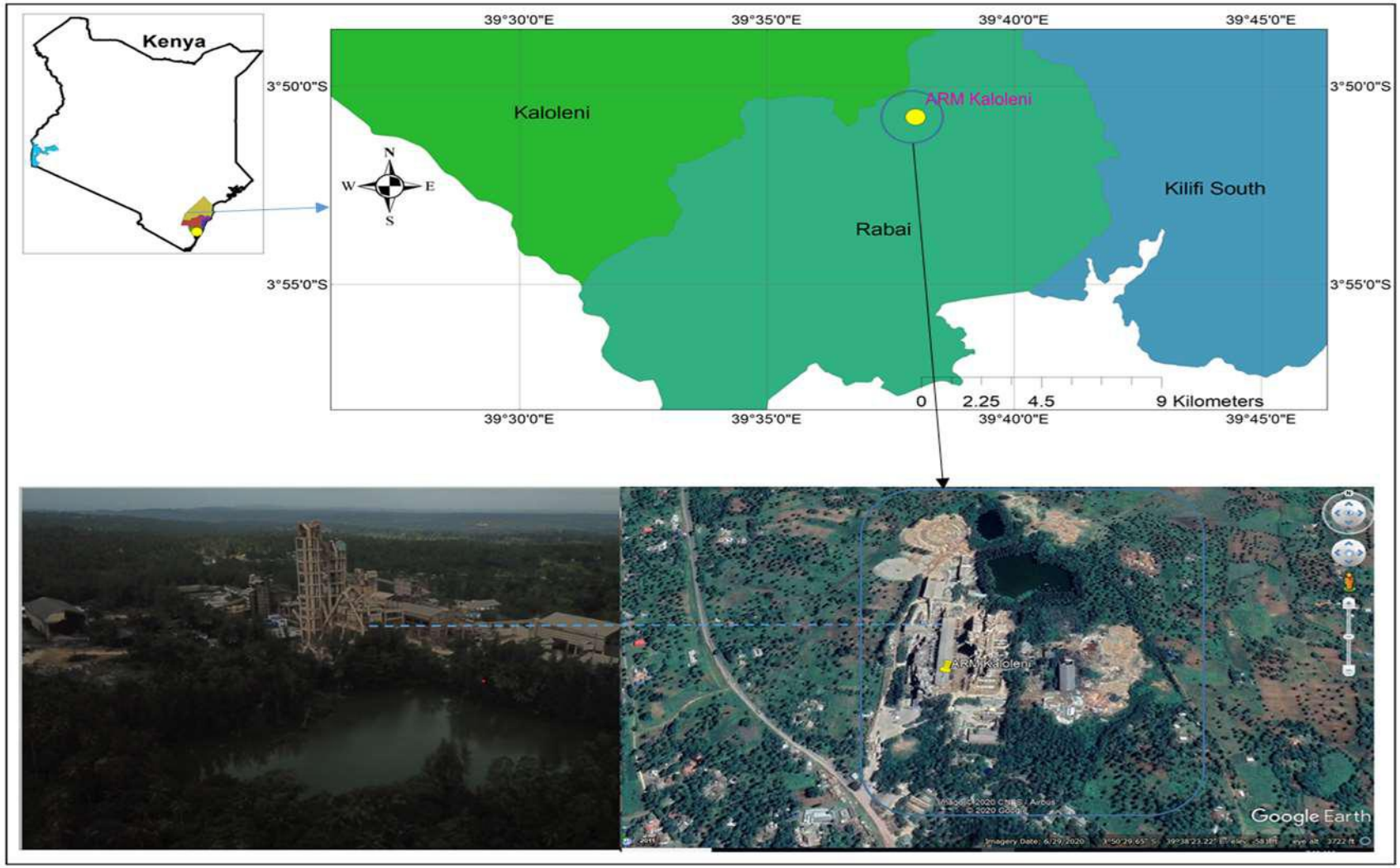


Figure 5-1. Project Site

Table 5-2: Weather Conditions

Sunlight	Sunny
Precipitation	None
Wind	Still
Temperature	28 ^{0} C
Cloud Cover	Sparse
Date	14th December 2020
Duration of Measurements	1hour

Source: Field data

Table 5-3. Ambient Air Emission: Air Quality Data – Sulphur Dioxide, SO2

Location	**Proxy**	**SO_2** ($\mu g/m^3$)	**WHO** AQG	**EMCA** (Air Qual. Reg. 2014)
HR Offices	MP1	<7.1	20 $\mu g/m^3$ 24hrs	80 $\mu g/m^3$ 24hrs
Main store	MP2	<9.0		
Weighbridge	MP3	<8.7		
Mill Area	MP4	<9.4		
Laboratory	MP5	<5.6		

Table 5-4. Weather Conditions

Sunlight	Sunny
Precipitation	None
Wind	Still
Temperature	28 ^{0} C
Cloud Cover	Sparse
Date	14th December 2020
Duration of Measurements	1hour

Source: Field Data

Table 5-5. Ambient Air Emission: Air Quality Data – Nitrogen Dioxide

Location	**Proxy**	**NO_2** ($\mu g/m^3$)	**WHO** AQG	**EMCA** (Air Qual. Reg. 2014)
HR Offices	MP1	19	40 $\mu g/m^3$ Annual 200 $\mu g/m^3$ 1hr average	80 $\mu g/m^3$ 24hrs
Main store	MP2	23		
Weighbridge	MP3	27		
Mill Area	MP4	29		
Laboratory	MP5	17		

Table 5-6. Weather Conditions

Sunlight	Sunny
Precipitation	None
Wind	Still
Temperature	28 ^{0} C

Date	14th December 2020
Duration of Measurements	1hour

Source: Field Data

5.1.2.1.2 Ambient Noise Emission Measurements

Table 5-7. Ambient Noise Level

Location	LAeq	LMax	LMin
HR Offices	54.8	63.9	45.7
Admin	60.9	71.5	53.5
Accounts Office 1	53.4	60.1	42.6
Accounts Office 2	50.3	59.4	42.2
Outside HR offices	67.5	70.2	55.2
Maintenance Store - Offices	55.8	64.9	46.7
Central Control Room	63.5	72.0	55.1
Shift Laboratory	74.4	89.6	52.8
Physical Laboratory	73.1	80.7	60.9
Chemical Laboratory	62.2	76.4	53.9
Preparation Room	90.1	102	88.3
Packaging/ Loading Area	80.2	87.6	69.9
Mill Area	90.1	91.3	89.2
Weigh Bridge Room	69.6	77.7	56.3
Raw Materials Storage Area	67.4	49.9	78.6
Outside Central Control Room	68.4	78.9	59.4
Fire station Area	74.2	77.7	71.6
Parking Lot - Next to Weigh Bridge	73.1	87.4	54.8

Table 5-8. Ambient Noise Level

Sunlight	Sunny
Precipitation	None
Wind	Still
Temperature	28 ^{0} C

Figure 5-2. Noise measurements at the Weighbridge

5.1.3 Soils and Geology

The soils of Kaloleni represent a wide range of profile characteristics just like other Coastal Towns. Differences in parent material, age or drainage condition have delivered an array of soils from high to low agricultural potential. Some of the characteristics that are generally recognizable within Kaloleni are: Coral rag that is developed from coral limestone with sand mixtures (reef complex) and dark red loamy sands (latosolic soils), mostly covering the soils of the Magarini formation. The geology in Kaloleni sub county area is wholly of sedimentary origin and range in age from Triassic to Recent; they fall naturally into three well-marked divisions.

- Cainozoic rocks,
- Jurassic rocks and
- Duruma Sandstone Series.

The Duruma Sandstone Series is the Kenya correlative of the Karroo System of South and central Africa and consists of grits, sandstones, and shales that, for the most part, were deposited under lacustrine or sub-aerial conditions. Miller (1952, p. 12) has proved the existence of a marine band in the lower part of the series, and others in the upper part have been hinted by Thompson but such intercalations constitute a very small percentage of the total thickness. The series is readily divisible into three broad lithological units with coarse sandstones and grits at the top and bottom of the succession and finer sandstones and shales in the middle. In the Kilifi area, only the upper and upper-middle units are represented. The Jurassic rocks are entirely of marine origin and consist of limestones, mudstones, shales and occasional thin sandy beds, ranging from the Bajocian to the Middle Kimmeridgian. They share the easterly regional dip of the Duruma Sandstone Series; against which they are downfaulted throughout most of the area. The Cainozoic rocks include a thick series of terrestrial sands and gravels that are probably of Upper Pliocene age, a Pleistocene coral reef with associated lagoonal deposits of coral breccia, calcareous sands, and beach sands, and various subsidiary sandy beds that seem to be of late Pleistocene or Recent age. They are all more or less flat-bedded, and rest uncomfortably upon members of the older divisions.

5.1.4 Topography

Kilifi County has four major topographical features with marked geological and rainfall characteristics which dictate the resource potential and land use patterns. These are the coastal plain, the foot Plateau, the coastal range and the Nyika Plateau. Kaloleni lies within the coastal plains of Kilifi County. The coastal plain is a narrow belt, varying in width between 3km and 20km. It lies below 30 m above sea level, except for occasional prominent peaks on the Western boundary, which includes major hills like Mwembetungu and Mamburi sand dunes. The rest of the area is broken by creeks and estuaries, giving rise to excellent marine and estuarine swamps, with mangrove forests and untapped potential for marine culture. The zone is composed of Triassic sediments of marine and deltaic origin, and includes coral limestone, marble, clay stones and other alluvial deposits, yielding deep soils which support agriculture. Kaloleni falls at the foot plateau and has distinct low range of sandstone hills and ranges between 150m to 450m high. These hills include Simba, Kiwava, Daka, Wacha, Gaabo, Jibana, Mazeras and Mwangea. The Nyika plateau that rises from 100m to 340m above sea level and occupies about two thirds of the

County area covers the lower lying ground along the western side of the County. The plateau is less populated with a thin vegetation cover, shallow depressions and gently undulating terrain. This is an arid and semi-arid zone, which is suitable for ranching.

5.1.5 Hydrology

The main river in river in Kaloleni is the Pungulu stream which flows from Mariakani township. Majority of streams in Kaloleni are seasonal laggas. The Pungulu stream and a seasonal lagga that flow through Kaloleni Town approximately 15km from the project site.

5.1.6 Agro–Ecological Zones

Kaloleni falls within the division of the Kilifi County i.e., five Agro-Ecological Zones (AEZ), which define areas that have similar characteristics such as annual mean temperatures, vegetation and humidity. For Kaloleni, the zones are: -

- Livestock-Millet Zone: The zone is of lower agriculture potential with precipitation of 700 – 900mm. The area is suitable for dry land farming especially drought tolerant crops and livestock ranching.
- Lowland Ranching: It varies in altitude of 90-300m with mean annual temperature of 27^0 C and annual precipitation of 350-700mm. Major activities within this zone include ranching and wildlife.

5.1.7 Flora

The project area is characterized by brush and thicket characteristic of a lowland dry forest in the coastal region. This vegetation zone is mainly cultivated with cashewnuts, mangoes, sugar cane coconuts and food crops and is mainly grassland. Agriculture does very well in the area due to its climatic conditions.

Figure 5-3: Vegetation around the project site

5.1.8 Fauna

The project area is home to various snake species, millipedes, centipedes, lizards and several domesticated animals.

5.2 Social Environment

5.2.1 Administrative Units

The county has seven sub counties namely: Kilifi North, Kilifi South, Ganze, Malindi, Magarini, Rabai and Kaloleni. It has 35 wards, 54 locations, and 165 sub locations as

shown in the **table 5-9 below.** Magarini sub-county is the largest while Rabai is the smallest sub county in terms of area.

Table 5-9: Kilifi County Administrative Units by Area

Sub County	Area (Km2)	No. of wards	No. of location	No. of Sub locations
Kilifi North	530.3	7	7	22
Kilifi South	400	5	7	16
Ganze	2,941.6	3	14	48
Malindi	627.2	5	8	18
Magarini	6,979.4	6	8	28
Kaloleni	686.4	4	11	21
Rabai	205.9	4	7	12
Total	**12,370.8**	**35**	**62**	**165**

5.2.2 Population

Kilifi County has a child rich population, where 0–14-year-olds constitute 47% of the total population. This is due to high fertility rates among women as shown by the highest percentage household size of 7+ members at 36%

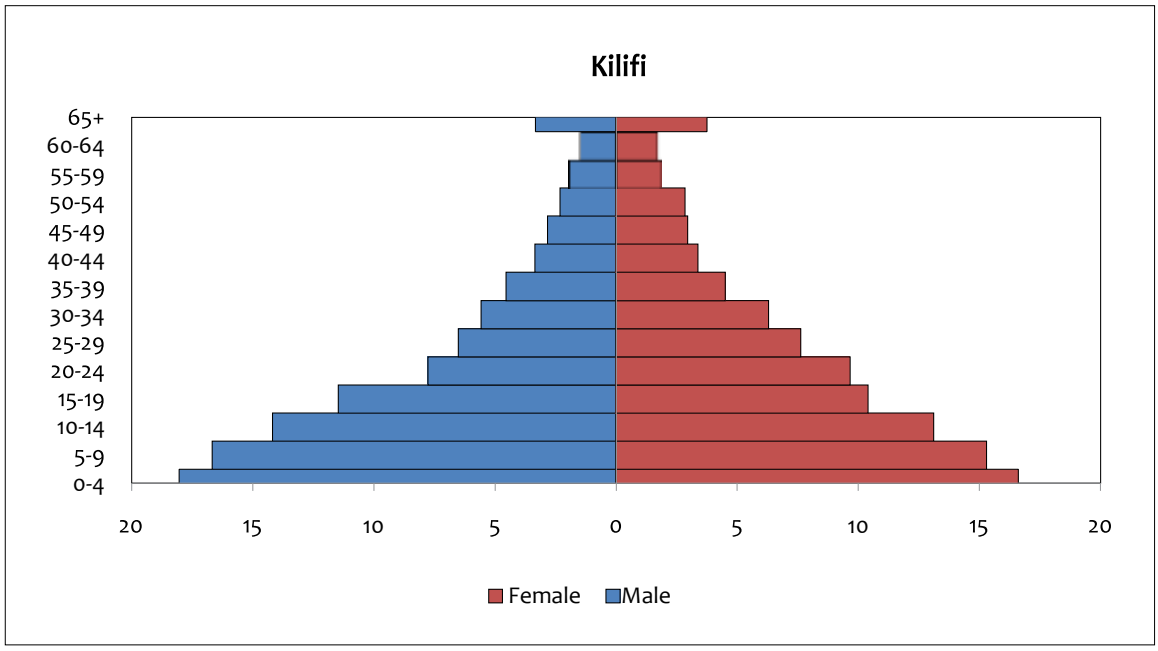


Figure 5-4. Kilifi Population Pyramid

5.2.3 Employment

The population and housing census covered in brief the labour status as tabulated below. The main variable of interest for inequality discussed in the text is work for pay by level of education. The other variables, notably family business, family agricultural holdings, intern/volunteer, retired/homemaker, fulltime student, incapacitated and no work are tabulated and presented in the **table 5-10** below up to ward level.

Table 5-10. Overall Empowerment by Education Levels in Kilifi County

Education Level	Work for pay	Family Business	Family Agricul-tural Holding	Intern/ Volunteer	Retired/ Home-maker	Fulltime Student	Incapacitated	No work	Number of Individuals
Total	24.8	12.2	22.3	1.3	17.1	13.7	0.5	8.1	544,445
None	15.8	11.8	35.5	1.7	26.0	0.4	1.2	7.7	144,005
Primary	23.2	12.0	21.0	1.1	15.7	18.5	0.4	8.2	281,751
Secondary+	39.4	13.0	9.4	1.3	9.5	18.6	0.2	8.6	118,689

In Kilifi County, 16% of the residents with no formal education, 23% of those with primary education and 39% of those with a secondary level of education or above are working for pay. Work for pay is highest in Nairobi at 49% and this is 10 percentage points above the level in Kilifi for those with secondary level of education or above.

5.2.4 Energy

5.2.4.1 Cooking Fuel

Only 2% of residents in Kilifi County use liquefied petroleum gas (LPG), and 8% use paraffin. 67% use firewood and 21% use charcoal. Firewood is the most common cooking fuel by gender with 65% of male headed house- holds and 73% in female headed households using it. (Gini–Coefficient).

5.2.4.2 Lighting

Some 17% of residents in Kilifi County use electricity as their main source of lighting. A further 17% use lanterns, and 63% use tin lamps. 2% use fuel wood. Electricity use is mostly common in male headed households at 18% as compared with female headed households at 14%.

5.2.5 Housing

In Kilifi County, 32% of residents have homes with cement floors, while 65% have earth floors. Less than 1% has wood and just 1% has tile floors. Malindi constituency has the highest share of cement floors at 56%. That is eight times Ganze constituency, which has the lowest share of cement floors Malindi constituency is 24 percentage points above the county average. Shella ward has the highest share of cement floors at 74%. That is almost 25 times Garashi ward, which has the lowest share of cement floors. Shella ward is 42 percentage points above the county average (Gini Coefficient).

5.2.6 Land Use

Pastures occupy almost half of County farmlands, woodlots 7%, improved pasture/forage production 8%, homesteads 9%, subsistence crop production 21%, commercial crop production 1.5% and unusable land (swampy, rocky, hilly, etc.) 8%. Use of land that has not been allocated to current occupiers (squatters) in the County is not so much a landlessness problem as is a communal protest against historical land injustices associated with colonialism and delayed or skewed post-colonial state's implementation of land sector reforms. Kilifi, as are most coastal Counties, is still contending not only with the monumental ten-mile coastal strip land alienation problem but also the British Crown land legacy. These legally protected lands are at the core of the squatter problem in both the

rural and urban areas of the County. While the Kenya Government, through the National Land Commission has in recent times been regularizing squatter settlement on the former British Crown land (that became state land after independence and now public land), formalizing squatter settlements in the privately registered land in the ten-mile coastal strip remains a thorny issue.

5.2.7 Water Sources

Boreholes and water pipelines are the major sources of water for the population across the county. The average walking distance to the nearest water point is estimated at 3.5km. According to the Department of Water Environment, Forestry Natural Resources solid waste management score Card Report, (2016), 60% of the households in the county have access to piped water distributed by Kilifi-Mariakani Water and Sewerage Company (KIMAWASCO) and Malindi Water and Sewerage Company (MAWASCO). The County Government and other stakeholders in the water sector are exploring possibilities of drilling boreholes, pipeline extensions and enhancing other water sources to meet the growing water demands in both rural and urban areas. Other equally important sources of water for the communities in the county are water pans, earth dams and rivers especially in the rural areas where piped water is either not available or inadequate. Therefore, deliberate efforts to expand water sources and develop a climate proof water schemes that are dedicated to serve the County citizens is paramount in ensuring adequate access to clean and safer water to all.

5.2.7.1 Sanitation

Access to basic sanitation facilities remains a formidable challenge across the county. The county toilet coverage is estimated at 67% while 30% of households have hand washing facilities. A significant proportion of the population in the county has no access to basic sanitation facilities, posing serious public health implications. More importantly, proportion of households with access to sanitation facilities varies across and between major urban centers and peri-urban areas and the concentration of these facilities tends to decline towards the rural areas within the county. Concerted efforts should be put in place to invest in public toilets in major towns and trading centers and establishing of sewerage facilities in coherence with existing town planning principles.

5.2.8 Health Access and Nutrition

This section describes health access, existing health facilities by type, community health units coverage, morbidity, nutritional status, immunization coverage, maternal health care, access to family planning services, HIV and AIDS prevalence rates and related services.

5.2.9 Transport and Infrastructure

Kilifi County has a road network of 101,000 km (out of which one (1) road is Class A Bitumen Trunk Road of 115.4Kms, one (1) Class A7 Bitumen National Road of 168.6 Kms, five (5) roads Class C Bitumen Primary Roads of 219.3 Kms, Class D gravel Secondary Roads and E earthen minor roads 3000Kms and the rest unclassified. The county has about 40km of rail network, which is part of the Mombasa-Kisumu railway stretch that passes through the county between Mazeras and Samburu. There is one station in Mariakani and another railway terminus in the neighbouring Mombasa County is about

180km Malindi town. The county boasts of two modern bus terminus in Malindi and Kilifi towns, respectively. There are other middle level bus/matatu Parks in Mariakani and Kaloleni. The construction of Mtwapa ultra-modern bus/Matatu Park in Kilifi South Sub-county is underway. In the future, the county will develop bus/matatu parks at Watamu, Kwachocha, Matsangoni, Tezo, Mavueni and Gongoni. The county is considering construction of marshalling yards for Lorries and trucks in the suburb and peri-urban areas of Malindi, Mtwapa, Kilifi and Mariakani towns.

Figure 5-5. Kaloleni – Mazeras road (C111).

5.2.10 Posts and Telecommunications

The county is covered by all the major mobile telephone service providers. The county has mobile telephone coverage of 75 percent and minimal usage of landline connection. The county has 7 post offices and 5 sub post offices. The County's major towns are also served by several other courier service providers. The proportion of the population that has to travel 5km or more to the nearest post office is 78 percent. There are 70 cyber cafes mostly in the urban areas

6 STAKEHOLDERS CONSULTATIONS

This chapter provides a description of the main stakeholders of relevance to the Project and a summary of stakeholder engagement activities undertaken during the preparation of the ESIA.

6.1 Stakeholder Engagement Principles

NCCL understands that effective stakeholder engagement and public consultation is a cornerstone of successful Project development, and is committed to free, prior, and informed engagement with stakeholders throughout the Project lifecycle. The key principles guiding NCCL's approach to stakeholder engagement on this Project are:

- To be open and transparent with stakeholders.
- To be accountable and willing to accept responsibility as a corporate citizen and to account for impacts associated with the Project activities.
- To have a relationship with stakeholders that is based on trust and a mutual commitment to acting in good faith.
- To respect stakeholders' interests, opinions and aspirations.
- To work collaboratively and cooperatively with stakeholders to find solutions that meet common interests.
- To be responsive and to coherently respond in good time to stakeholders.
- To be proactive and to act in anticipation of the need for information or potential issues.
- To engage with stakeholders such that they feel they are treated fairly and their issues and concerns are afforded fair consideration.
- To be inclusive and accessible to stakeholders so that they feel able to participate; to receive and understand information; and to be heard.

6.2 Stakeholder Engagement Objectives

The objectives of this stakeholder engagement were as follows

- To identify and map all relevant stakeholders, their context, interests and concerns
- To establish a two-way dialogue to understand concerns, management options and external perspectives
- To promote and secure participation of stakeholders by building their capacity for informed participation.
- To build and maintain trust between stakeholders
- To support the resolution of emerging tension and maintain the project's social license to operate
- To manage stakeholders' expectations
- To facilitate the collection of quality primary and secondary information relevant; to the project processes including monitoring
- To triangulate data collected and analysis done to inform decision making
- To document information disclosed and public consultation efforts
- To comply with regulations and requirements on disclosure and consultation
- To provide information about the project and its potential impacts to those interested in or affected by the project, and solicit their opinion in this regard
- To identify additional impacts/issues and possible mitigation measures

- To inform the process of developing appropriate mitigation measures and facilitate consideration of alternatives and trade-offs (if any)
- To reduce chances of conflict through early identification of contentious issues
- To ensure transparency and accountability of decision-making; and
- To increase public confidence in the project.

6.3 Stakeholder Mapping and Identification

Stakeholders include individuals or groups that may influence or be impacted by the Project, as described in Box 6-1 below.

Box 6-1: Definition of a Stakeholder

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses." The level of interest and impact of any given group of stakeholders is dependent on a number of factors including level of authority, socio-economic context, influence, education and cultural factors. Stakeholder identification began at Project inception and planning and has continued through the various stages of the Project development.

Stakeholders identified to date represent the organizations and individuals who may be directly or indirectly (positively or negatively) affected by the Project or who may have an effect on how the Project is implemented. Stakeholders identified for inclusion in engagement activities meet one of the following criteria:

- Have an interest in the Project
- Would potentially be impacted by or have an influence on the Project (negatively or positively); and/or,
- Could provide commentary on issues and concerns related to the Project.

6.4 Approach and Methods of Stakeholder Engagement

Below is a summary of the approaches and strategies adopted throughout the stakeholder consultation exercise.

6.4.1. Mobilization

- **Introduction letters:** NCCL provided the consulting team with official letters of introduction informing all stakeholders about the proposed project, introducing the ESIA consultant, informing about the planned consultation activities and requesting them to support the consultants wherever possible.
- **Mobilisation through local administration:** NCCLand the consulting team visited the offices of the local administrators and informed them about the proposed project and the upcoming consultation activities. Other than information sharing, these meetings were aimed at requesting the administrators to further mobilise the

concerned stakeholders. Local administrators consulted included the local chief, sub chief, ward administrator and the village administrator.

- **Mobilisation by phone and emails:** Other key stakeholders who were not available due to conflicting obligations were contacted either through email or by phone. This mainly applied to custodians of relevant data and literature for the ESIA study.
- **Confirmation of appointments:** Prior to the appointment dates, the ESIA consultant reconfirmed the appointments by contacting the focal persons at each venue at least one day prior to the meeting to verify whether the proposed schedule was still valid for the expected audience.

6.4.2. Interviews and Surveys

Enumerators were employed during the stakeholder consultation period to undertake surveys with key community members and stakeholders. A quantitative survey was conducted using structured questionnaire designed to generate the required information. The information gathered was used to answer questions related social and economic parameters of the communities within the project site including, the availability or lack of social service facilities, existing levels of access to education, health, potable water and related services. Consultations were held using both formal and informal meetings with carefully selected members of the communities.

6.4.3. Focused Group Discussions and Public meeetng

Stakeholders were further consulted in two ways; through public meeting where members of the community were called to a meeting with the agenda of discussing the proposed Project and through Focus Group Discussions (FGDs), where different groups were isolated and interviewed in a culturally appropriate setting. The FGD groups included women, youth and men. The views and recommendations expressed during the consultation meetings were incorporated in the ESIA report. Generally, the result of the participation showed support for the proposed project, with the community looking forward to the anticipated socio-economic developments associated with the project.

Figure 6-1: Consultation with Stakeholders

6.5. Feedback from Stakeholder Interviews

The respondents were identified through simple random sampling technique. Some of those interviewed had prior knowledge of the proposed project, particularly those living in the vicinity of the proposed site. The public survey focused around economic, social,

safety, health, environmental and welfare issues. Those interviewed were welcoming of the project since in their opinion, the project will create employment for skilled and unskilled labourers especially bearing in mind that the area relies heavily on casual employment from a number of factories and processing facilities in the area.

6.5.1. Summary of Responses

This section presents a brief compilation of the responses obtained from those interviewed.

6.5.1.1. Perceived Positive Impacts

Respondents acknowledged that the project would have some positive impacts which they enumerated as below:

- Create more job opportunities to the local community
- More revenue to the national and the county government
- Increased economic status of the area
- Minimization of crime as majority of youths will get busy in work

6.5.1.2. Perceived Negative Impacts

Majority of the people whose opinion was obtained during the ESIA consultations had no objection to the implementation of the project but agreed that the project has potential gains and costs. The negative impacts perceived by respondents have been highlighted in the subsequent section.

- Noise pollution during operation
- Air pollution because of the trucks coming in and out of the facility and from operation
- Pollution of underground water

6.5.1.3. Community Expectations

Views on expectation of what the project should bring to the people were unanimous and can ranked in the following order of priority:

- Getting priority to be employed
- Getting clean drinking water tanks
- Furnishing the dispensary with medicine and improving the health situations in the community

Table 6-1: Summary of Concerns raised by the Project-Affected Persons

Theme	Comments and Issues	Response
Waste Generation	Stakeholders were concerned about waste generation and methods of waste disposal during project implementation.	The consultants informed community members that the ESIA report will recommend that a waste management system be put in place; Waste will also be handled and transported by NEMA certified waste handlers.
Noise and Vibration	Questions concerning potential air and sound pollution arising from excessive noise and vibration also arose from community members	The Consultants informed the stakeholders that the project will be using up to date technologies to improve efficiencies to reduce noise and vibrations and further mitigation measures will be recommended in the ESMP.
Air Pollution	Some of the stakeholders feared that the project will generate emissions and generate dust leading to air pollution.	The consultants informed the members that the project will be using up to date technologies to improve efficiencies to reduce emissions and mitigation measures will be put in place to reduce emissions in line with national air quality regulations and international best practice.
Employment	Community members inquired whether there will be employment opportunities and what would be the criteria for gaining access to such opportunities. They decried an ongoing pattern of contractors hiring persons who don't reside in their localities to carry out tasks that locals are capable of doing and requested that, in this project, they be given first priority whenever employment opportunities arise.	The consultants informed stakeholders that they have incorporated the development of a Labour Recruitment Plan in the ESIA. These plans will cover all employment issues ranging from recruitment, dismissal, hours of work, non-discrimination, child labour, fair remuneration and grievance management. Stakeholders were however cautioned that where specialist skills are required for the project and the skills are not locally available, specialist would be hired from other jurisdictions through a competitive process.
Social impacts	It was a concern of the community members that the proposed project will increase the population in the project area and its surroundings which could lead to socio-cultural diversification and cultural contamination There were fears that with the increase in	The consultants and the clients' team informed the community that it will put in place sufficient safeguards to mitigate such incidences through for instance, developing and implementing a grievance redress mechanism; putting in place a sexual harassment policy and a HIV/AIDs prevention and awareness plan. The proponent will also work closely with other

	population, there will be an increase in the spread of HIV and AIDS, teenage pregnancies, drug and alcohol abuse and prostitution. Further they stated that enhanced economic status particularly among the women and youth would lead to increased occurrences of SGBV. Concerns were also raised about competition for limited resources due to population influx. This would particularly manifest in inadequate housing and shortage of water supply.	government agencies, in particular law enforcement and social protection offices to curb increase in crime in the project area.

6.5.1.4. Post ESIA Consultations

NCCL is aware that public consultation is a key component of project implementation and will therefore put in place a Stakeholder Engagement Plan (SEP). The overall aim of SEP will be to address the concerns and opinions of the stakeholders with the ultimate view to assuring a smooth project implementation. NCCL shall welcome suggestions and information from relevant stakeholders, contractors, visitors and the general public. A Community Liaison Officer (CLO) will be appointed by the contractor and will address complaints and suggestions from the communities. Further, consultations, which began during the ESIA process, will continue throughout the project life cycle in line with the SEP.

6.5.1.5. Monitoring/Reporting Stakeholder Engagement Activities

It will be important to monitor and report on the on-going stakeholder engagement activities to ensure that the desired outcomes are being achieved, and to maintain a comprehensive record of engagement activities and the issues raised.

6.5.1.6. Data Management

In order to record activities, assess the effectiveness of the Stakeholder Engagement Plan and associated community dialogue activities, NCCL will implement a data management and monitoring process. Stakeholder engagement activities will be documented and filed in order to track and refer to records when required and ensure delivery of commitments made to stakeholders. The following stakeholder community dialogue records and documentation will be used and maintained by NCCL during pre-construction and construction phase:

- Stakeholder list
- Stakeholder engagement log
- Commitments register
- Meeting minute template
- Grievance log

6.5.2. ESIA Study Report Disclosure

This ESIA study report will be disclosed in accordance with the country's disclosure requirements. The report upon approval by NEMA will be disclosed in NCCL's website and NEMA's website. Hard copies will also be made available at the Contractor's office.

7 ANALYSIS OF PROJECT ALTERNATIVES

This chapter describes the analysis of technically and financially feasible alternatives considered in the development of the project and provide documentation of the rationale for selecting a particular option. The purpose of the alternatives analysis is to identify feasible alternatives that could improve the sustainability of the project's design, construction and operation.

7.1 No Project Alternative

No project alternative is the option of not upgrading the plant. This alternative would result in further environmental and social impacts in the project area due to the nefficiencies that the upgradation is aimed at resolving. The selection of the 'No Project option' would mean the discontinuation of the proposed project's implementation and this would result in the existing form. There are physical, biological and socio-economic implications of this alternative. This option is likely to have the greatest implication on the socio-economic environment of the area and its environs. Due to the proposed quality of the project, it is anticipated that it would provide a major opportunity for employment, revenue, benefits associated with the mining industry and cement manufacturing in Kenya. In addition, a project of this caliber will add to the community's ability to develop. Increased community conflicts which would promote insecurity and a negative image of the area would repel potential investors. If this alternative is adopted, the proponent would need to find an alternative site for the development. This is likely to hinder development and slow industrial development in the Country. From the analysis above, it becomes apparent that the No Project Option is no alternative to the proponent, local people, Kenyans, and the government of Kenya. Subsequently, the do-nothing alternative is not a preferred alternative and will not be assessed in further detail during this ESIA phase.

7.2 Alternative Processing Technology

The analysis of alternatives route involved the evaluation certain sensitivities associated with the various options. Table 7-1 below summarizes the sensitivity criteria used for the alternative analysis. Each sensitivity aspect was assigned a score and the score was used as a basis for comparison between options. Three technologies available for manufacture of cement are:

- Wet process
- Semi dry process and
- Dry Process

7.2.1 Wet Process Technology

In the wet process, raw materials are crushed and grounded with water to form slurry. The slurry is fed into the kiln, where it is dried, calcined and sintered to produce clinker. The clinker is then mixed with gypsum and ground to produce Ordinary Portland Cement. Thermal energy consumption in wet process is in the range of 1300-1600 kcal per kg of clinker.

7.2.2 Semi Dry Process Technology

In Semi Dry Process, the raw meal is mixed with small quantity of water (12-14%) to make nodules before being fed into the kiln. These nodules are then carried on a travelling grate through which hot flue gases from rotary kiln arc circulated, precise nodule formation is required for injection into the kiln. The maintenance cost of grate components exposed to high temperature is high. In the semi-dry process, the thermal energy requirement is 950-1100 kcal per ton of clinker.

7.2.3 Dry Process Technology

In dry process of cement manufacturing, at no stage water is added to the raw materials. In this process, raw materials are crushed and ground dry and fed as such to the kiln. Where the scale of operations is large and operative economics are of paramount consideration, the dry process is preferred over the wet and semi-dry processes. Even in earlier times, wet and semi-dry processes were preferred only for smaller and medium sized plants and where raw materials contain high moisture, with ever-increasing cost of fuel, dry process is now selected even for small plants, wherever possible. The thermal energy requirement in the dry process plant, depending on the system selected ranges between 700 kcal per kg of clinker. The important systems of the dry process are as follows:

a) Long kiln without any preheating arrangement,
b) Kiln with suspension pre-heater and
c) Kiln with suspension pre-heater and pre-calcinator

Long Kiln without Any Pre-Heater Arrangement

In this process, the dry ground material is fed straight into the kiln to produce clinker. This process is usually preferred for smaller capacity plants to avoid problems of choking of pre-heater cyclone.

Kiln with Suspension Pre-Heater

In the suspension preheater system, the dry raw material is fed through series of cyclones and ducts so staggered so as to enable the maximum transfer of heat from the flue gases (exhaust of kiln) to materials flowing down by gravity into the rotary kiln. The application of suspension preheater system at times creates problems in operation if the materials contain high percentage of alkalis and chlorides.

Kiln with Suspension Pre-Heater and Pre-Calcinator

During the seventies, attempts were made in Japan and Europe to increase capacities of plants with suspension pre-heater beyond 2500 TPD. During this period, it was found necessary to restrict the kiln size to an optimum diameter of 5-6 meters due to mechanical problems of kiln construction, increased damage to refractory lining and problems of transportation of over-dimensioned equipments. These restrictions of kiln size led to the development of pre-calcinator technology, where the calcination was taken off the kiln and was done in static equipment called pre-calcinator, preceding kiln. In suspension pre-heater with pre-calcinator system, roughly 90% of the calcination is done in the calcinator before raw materials are charged into the kiln. The result is that a short kiln is sufficient for a given output owing to the elimination of de-carbonation, inside the kiln. The practical characteristics of the pre-calcination process are summarized below.

- With introduction of pre-calcination, it is possible to reduce equipment and installation cost per unit capacity due to reduction in kiln size.
- Because of 90% de-carbonation reaction outside the kiln reduces thermal loading in the burning zone which increases clinker-burning capacity of the kiln.
- Most of the raw materials supplied to kiln are calcined and there is almost no fluctuation in calcining percentage, a highly stable operation of the kiln can be achieved.
- The life of the refractory bricks is prolonged because the fuel supplied from the kiln burner is less by approximately 40% of the total requirement of fuel. This results in reduction in the consumption of refractories.
- Lower maintenance costs.
- Easy transportation due to reduction in kiln size and
- Lower fuel consumption under favorable conditions.

7.3 Resource Provision Alternatives

7.3.1 Energy Source

Coal will be the only source of energy since it is energy-efficient and provides the cement with coal ash as a corrective addition. Power for normal operations will be supplied from the national electrical grid (33 kV substation from Rabai). The project is already using coal to run the plant production process. Coal is energy-efficient and provides the cement with coal ash as a corrective addition and was considered as the source of energy in the production process. Presently, the plant uses electricity supplied from the national electrical grid (33 kV substation from Rabai) to run operations in the plant specifically for lighting. The power from the 33kV line will continue to run activities in the plant during construction and operation. Consequently, the plant has two generators which are the other alternative considered in lighting the plant however it is less favorable due to the cost involved but will be used when there is black out.

Municipal Solid Waste (MSW), the common alternative fuel in the cement industry that was considered. However, most of the country's municipal waste are unsorted and therefore the heterogeneity nature of the waste and the presence of components could pose quality and environmental concern. In this regard, the alternative was disregarded.

Heavy Fuel Oil (HFO) are products based on the residues from various refinery distillation and cracking processes. It has a high calorific value with low consumption rate and produces heat that have particularly high viscosity and density which is suitable for the production as it utilizes a small amount of light fuel oil in the form of heating oil, gas oil or diesel grades to fire kiln "lighting up" burners, and to heat auxiliary furnaces for calcining. This alternative was however not feasible since it would be costly and the production design had already recommended coal as the suitable energy source based on previous productions.

7.3.2 Water Source

Piped water

The site is currently connected to a piped water supply from Mzima springs and therefore water from this source is considered adequate for use during construction and operation.

However, its supply is erratic and unreliable and for this reason, the use of this source of water is considered for domestic use during the operation (drinking, washing, cleaning), but rejected for use in operations of plant production.

Water reservoir

Water supply supporting current operations at the plant is obtained from the site. The water at the reservoir is collected through surface run off, drainage channels and point sources from water treatment plant onsite before being distributed for various uses in the plant. The reservoir has sufficient water to support the and meet the water requirements of the plant.

8 ASSESSMENT OF POTENTIAL RISK AND IMPACTS

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project and possible mitigation measures. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. The objective of this chapter is to assess the likelihood of those social and environmental impacts as far as possible and to propose measures which will be incorporated in the project design, construction and operation, to, if not eliminate, at least mitigate these impacts to as low as reasonably practicable (ALARP) and to meet national Kenyan standards and regulations, international industry standards, and quality standards requirements.

The construction and operation of a clinkerization and grinding plant have the potential to create a range of impacts on the environment. As previously mentioned, the proposed development project is expected to extend over a 12 months' construction period and will involve, in addition to the construction of the cement plant, mining operations of raw material from three quarries. These potential impacts can be both positive (beneficial) and negative (adverse) depending on the resources and receptors involved along with other parameters such as geographical scope (magnitude and extent), temporal scope (duration) and reversibility. It is anticipated that this project will have positive impacts on sectors such as the economy, employment and foreign exchange earnings among others. Moreover, the project is expected to result in negative impacts of short-term duration and transient in nature.

8.1 Methodology of Impact Evaluation

The type, nature (positive, negative, direct, indirect), magnitude, timing (during design, operation), duration (short term/temporary, long term/permanent) and significance of impacts will be assessed in this section. The evaluation approach implemented in this study includes during the construction, operation and decommissioning phase. The analysis covers all potential fields of impacts and/ potential receptors:

- Ambient qir quality
- Noise and vibration
- Biodiversity (fauna and flora)
- Waste management
- Socio-economic environment
- Occupational health and safety

The general evaluation process will include the following stages:

- Step 1: Identification of project related activities (sources) and environmental aspects
- Step 2: Identification of potential impacts to the environment (physical, biological, human)
- Step 3: Evaluation and assessment of the related unmitigated impact significance
- Step 4: Identification of Best Practicable Environmental Options (BPEO); and
- Step 5: Re-evaluation and assessment of the mitigated impact significance.

8.1.1. Impact Evaluation Pre-Screening Level

The screening methodology that is adopted for the purpose of this ESIA study comprises a preliminary screening process followed by a more delicate and detailed secondary screening process. The pre-screening process includes an intensive literature research and review of cement manufacturing industry projects implemented in other parts of the world as well as in Kenya. The pre-screening highlighted some of the major impacts that might be associated with normal operations based on the literature research and the nature of the surrounding environment. The key issues identified were further investigated and evaluated based on planned project operations including proposed NCCL activities, time duration, national regulations, and the environmental baseline conditions.

8.1.2. Impact Evaluation Secondary Screening Level

A secondary screening level systematically screens the wide range of possible sources and potential previously highlighted impacts. This screening level also assesses the impacts in terms of their significance, duration, reversibility, likelihood of occurrence and geographical extent. In the secondary screening level, consequence criteria were ranked into six levels of significance listed in **Table 8-1**. Then, the likelihood of the occurrence of the impact was rated according to the criteria outlined in **Table 8-2.** Based on the level of significance, and likelihood of occurrence, the impact severities (risk) are determined. The assigned impact severity assessment was first undertaken in accordance with NCCL's currently planned project design and mitigation measures incorporated. The assessment was conducted to identify the potential unmitigated impacts and the residual impacts under current project designs and NCCL's control measures.

Table 8-1: Level of Significance

Criteria	Consequence
Massive impact over a large area resulting in extensive, potentially irreparable damage to a VEC*. Has a measurable effect on the livelihood of those using a resource over a period of years. Massive impact over a large area resulting in extensive, potentially irreparable damage to a site of social and/or cultural importance.	5. Catastrophic
Long term or continuous impact resulting in substantial adverse changes in a VEC, well outside the range of natural variation. Unassisted recovery could be protracted. Area of effect is extensive and/or encompasses an area that supports a statistically significant proportion of a VEC population or ecosystem. Has a measurable effect on the livelihood of those using a resource over a period of months.	4. Significant
Significant damage / impact to a site of social and/or cultural importance. Moderate adverse changes in a VEC or area that supports a VEC population. Changes may exceed the range of natural variation though potential for recovery within a few years without intervention is good. Area of effect encompasses an area that supports either a moderate or minor proportion of a VEC population or ecosystem. Long term (> 5 yrs) changes over an area which is not considered to be a VEC. Has a measurable effect on the livelihood of those using a resource over a period of weeks.	3. Moderate
Moderate damage to a site of social and/or cultural importance. Minor adverse changes in a VEC. Changes will be noticeable but fall within the range of normal variation and be typically short-lived, with unassisted recovery	2. Minor

possible in the near term. However, it is recognized that a low level of impact may remain. Medium term impact (1-5 yrs) in an area that does not encompass a VEC or whose impact is highly localized within a VEC. Long term impact over a discrete, small area which does not support a VEC. May be noticed but does not affect the livelihood of those utilizing a resource.	
Minor impact to a site of social and/or cultural importance. Short term changes in an ecosystem that are unlikely to be noticeable (i.e., fall within the scope of natural variation). Area of effect is restricted to the immediate vicinity of the source. Has no discernible effect on the environmental resource as a whole and is likely to go unnoticed by those who already use it.	1. Negligible

* VEC means Valuable Ecosystem Component, used to refer to components of the environment that are considered to be of commercial and/or ecological importance.

Table 8-2. Likelihood Evaluation Criteria

Likelihood to occur	Category	Score
Impact is highly likely or certain to occur under normal operating/ construction conditions	High	C
Impact may possibly occur under normal operating/construction conditions.	Medium	B
Impact is unlikely to occur under normal operating/construction conditions but may occur in exceptional circumstances	Low	A

Table 8-3. Impact Assessment Management Matrix

		LIKELIHOOD RATING		
		A	**B**	**C**
CONSEQUENCE RATING	**1**	1A	1B	1C
	2	2A	2B	2C
	3	3A	3B	3C
	4	4A	4B	4C
	5	5A	5B	5C
	6	6	6	6

Consequences		Likelihood	Acceptability
1 - Negligible	4 - Significant	A - Low	Negligible with minor mitigation
2 - Minor	5 - Catastrophic	B - Medium	Minimize Impacts
3 - Moderate	6 - Beneficial	C - High	Unacceptable

Table 8-4. Analysis of Impacts

Phase	Source/Activity	Types of emissions/ Resultants	Type of Impact
Construction	Site preparation, land clearance (project footprint), movement of heavy machinery/equipment, road grading and excavation/construction works	Emissions to atmosphere (CO, NOx, SOx, Particulate Matter) Leakage diesel/oil spills Solid waste generation (inert; soil, vegetation, domestic, hazardous), spare damaged equipment's Noise generation	Vegetation clearance Topsoil removal and alteration of surface soils profile Degradation of local air quality disturbance to local population Habitat alteration Damage to surface and underground physical infrastructure (roads)
	Influx of labour and workforce	Increased water consumption rates and waste generation (liquid and solid effluents), heavy traffic movement	Employment prospects in development area for skilled and unskilled workers and service providers **(beneficial)** Increase in commercial trade with nearby communities **(beneficial)** Traffic congestion/risk of collision Depletion of natural water resources (groundwater and surface water if any) Increased risk of social conflicts/disputes Increased risk on health and safety of occupational workers
	Transportation for logistics support, material/goods and services	Fine particle suspension especially in desert area, Emissions to atmosphere (CO, NOx, SOx), leakage diesel/oil spills, solid waste (raw material...), noise generation	Enhance local trading and commerce **(beneficial)** Increased road traffic and accidents Soil compaction and quality deterioration Behavioral change of native faunal species.
Operation	Quarrying/drilling/blasting	Waste discharge noise and vibration Water consumption Drainage/run-offs/wash water Water consumption Emissions from raw material and manpower transportation and onsite	Employment opportunities for skilled and unskilled labour **(beneficial)** Loss of flora, fauna, contamination of groundwater aquifers occupational health and safety risk hazard due to risk of abnormal operations (blasting, emergencies, fire, etc) Nuisance to local population (particularly those suffering with respiratory morbidities

		equipment (crusher...) including mainly dust Explosive and chemicals handling/use	
	Maintenance	Spare damaged equipments Waste discharge	Hydrocarbon contaminated waste
	Process operations (cement plant stack emissions) Hauling, loading and unloading of raw material as well as finished product	Spent chemicals/oil/grease Atmospheric Emissions mainly SO2, NOX, CO2, Particulate Matter/TSP Fugitive dust emissions vehicular exhaust Solid waste generation (slag, fly ash) and liquid industrial effluents (blow down, wash water) Increased vehicular movement and risk of vehicle collision	Heavy metals generation Degradation of air quality Disturbance to land aesthetics, and local biodiversity Traffic congestion Occupational health and safety risks Nuisance to local population (particularly those suffering with respiratory morbidities
	Collision of trucks / vehicle accidents Fire / Explosion and process failure	Leakage diesel spills, noise generation Emissions to atmosphere (CO, NOx, SOx)-Fine particle suspension especially in desert- like area	Contaminant dispersion (groundwater, surface water, soil) Increased risk for occupational injuries (stress, fatigue) Loss of flora, fauna, archaeological artefacts (if any), visual impacts Increased risk for occupational injuries (stress, fatigue)
Site restoration/quarry rehabilitation	Restoration activities (green area plantation)	Nil	Restoration of site and landscape **(beneficial)**

8.2 Beneficial Impacts

8.2.1 Construction Phase

8.2.1.1 Expected Impact on Poverty Alleviation

The proposed upgrade of the project by NCCL Kaloleni seeks to increase the cement grinding capacity per year as well as the efficiency. This if achieved will effectively contribute to significant increase in cement production in Kenya.

8.2.1.2 Employment

The updgrade of the plant including operation and maintenance activities will provide employment opportunities–directly and indirectly–to skilled as well as unskilled manpower primarily to local manpower. During construction, the project will be beneficial through creation of employment opportunities for the local communities. The income, thus enhanced, of the local skilled and unskilled work force would also bring out a multiplier effect to other sectors of the economy.

8.2.1.3 Knowledge/Skills Transfer

Local workers will benefit in terms of knowledge transfer especially from external skilled workers who when paired with the local workers will transfer on-the job skills to them. Further, local workers may undergo certain training as part of skill enhancement prior to employment.

8.2.1.4 Local Material Supplies

Another positive impact of the project involves local material sourcing mainly sale of materials for use in the project. Some of these can be expected to be sourced locally and the rest through importation. It is expected that the project will generate new income revenues for the local population across the Country in harvesting and transportation of sands, ballast, stones, concrete/wooden poles and gravel. The new income revenues received will create demand for other goods and services causing a trickledown effect to the entire economy.

8.2.2 Operation Phase

8.2.2.1 Increased Exploitation of Minerals Used in Cement Production

The proposed upgrade will likely result in increased mining and exploitation of common minerals used in cement production. Such common minerals include limestone which is the bulk raw material used in cement production. Other minerals whose exploitation is likely to increase as a result of the expansion may include pozzolana and gypsum.

8.2.2.2 Reduction in Cement Imports

The proposed upgrade will mean there will be more cement in Kenya than before. This will mean previous cement deficit will be farther narrowed. There will thus be less need for cement importation. Reduced cement importation will translate to reduced spending of foreign currencies; this will mean there will be more foreign currency reserves due to reduced cement importation and consumers may benefit from cheap cement.

8.2.2.3 Employment Opportunities

The proposed upgrade will provide opportunities for employment for more people to work in the expanded factory. It is envisaged that the workforce may double to cater for the expansion needs.

8.2.2.4 Support of Local Businesses

Services of local businesses such as transporters will be required to cater for the expanded factory. This will contribute to growth and development of such businesses. Other businesses may start or be farther developed to cater for the needs of the expanded factory such businesses likely to grow my include housing to cater for the increased workforce, hospitals, schools, shops among others.

8.2.2.5 Increased Revenue to National and County Government

The proposed upgrade of the plant will translate to increased tonnage of cement and clinker that will be produced. This will translate to increased tonnage of sales of clinker and cement translating to increased profits to the company. Increased profits will translate to increased taxes hence increased revenue to government. The expansion will translate to increased use of raw materials this will result to increased taxes to Kilifi County Government and the National Government.

8.2.2.6 Reduced GHG Emissions

The proposed project may contribute to reduction in Green House Gaseous (GHGs) emissions due to the fact that the plant will use less energy due to the efficiencies that will be achieved.

8.3 Adverse Impacts

Following a scoping process, this impact assessment was focused on interactions between the Project activities and various resources/receptors that could result in adverse significant impacts.

8.3.1 Air Pollution Impact

8.3.1.1 Construction Air Pollution Impacts

Air pollution during construction include gaseous and dust emissions which may have an impact on air quality. Project activities that have potential to impact air quality include emissions of air pollutants from temporary power generators, construction equipment and vehicles. The construction of the cement plant will entail the use of motorized machinery and vehicles which will lead to air pollution which will impact human health and the environment in general. Pollutants from motorised equipment during construction will include:

1. CO – Carbon monoxide
2. HC–unburned hydrocarbons generated through combustion processes and fugitive fuel evaporation, including benzene, a known carcinogen
3. CO2 - Carbon dioxide
4. NOX– Nitrogen oxides including NO2-nitrogen dioxide and NO-nitric oxide.
5. PM10 – fine particulate matter including soot/black; and

6. Sulphur dioxide (SO2): SO2 is of concern because of its impacts on health and vegetation.
7. Dust is defined as all particulate matter up to 75 μm in diameter and comprising both suspended and deposited dust, whereas PM_{10} is a mass fraction of airborne particles of diameter 10 μm or less. Dust and PM_{10} emissions arise from a number of sources, so both construction activities and emissions from vehicles associated with the construction site need to be considered.

Construction vehicles are generally fueled with diesel, and thus, SO_2, PM, NO_X, VOC and CO emissions are expected to occur along the route. In addition to these mobile source emissions, there will be also stationary emissions from the activities in the sub-station and maybe camp site (if decided upon by contractor). These emissions will be mostly due to power generations in diesel generators if used. Most site equipment (bulldozers, diggers, etc.) can be considered as similar to medium or heavy-duty trucks. Vehicles are used for the transport of materials and equipment on and off site as well as carriage of personnel to and from site using minibuses and cars. Since the project construction phase duration will be about 12 months long, air quality impact generated from these activities will not be static. Although the general terms of the construction of phases are similar, their application locations will follow each other. The quantities of motorized equipment (trucks, excavators) etc. will be minimal due to localized activities. In addition, quantities of material to be loaded and unloaded, number and type of construction equipment and machinery all which are contributors to air emissions are also expected to be minimal due to project limited scope and footprint. The above pollutants are only likely to be significant where coal or heavy fuel oil are in use. As these fuels will not be used for the Project, significant impacts on air quality from these pollutants are therefore considered unlikely. The above pollutants are of concern due to the adverse effects on human health and natural ecosystems in the local environment.

Construction activities will also create dust in particular where vehicles are using unpaved roads close to properties and agricultural areas. Dust will be emitted from excavation, earth moving, loading, handling and transportation of materials. Dust deposition from road traffic is not likely to be a more significant issue than exhaust emissions, as many of the roads used by construction vehicles are paved. The construction has the potential to cause emissions of dust Total Suspended Particles (TSP) from land clearing, earthworks, movement of vehicles over unpaved surfaces and roads, handling of friable materials etc. These sources have the potential to increase ambient concentrations of particulate matter, resulting in nuisance at nearby settlements and to affect crops and natural vegetation through dust deposition.

Table 8-5: NEMA Reference Standards and Guidelines for NOx PM, SOx.

Parameter	Air Quality Standards
Sulphur Dioxide, SO2	20 μg/m^3
Nitrogen Oxides, NOx as NO2	200 μg/m^3 (1hr)
Suspended Particulate Matter	200 μg/m^3
PM10	100 μg/m^3
PM2.5	25 μg/m^3
Ozone	100 μg/m^3

Baseline Conditions

Pollutant Levels

Based upon the potential impacts, the pollutants of interest are oxides of Nitrogen, and particulate matter. Baseline dust and PM_{10} is influenced by a wide range of emissions, including man-made and natural sources. Along the route it is anticipated that there will be locations where the dust and PM_{10} baseline is elevated and close to and frequently above air quality standards due to existing levels of human activities including vehicle traffic. This includes the urban areas and in settlements where there are unpaved roads, at individual properties close to unpaved roads and properties close to agricultural activities. On this basis, the baseline dust and PM_{10} airshed is considered to be degraded but only on a localized basis.

NO^2 is emitted from combustion sources and these are almost exclusively man-made. In the absence of significant local sources, NO^2 concentrations are not expected to approach or exceed air quality standards. On this basis, existing levels of NO^2 will be below air quality standards throughout the route and the airshed is considered to be undegraded. The net impact of the project on air quality is not significant and temporary and will be limited to construction period.

Impact Assessment

Exhaust Emissions

No detailed traffic data is available at this stage. However, the numbers of Heavy-Duty Vehicles (HDV) and Light Duty Vehicles (LDVs) are expected to be well below the thresholds for potentially significant impacts. On this basis, the magnitude of impacts associated road traffic exhaust emissions are predicted to be negligible. Combined with the medium and low receptor sensitivities identified, the overall significance of impacts is Negligible at all locations.

Dust and PM10

There are the potential for impacts to arise from:

- Traffic on unpaved roads
- Earthworks
- Construction activities; and
- Trackout[1]

The Project will generate traffic on unpaved roads close to dwellings and within settlements. As this is expected to be more than five HDVs/day, and at some locations for more than four weeks, the magnitude is large. The project will require earthworks within the project upgradation site. These works will include stripping vegetation, excavations for the concrete foundations etc. Due to the scale of these activities, the magnitude is medium to negligible. The exact number of HDVs that will be generated is unknown. However, this is expected to range from 2 to 5 HDVs per day category using unpaved site roads. On this basis, the magnitude of trackout is medium. Combined with the medium and low receptor sensitivities identified the significance of unmitigated impacts are:

[1] Track-out or carry-out is dirt, mud or other debris tracked onto a paved road surface or area accessible to the public by a vehicle.

- Traffic on unpaved roads are **Major** where there are receptors within 50m of unpaved roads used by construction traffic, or the haul route;
- Earthworks are **Major** where there are receptors within 350m of locations where earthworks are being undertaken, including route stripping, construction compounds and excavations
- Construction activities are **Negligible** at all receptors; and
- Trackout are **Majo**r at receptors within 50m of routes used to access the construction route where these are within 500m of the access point to the route or construction compounds.

On this basis there is a need for mitigation to be implemented to reduce dust emissions/impacts.

Table 8-6: Pre-Mitigation Impact Assessment

Impact	**Degradation of the Airshed during Construction**				
Impact Nature	Negative	Positive	Neutral		
	Increase in airborne pollution.				
Impact Type	Direct	Indirect	Induced		
	Impact is a result as a direct interaction between project activities and the environment along the footprint of the project.				
Impact Duration	Temporary	Short Term	Long Term	Permanent	
	The impact is expected to be temporary as emissions arise throughout the construction phase.				
Impact Extent	Local	Regional	International		
	The impact will arise locally in the footprint of the project and immediate surrounds. Impacts will also arise further afield close to unpaved public roads used to access the work sites during construction.				
Impact Scale	The impact is considered as small (local) scale.				
Frequency	Intermittent – impacts will typically only arise during working hours				
Likelihood	Inevitable				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered small.				
Resource/ Receptor Sensitivity	Low	Medium	High		
	The sensitivity of human receptors is Medium in dwellings and settlements, Low elsewhere. The receptors of agricultural activities is Low.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Dust emissions have the potentially to have Major significant impacts at nearby sensitive human receptors.				

Mitigation Measures

Mitigation measures are split into general considerations for all construction activities, and specific mitigation measures for traffic on unpaved roads, earthworks and track-out. As general measures for all locations:

- Develop a **Dust Management Plan**
- Record all dust and air quality complaints, identify cause (s), take appropriate measures
- Liaise with local communities to forewarn of potentially dusty activities

- Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring
- Undertake inspections to ensure compliance with the Dust Management Plan
- Plan potentially dusty activities so that these are located as far from receptors as feasible
- Erect solid screens if feasible around stockpiles and concrete batching
- Avoid run off of mud and water and maintain drains in a clean state
- Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible
- Impose speed limits on haul routes and in construction compounds to reduce dust generation
- Minimise drop heights when loading stockpiles or transferring materials; and
- Avoid waste or vegetation burning.
- Develop Traffic Management Plan

For traffic on unpaved roads:

- Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the **Dust Management Plan** and will consider water availability and any stakeholder grievances; and
- On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity.
- Develop Traffic Management Plan

For earthworks:

- Revegetate exposed areas as soon as feasible
- Revegetate or cover stockpiles if feasible
- Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow.

For trackout:

- Where trackout is onto paved roads, use wet road cleaning methods to remove dirt and mud build up
- Avoid dry sweeping of large areas; and
- Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.
- Develop Traffic Management Plan

8.3.1.2 Operation Air Pollution Impacts

Dust Emissions

In reference to cement manufacturing, the cement kiln is regarded as a major point source of dust predominantly particulate matter emissions, since they are inherent to the cement manufacturing process. However, dust emission from cement kiln stacks has been reduced dramatically over the last two to three decades due to regular improvements in design and operation, including increased use of modern de-dusting equipment.

Additional sources of dust include the near-ground fugitive releases originating in most cases from crushing, grinding operations, transportation of material by truck or conveyor belts, storage conditions of clinker and/or cement, bagging activities. The main environmental concerns associated with dust emissions are centered on occupational health risk and irritation to human health. Dust (i.e., PM_{10}, particulate matter with a diameter of less than 10 µm) is able to penetrate deeply into the lungs and is known to impact the upper respiratory tract and cause irritation and infection, exacerbation of and increased mortality from cardiorespiratory diseases.

Given the setting of the area and the distribution of the population clusters, impacts from dust on the local air quality and human health are **medium** likely to occur and are expected to be of **Moderate Effect (3B)** when no mitigation measures are in place to control local (i.e., inside plant working area) emissions, and offset emissions from industrial stacks.

Mitigation Measures

As part of NCCL best available technique (BAT) and environmental commitment, all exhaust gas released from the raw mill and kiln circuit is handled by the Gas Conditioning Tower (GCT) and Electro-Static Precipitators (ESP) in charge of de-dusting operations. Upon filtering, dust emissions would be reduced to a maximum of 50 mg/Nm³ compliant with national and international standards.

Additional mitigation measures proposed to reduce, if not prevent, dust emissions tackle the handling of raw and finished material and include the use of sealed conveyor belts, silos for storage of raw and finished materials, vehicle and road wash-down procedures. In the case of truck hauling of raw material (such as the case for basalt and coal) to the plant, NCCL will ensure that hauled material is adequately contained in the trucks while using rubber film/sheet to cover trucks so as to reduce risk of releases and appropriate speed limits are maintained and vehicles travel on existing roads

Subsequently, impacts from dust emissions on the local air quality are reduced to a **Minor (2C) Effect** with a reduced risk on human and occupational health implications.

Gaseous Emissions

There are three main sources of gaseous emissions from a cement production system namely raw materials, the fuel, and the process itself. Gases produced from the clinker production process include carbon dioxide, carbon monoxide, nitrogen oxides, sulfur dioxide, and ammonia.

Carbon dioxide

Carbon dioxide results from the combustion of fuel and the calcination of the limestone component of the raw material mix, an essentially unavoidable and fixed consequence of clinker manufacture. Of the total amount of CO_2 emitted from a cement kiln, about half of the CO_2 originates from the raw material while the other half originates from the combustion process.

Carbon monoxide
CO is a product of incomplete combustion of carbonaceous fuel resulting from insufficient oxygen at the combustion site, insufficient mixing of oxygen and fuel at the combustion site, and/or rapid cooling of the combustion products to below the ignition temperature of CO prior to its complete oxidation. CO can be formed unintentionally at any of the combustion sites in the pyroprocessing system. The emission of CO usually represents partially burned and underutilized fuel.

Nitrogen oxides
NO_x emissions are formed by the reaction of nitrogen (N^2) in air with oxygen (O_2) at the high temperatures reached during the clinker production process. Oxides of nitrogen (NO_x) can be formed from the oxidation of organic nitrogen present in the fuel.

NO_2 is a toxic gas, even at relatively low concentrations contributing as well to the formation of acidic species, which can be deposited by wet and dry processes. NO_x can also increase the formation of ozone at ground level when mixed with VOCs in the sunlight atmosphere. NO is a relatively innocuous species but is of interest as a precursor for NO_2. The main adverse health effect caused by exposure to nitrogen dioxide (NO_2) is damage to the respiratory system. Inhalation of nitrogen dioxide increases a child's risk of respiratory infection and may lead to reduced pulmonary function later in life.

NOx emissions are also **highly** anticipated from the project's process operations however impacts on human health and air quality are expected to be **Negligible (1B).**

Sulphur Dioxide
SO_x emissions are generally formed from the combustion of sulphur (S) in the fuel (coal in this case) and from the oxidation of sulphur present in the raw materials and are predominantly (99%) released as Sulphur Dioxide (SO_2). The main sources of SO_2 emissions during the operation of NCCL Kaloleni would be from:

- The pyritic sulphur in the kiln feed; and
- The combustion of sulphur present in coal fed to the cement kiln

NCCL intends to reuse solid by-products from power generation (i.e., fly ash and slag) for cement manufacturing. This practice is expected to reduce on reliance on coal hence leading to a decrease in SO_x emissions.

The impacts from industrial SOx emissions would have a **Negligible effect (1C)** on the local (plant boundary) and surrounding environment.

In commitment to mitigate gaseous emission, NCCL is committed to:

- To concentrate on interface between the cement plant flue gases & treatment plant (gas conditioning, scrubbing, liquefaction)
- To understand global chain from capture to sequestration (technology, specifications and cost)
- Using alternative materials and biomass

- Energy consumption (reduce Specific Heat Consumption) Reduce the consumption of power.
- Upgrade its factories and improve its activities and operations on a continuous basis by using alternative power sources.
- Using industrial wastes such as ash and sludge to produce cement.
- Some additions can totally or partially replace the limestone, such as materials that were burned before, besides the reduction of burned calcium; this can reduce the emissions of CO_2.

8.3.1.3 Decommissioning Air Pollution Impacts

Air pollution during decommissioning include gaseous and dust emissions from temporary power generators, equipment and vehicles. The pollutants include Carbon Dioxide (CO_2), Volatile Organic Compounds (VOC), carbon monoxide (CO), Nitrogen Oxides (NO_2) and particulate matter (PM). Excavation, earth moving, loading, handling and transportation of materials will also give rise to fugitive dust. The significance of the impacts on air quality from the decommissioning activities is considered minor. The numbers of vehicles and mobile equipment are expected to be well below the thresholds for any significant impact associated with traffic exhaust emissions. The traffic management plan developed during construction will be used during this phase. The impact on air quality is predicted to be negligible.

Residual Impact

The residual impacts associated with road traffic exhaust emissions are **Negligible**. With the implementation of suitable mitigation and with adequate monitoring, residual impacts associated with dust and PM_{10} from construction activities are **Negligible**.

Table 8-7: Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Road traffic exhaust emissions	Construction	Negligible	Negligible
Dust and PM_{10} from construction activities.	Construction	**Major**	Negligible

8.1.3. Noise Emission and Vibration

8.1.3.1. Construction Noise Emission and Vibration Impacts

Potential noise impacts may arise as a result of the construction activities associated with the plant. There will be risks and impact of noise and vibration resulting from the construction equipment and machinery on people. Potential sources of noise and vibration during construction will include clearing, excavations, earthmoving, construction traffic etc. Construction activities and equipment are not expected to result in significant levels of vibration. Equipment that might cause high levels of vibration (such as impact piling or vibratory compaction) may be used but for a short period of time. The equipment used in construction will generate minimum noise during construction of the plant and will not adversely affect communities and fauna. EMCA noise emission regulations and guidelines

provide guidance on acceptable noise levels based on standards and these are set out in Table 8-8.

Table 8-8: EMCA Noise Regulations

	Maximum Allowable Ambient Noise Levels, LAeq,1hr, dBA Free field	
	Daytime	Night-time
	07:00 – 22:00	22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Impact Assessment

Construction

Although the overall construction program may last for up to 12 months, construction works to install each equipment will affect individual Noise Sensitive Receptors (NSRs) for approximately 3 months. Installation work will be carried out during the day only. Noise levels exceeding the daytime criterion for a medium magnitude impact are predicted at distances of 19m or less. However, the predictions conservatively assume all equipment will always be located at the closest part of the site to the receptor which is unlikely to be the case in practice. In addition, contractors are required to safeguard the work site to protect the safety of people and animals which may include erecting a temporary fence around the site. Small magnitude impacts of minor significance may affect a small number of the closest receptors during the daytime only.

Table 8-9: Pre-Mitigation Impact Assessment

Impact	**Noise during Construction**				
Impact Nature	Negative	Positive	Neutral		
	Elevated noise levels from operation of construction equipment.				
Impact Type	Direct	Indirect	Induced		
	Impact is a result of noise generated by construction activities.				
Impact Duration	Temporary	Short Term	Long Term	Permanent	
	Impacts are expected to be short term				
Impact Extent	Local	Regional	International		
	The impact will be limited to the NSRs within the immediate surrounds of plant worksite.				
Impact Scale	Local				
Frequency	Impacts may occur during daytime periods over a short-term duration at the plant worksite.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered negligible to small.				
Resource/ Receptor Sensitivity	Low	Medium	High		
	Dwellings are considered to have a high sensitivity to noise.				
	Negligible	Minor	Moderate	Major	

Impact Significance	Considering the impact magnitude is small to negligible and the sensitivity is high, the overall significance is considered to be negligible to minor.

There will be noise and vibrations generated during the construction phase, but it will be typical of any construction site. The noise impact during construction is expected to be negative and short-term. The major receptors are expected to be the construction workers as well as any immediate neighbouring residential premises. Sources of noise will be trucks and the off-road vehicles in transit, use of compressor to break hard ground and the use of motorized chain saws for vegetation clearing.

Mitigation

Mitigation measures are set out below, which have been assumed for the base case assessment. Management of the noise risks can be done in six steps namely: -assessing the risks; protecting employees; Maintaining and equipment use; training and sensitizing of workers; health surveillance; work reviews use of appropriate technology. Assessing noise risks involves identification of noise hazards at the workplace and developing the appropriate action plans. Employee protection should involve elimination or controlling noise risks to acceptable legal limits by use good practice, appropriate engineering controls and employee protection. Equipment use and maintenance involves appropriate use of all noise control equipment and appropriate use of hearing protection. Training and sensitization of workers involves employee accessing information and training on noise risks, control measures and hearing protection. Health surveillance involves hearing checks for exposed workers and using result to improve on protection of the workers. Work reviews involve constant review of work practice, changes in noise exposure and new ways to reduce risks. The following standard mitigation measures will be employed:

- Siting noisy equipment as far away as possible from NSRs, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable
- Where practicable noisy equipment will be orientated to face away from the nearest NSRs;
- Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only
- Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable
- Where practicable, stationary equipment will be located in an acoustically treated enclosure
- For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals
- Throttle settings will be reduced, and equipment and plant turned off, when not being used
- Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and
- Fitting of mufflers or silencers of the type recommended by manufacturers

Residual Impact

Standard mitigation measures listed above have been assumed for the base case noise assessment. No impacts above small are predicted and therefore no further mitigation is required. Consequently, the residual impacts are the same as those presented above.

Table 8-10. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Noise from construction activities affecting nearby dwellings	Construction	Negligible-Minor	Negligible

8.1.3.2. Operation Noise Emission and Vibration Impacts

During the operational phase, industrial machinery and processes are composed of various noise sources such as rotors, stators, gears, fans, vibrating panels, turbulent fluid flow, impact processes, electrical machines, and internal combustion engines among others. The basic mechanism of noise generation can be due to mechanical noise, fluid noise and/or electromagnetic noise. Sound fields in the workplace are usually complex, due to the participation of many sources which may include propagation through air (air-borne noise), propagation through solids (structure-borne noise), diffraction at the machinery boundaries, reflection from the floor, wall, ceiling and machinery surface, absorption on the surfaces among others.

The mechanisms of noise generation depend particularly on the noisy operations and equipment including grinding, shake out (foundries), punch presses, drop forges, drilling, lathes, pneumatic equipment, tumbling barrels, plasma jets, cutting torches, machine tools for forming, dividing and metal cutting, such as punching, pressing and shearing, milling machines and grinders, pumps and compressors, drive units, hand-guided machines, self-propelled working machines, in-plant conveying systems and transport vehicles. Clinker and cement manufacturing includes raw material grinding, mixing and storage; intermediate and final product handling and transportation; and operation of exhaust fans. Noise levels from primary noise sources at the cement plant will be in the range of 73-100 dB(A) as presented in Table 8-11 below.

Table 8-11: Principle Sources of Noise and predicted Noise Levels at site

OPERATION	SOUND LEVEL DB(A)
Vertical mills	95-100
Kilns	80-85
Cement mills	95-100
Pumps	73
Compressor	85-95
Cooler	85

The site already has built about 2 m high concrete wall around the cement plant premises and has grown trees around the plant premises in order to minimize on noise. Moreover, NCCL in an attempt to completely neutralize on noise generation, implies to:

- Select low noise equipment
- Install mufflers at air inlets and outlets of the fans and air compressors
- Install sound insulation cover (room) for equipment with higher noise
- Place noisier sources farther away from sensitive receptors in the overall design
- Build sealed or semi-sealed workshops for noisier production processes

Offsite Traffic

Offsite noise impacts may arise from transport of raw material along the road linking the quarries and the cement plant crossing nearby communities. Typical noise levels from trucks could range between 60 and 75 dB(A) based on vehicle condition and speed. The flow of large volume of trucks at close proximity from communities will be a major source of noise pollution in addition to high safety risk to pedestrians and motorists.

With no mitigation measures in place to reduce on the impacts on the health and safety of public community/local settlers situated along the road, repercussions **highly** likely to occur and are anticipated to be **Significant** and of long-term nature **(4C)**.

NCCL shall develop a detailed traffic management plan for organizing truck movement inside the plant, traffic flow, parking spaces, warning signs, timing, directions, measures to prevent traffic related accidents or injuries to workers and motorist driving along the highway and at the facility main entrance/exit gate.

The adoption of the propose mitigation measure will reduce the impacts from offsite noise pollution to acceptable **Minor** level **(2B)**.

Mitigation Measures

- Use of properly tuned engines, proper mountings and muffling of equipment and equipment fitted with silencers
- Providing permanent enclosures around the heavy noise producing equipment
- Ensuring good maintenance and repair of the heavy equipment
- All equipment shall be switched off when not in use.
- Equipment and trucks used shall use the best available noise control techniques (e.g., improved mufflers; equipment redesign; use of intake silencers, ducts, engine enclosures and/or acoustically attenuating shields or shrouds) wherever feasible and necessary.
- Stationary noise sources shall be located as far from sensitive receptors as possible. If they must be located near sensitive receptors, they shall be muffled to the extent feasible and enclosed within temporary shed.

Table 8-11. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Noise from construction activities affecting nearby dwellings	Operation	Negligible-Minor	Negligible

8.1.3.3. Decomisisoning Noise Emission and Vibration Impacts

There will be risks and impact of noise and vibration resulting from the equipment and machinery on people. Potential sources of noise and vibration during decommissioning will include clearing, excavations, earthmoving, construction traffic etc. Decommissioning activities and equipment are not expected to result in significant levels of vibration. Equipment that might cause high levels of vibration (such as impact piling or vibratory compaction) may be used but for a short period of time. To further minimize exposure to noise, work will be carried out during the day only. The significance of the noise impacts during decommissioning has been rated as negligible.

Table 8-12. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Noise from construction activities affecting nearby dwellings	Decommissioning	Negligible-Minor	Negligible

8.1.4. Soil Erosion and Contamination Impacts

8.1.4.1. Construction Soil Erosion and Contamination Impacts

Construction activities will have direct physical impacts to soil. Possible direct physical impacts to soil include erosion resulting from activities such as excavation of foundations, clearing of vegetation for infrastructure such as roads, laydown areas, construction zones and workers camp (if applicable). The excavation of soil for the construction will disrupt the soil cohesion and also may result in surplus soil due to the use of concrete for the foundation. If not properly restored or managed, this soil may erode and wash into nearby surface water bodies adversely impacting these. Any temporary soil stockpiles established during construction of infrastructure will be at risk of erosion from wind and rainfall. Impacts to soil from unplanned events, such as accidental release of hazardous materials is discussed elsewhere.

Baseline Conditions

The potential for soil erosion to occur during the construction phase is based on a number of factors including the type and physical properties of soil, the topographic slope, the vegetation cover, and the nature and duration of construction activities which disrupt the soil.

Impact Assessment

The excavation of foundations and equipment laydown areas will have a direct negative effect on soil cohesion, thereby increasing the risk of erosion on the entire footprint of the project. The impact is likely to occur, but the extent of the impact is likely to be limited to the footprint of the activities, particularly the construction and use of access roads, laydown areas (i.e., local extent). The impacts of construction activities on soil erosion are anticipated to last for the duration of the construction phase only (i.e., short term). Given the subtropical location of the Project and the nature of vegetation present, it is anticipated that cleared areas will revegetate naturally and relatively quickly (assuming rainfall patterns similar to the current averages persist), minimizing the risk of erosion.

During construction there is the potential for spills of fuels and oils during construction activities, fueling, maintenance of machinery and vehicles. Spills could occur in a number of locations on site. Spills have the potential to affect terrestrial environments and could lead to the deterioration of soil, water and sediment quality. This could lead to knock on effects for flora and fauna and local community users. If hazardous materials such as fuel were to be released to the soil and surface water resources, this would be limited to the local extent, depending on the volume spilt and rate of spillage. Within the Project AoI there are limited surface water resources such as streams and rivers which could be impacted if the spill were to occur within proximity of the resource.

Likelihood: -Incidental spills of fuels are infrequent but do occur; most frequently due to malfunction of handling systems, poor practice of workers and force majeure. Spills are most likely to occur during refilling and transportation of substances. Large releases of hazardous materials are rare, and it is considered unlikely that a spill would occur of emergency scale.

Significance of Impacts: -For impacts to soils, the spatial scale is considered to be local. The impact could be long term and is a direct negative impact. The overall magnitude is considered to be medium.

Table 8-13: Pre-Mitigation Impact Assessment

Impact	**Soil Erosion during Construction**				
Impact Nature	Negative	Positive	Neutral		
	Loss of soil cohesion contributing to erosion.				
Impact Type	Direct	Indirect	Induced		
	Impact is a result as a direct interaction between project activities and soil at the project site.				
Impact Duration	Temporary	Short Term	Long Term	Permanent	
	The impact is expected to be short term, however in the case of serious erosion the impacts may be experienced long term.				
Impact Extent	Local	Regional	International		
	The impact will be limited to the footprint of the project and immediate surrounds.				
Impact Scale	The impact is considered as small (local) scale.				
Frequency	Continuous				
Likelihood	Possible				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered small.				
Resource/Receptor Sensitivity	Low	Medium	High		
	The sensitivity of the soil around the proposed plant to erosion is considered to be medium to low.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor.				

Mitigation

The following mitigation measures will be implemented to minimize the potential for soil erosion:

- Vegetation clearing and topsoil disturbance will be minimized.
- Contour temporary and permanent access roads/laydown areas so as to minimise surface water runoff and erosion
- Sheet erosion of soil shall be prevented where necessary through the use of sandbags, diversion berms, culverts, or other physical means.
- Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. Wherever possible construction work will take place during the dry season.
- Topsoil shall be evenly spread across the cleared areas when reinstated.
- Accelerated erosion from storm events during construction shall be minimised through managing storm water runoff (e.g., velocity control measures).
- Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile.
- Spread mulch generated from indigenous cleared vegetation across exposed soils after construction.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to negligible to minor onsite

Table 8-14. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Loss of soil resources due to erosion	Construction	Negligible-Minor	Negligible to minor

8.1.4.2. Operation Soil Erosion and Contamination Impacts

Operation activities will have no direct physical impacts to soil. Possible physical impacts to soil during operation may include impacts to soil from unplanned events, such as accidental release of hazardous materials (fuel) which is discussed elsewhere in chapter xx.

Table 8-15. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Loss of soil resources due to erosion	Operation	Negligible-Minor	Negligible to minor

8.1.4.3. Decommissioning Soil Erosion and Contamination Impacts

Decommissioning activities will have direct physical impacts to soil similar to those impacts experienced during the construction phase. Possible direct physical impacts to soil include erosion resulting from activities such as demolition of the existing structures. The demolition of structures during the decommissioning will disrupt the soil cohesion and also may result in surplus soil due to the use of concrete for the foundation. If not properly restored or managed, this soil may erode and wash into nearby surface water bodies adversely impacting these. Any temporary soil stockpiles established during construction

of infrastructure will be at risk of erosion from wind and rainfall. Impacts to soil from unplanned events, such as accidental release of hazardous materials is discussed elsewhere.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to negligible to minor onsite

Table 8-16. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Loss of soil resources due to erosion	Decommissioning	Negligible-Minor	Negligible to minor

8.1.5. Surface Water Quality Impacts

Construction activities associated with the cement plant can have significant effects on the surface water resources in the proposed project area and good environmental management, including control of runoff, sediments, storage of fuels and good practice should be followed. Project activities will interact with water resources in the following ways:

- There will be direct interaction during clearing and construction near to or in surface water bodies.
- There will be indirect interaction in the case of erosion of soils into water bodies.
- There will be direct interaction from the abstraction of water from surface water bodies for construction (e.g., for dust control).
- There will be no direct interaction from the discharge of treated domestic wastewater to surface water bodies.
- In addition, if vegetation and soil clearing are not properly managed, there is the potential for soils to run into water bodies and increased sediment load. This in turn may have a detrimental effect on water quality and affect surface water users.

During the construction, water will be required for several purposes including for use in plant construction process which requires water, cleaning of the vehicles and equipment, keeping down construction dust impacts among others. The potential impacts and risk of the project relating to surface water supply are:

- Stresses on local water resources from construction water abstractions from surface and/or ground water; and
- Potential indirect effects from water demand caused by local population expansion due to in-migration.
- Overall raw water supply requirements for the construction of will be very low and necessary during concrete mixing only and keeping down the dust.

8.1.5.1. Water Quality Construction Impacts

Below are risks and impacts on surface water that are likely to be encountered as a result of the project during the construction phase:

1. The construction of the project may cause temporary disturbances and negative effects on surface water resources. These negative impacts could increase without proper scheduling or programming of the works or particular activities. In other

words, there are likely to be impacts of construction of the project on water quality where required mitigation activities are not implemented correctly.

2. Stockpile and other materials may enter any other surface water resources near to the Project site where there are inadequate containment measures. Such surface runoff may carry sediments or harmful wastes, and these may collect in surface water resources and therefore there will be negative impacts on water quality.
3. In addition, in the project site there may be storage areas for chemicals, fuels, oils, etc., used for construction activities including refueling of vehicles. These materials must be stored according to the regulatory requirements, including the related regulation. Otherwise, there may be risk of leakage of all chemicals to the surface water resources, and so there may be impact on water quality.
4. In addition, all chemicals, fuels, oils etc. used for construction activities must be handled, transported and used according to related regulation and procedures. Otherwise, there may be risk of spill of these by accidents etc. Therefore, there may be impact on water quality.
5. There may also be risks of pollution from the uncontrolled runoff or accidental spillage of fuels and lubricants, or from the inadequate or unsafe disposal of wastewater from construction sites.

No information is available about the turbidity and concentration of suspended solids in rivers in the project area, however given the extent of human settlement and agricultural activities it is probable that these are elevated already and therefore that these rivers have a low to medium sensitivity to change. The volume of soil like to be disturbed by proposed project activities is likely to be ***minor*** and therefore the extent of the impacts from sediment addition to the river is considered to be local. Owing to the subtropical location of the project and the high probability that cleared areas will revegetate naturally thereby limiting erosion, the duration of this impact is anticipated to be short term. The nature of the construction activities for the plant render the erosion of soil and subsequent siltation of rivers nearby possible. The ***small*** magnitude of this impact on surface water quality and the *low* sensitivity of these rivers to increased turbidity means the significance of this impact is assessed as ***minor***.

Table 8-17: Pre-Mitigation Impact Assessment

Impact	**Siltation of surface water**			
Impact Nature	Negative	Positive	Neutral	
	Eroded soil entering surface water bodies.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and the environment aound the footprint of the project.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is expected to be short term, however in the case of serious erosion the impacts of siltation of surface water may be experienced long term (into the operational phase).			
Impact Extent	Local	Regional	International	
	The impact will be limited to the footprint of the project and immediate surrounds. The dilution of sediments in the river will render this impact negligible at the regional scale.			
Impact Scale	The impact is considered as small (local) scale.			
Frequency	Continuous			

Likelihood	Possible				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered small.				
Resource/ Receptor Sensitivity	Low		Medium		High
	The sensitivity of the rivers near the proposed project to siltation is considered to be medium to low.				
Impact Significance	Negligible		Minor	Moderate	Major
	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor.				

Table 8-18: Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Availability and Quality of Water	Construction	-Minor	Negligible to minor

8.1.5.2. Water Quality Operation Phase Impacts

Once the plant is reinstated, no direct disturbance of surface water bodies is anticipated. Operation activities will have no direct physical impacts to water quality (surface and underground). Possible impacts to water bodies during may include impacts to water from unplanned events, such as accidental release of hazardous materials (fuel).

Mitigation

The mitigation measures listed for soil management above are also applicable to surface water quality. In addition, the following mitigation measures will be implemented to minimise the potential for siltation of surface water:

- All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment; and
- Domestic wastewater shall be treated and disposed of in accordance with an approved waste management plan.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to ***negligible*** to ***minor*** on theentire project area of the plant.

Table 8-19. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Loss of soil resources due to erosion	Operation	Negligible-Minor	Negligible to minor

8.1.5.3. Decommissioning Phase Impacts

Below are risks and impacts on surface water that are likely to be encountered as a result of the project during the decommissioning phase:

1. The decommissioning of the project may cause temporary disturbances and negative effects on surface water resources. These negative impacts could increase

without proper scheduling or programming of the works or particular activities. In other words, there are likely to be impacts of decommissioning of the project on water quality where required mitigation activities are not implemented correctly.

2. Stockpile and other materials may enter any other surface water resources near to the Project site where there are inadequate containment measures. Such surface runoff may carry sediments or harmful wastes, and these may collect in rivers or any other surface water resources and therefore there will be negative impacts on water quality.
3. In addition, in the project site there may be storage areas for chemicals, fuels, oils, etc., used for decommissioning activities including refueling of vehicles. These materials must be stored according to the regulatory requirements, including the related regulation. Otherwise, there may be risk of leakage of all chemicals to the surface water resources, and so there may be impact on water quality.
4. In addition, all chemicals, fuels, oils etc. used for decommissioning activities must be handled, transported and used according to related regulation and procedures. Otherwise, there may be risk of spill of these by accidents etc. Therefore, there may be impact on water quality.
5. There may also be risks of pollution from the uncontrolled runoff or accidental spillage of fuels and lubricants, or from the inadequate or unsafe disposal of wastewater from construction sites.

Table 8-20. Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Loss of soil resources due to erosion	Decommissioning	Negligible-Minor	Negligible to minor

8.1.6. Impacts on Flora and Fauna

8.1.6.1. Decommissioning Impacts on Flora and Fauna

Impacts on local vegetation and fauna from the decommissioning phase are mainly linked to on site dust emmissions ($PM_{10)}$, as well as on and off-site atmospheric emissions (sulphur dioxide, carbon dioxide, oxides of nitrogen) released from the vehicular traffic. Apart from atmospheric emissions, particulate matter/dust is also a common atmospheric process pollutant. The main impact from suspended and deposited dust particles on the vegetation is the decrease in absorbed light intensity due to the coverage of leaves as well as impediment of the pollination progression which could lead to plant growth disruption and loss of integrity.

SOx and NOx levels that could potentially affect natural vegetation will not be reached in the cultivated areas located surrounding the plant site. Impacts from NOx and SOx emissions on vegetation will be Negligible (1C).

8.1.6.2. Operation Impacts on Flora and Fauna

Impacts on local vegetation and fauna from the operation phase are mainly linked to on site dust emmissions ($PM_{10)}$, as well as on and ff-site atmospheric emissions (sulphur dioxide, carbon dioxide, oxides of nitrogen) released from the vehicular traffic. Apart

from atmospheric emissions, particulate matter/dust is also a common atmospheric process pollutant. The main impact from suspended and deposited dust particles on the vegetation is the decrease in absorbed light intensity due to the coverage of leaves as well as impediment of the pollination progression which could lead to plant growth disruption and loss of integrity.

8.1.6.3. Decommissioning Impacts on Flora and Fauna

Impacts on local vegetation and fauna from the decommissioning phase are mainly linked to off-site atmospheric emissions (sulphur dioxide, carbon dioxide, oxides of nitrogen) released from the processes of cement manufacturing (kiln stacks) and coal stack. Apart from atmospheric emissions, particulate matter/dust is also a common atmospheric process pollutant. The main impact from suspended and deposited dust particles on the vegetation is the decrease in absorbed light intensity due to the coverage of leaves as well as impediment of the pollination progression which could lead to plant growth disruption and loss of integrity.

8.1.7. Solid and Liquid Waste Impacts

8.1.7.1. Solid and Liquid Waste Impacts

Improper waste management procedures or lack of mitigation measures during decommissioning phase of the Project may result in adverse environmental and social impacts on: -

- Storm water quality and thus water quality in the water bodies in project areas
- Soil quality
- Surface water quality
- Ground water quality; and
- Ecological receptors or human health.

The different types of wastes and sources that are likely to be generated from the decommissioning of the plant are described below.

a) Recyclable and Reusable Waste

The types of recyclable and reusable wastes to be generated on site during the decommissioning period include among others: -

Box 8-1: Recyclable and Reusable Waste

1. Waste metal
2. Waste plastic
3. Waste cables
4. Waste glass
5. Wastepaper (packaging material)
6. Clean containers, drums, bins etc.
7. Spoil

b) Excavation Waste

The greatest volume of excavated material will arise from the decommissioning activities of the Project during civil works associated with decommissioning of the plant. The excavated materials will be re-used immediately as back fill material.

c) Wastewater

Water will be required for the decommissioning works, dust suppression, mixing of concrete and washing of equipment among others.

d) Hazardous Waste

The construction activities will generate hazardous wastes which may adversely impact on the local environment due to handling, storage, transport and disposal. These include, oil, grease etc. During the decommissioning period, waste oil will result from the maintenance of machines, equipment and vehicles.

Impact Assessment

Direct and indirect disposal of waste oils to the receiving environment is likely to adversely impact on the environment and human health. Without mitigation measures, it is anticipated that there will be potential major to moderate adverse impacts during construction and moderate adverse impacts during the maintenance and operations periods. Wastewater if discharged indiscriminately into the environment, will lead to risks and impacts on water bodies, soil, vegetation, fisheries and human health.

Table 8-21. Pre-Mitigation Impact Assessment

Impact	**Waste generation and hazards during Construction**				
Impact Nature	Negative	Positive	Neutral		
	Disposal of waste to the receiving environment is likely to adversely impact on the environment and human health.				
Impact Type	Direct	Indirect	Induced		
	Waste generated from the used materials during construction and operation activities that could cause land and groundwater contamination if spilled or not handled, stored and disposed of correctly.				
Impact Duration	Temporary	Short Term	Long Term	Permanent	
	The impact is considered to be temporary for the duration of the construction phase.				
Impact Extent	Local	Regional	International		
	Impact limited to the Study Area				
Impact Scale	The impact is considered as small scale since it is local to the construction area.				
Frequency	The frequency is considered to be occasional considering that the construction activities are localized.				
	Positive	Negligible	Small	Medium	Large
Impact	**Waste generation and hazards during Operation**				
Impact Magnitude	Based on the parameters above and considering the embedded measures, the magnitude is considered to be small.				
Resource/Receptor Sensitivity	Low	Medium	High		
	The sensitivity of the of the potential receptors- land and ground water is High				

Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude is small and sensitivity is high, the impact on the land and water resources during construction is considered to be of **moderate** significance.			

Mitigation

The following mitigation measures should be employed to reduce any impacts on associated with waste generation.

- A Waste Management Plan must be prepared prior to commencement of decommissioning by the contractor (s).

8.1.7.2. Operation Solid and Liquid Waste Impacts

Improper waste management procedures or lack of mitigation measures during decommissioning phase of the Project may result in adverse environmental and social impacts on: -

- Storm water quality and thus water quality in the water bodies in project areas
- Soil quality
- Surface water quality
- Ground water quality; and
- Ecological receptors or human health.

The different types of wastes and sources that are likely to be generated from the decommissioning of the plant are described below.

Recyclable and Reusable Waste

The types of recyclable and reusable wastes to be generated on site during the decommissioning period include among others: -

Box 8-2: Recyclable and Reusable Waste

1. Used oil
2. Office waste (papers) etc

Wastewater

Water will be from claning of the plant and use in washroom facilities among others.

Impact Assessment

Direct and indirect disposal of waste oils to the receiving environment is likely to adversely impact on the environment and human health. Without mitigation measures, it is anticipated that there will be potential major to moderate adverse impacts during construction and moderate adverse impacts during the maintenance and operations periods. Wastewater if discharged indiscriminately into the environment, will lead to risks and impacts on water bodies, soil, vegetation and human health.

Table 8-22: Pre-Mitigation Impact Assessment

Impact	**Waste generation and hazards during Operation**				
Impact Nature	Negative	Positive	Neutral		
	Disposal of waste to the receiving environment is likely to adversely impact on the environment and human health.				
Impact Type	Direct	Indirect	Induced		
	Waste generated from the used materials during operation activities that could cause land and groundwater contamination if spilled or not handled, stored and disposed of correctly.				
Impact Duration	Temporary	Short Term	Long Term	Permanent	
	The impact is considered to be temporary for the duration of the construction phase.				
Impact Extent	Local	Regional	International		
	Impact limited to the Study Area				
Impact Scale	The impact is considered as small scale since it is local to the operation area.				
Frequency	The frequency is considered to be occasional considering that the operation activities are localized.				
	Positive	Negligible	Small	Medium	Large
Impact	**Waste generation and hazards during Operation**				
Impact Magnitude	Based on the parameters above and considering the embedded measures, the magnitude is considered to be small.				
Resource/ Receptor Sensitivit	Low	Medium	High		
	The sensitivity of the of the potential receptors- land and ground water is High				
Impact Significance	Negligible	Minor	Moderate	Major	
	Considering the magnitude is small and sensitivity is high, the impact on the land and water resources during construction is considered to be of **moderate** significance.				

Mitigation

The following mitigation measures should be employed to reduce any impacts on associated with waste generation.

- A Waste Management Plan must be prepared prior to commencement of construction by the contractor (s).

8.1.7.3. Decomissioning Solid and Liquid Waste Impacts

Improper waste management procedures or lack of mitigation measures during decommissioning phase of the Project may result in adverse environmental and social impacts on: -

- Storm water quality and thus water quality in the water bodies in project areas.
- Soil quality
- Surface water quality
- Ground water quality; and
- Ecological receptors or human health.

The different types of wastes and sources that are likely to be generated from the decommissioning of the plant are described below.

Recyclable and Reusable Waste

The types of recyclable and re-usable wastes to be generated on site during the decommissioning period include among others: -

Box 8-3: Recyclable and Reusable Waste

1. Waste metal
2. Waste plastic
3. Waste glass
4. Wastepaper (packaging material)
5. Containers, drums, bins etc.
6. Spoil

Demolition Waste

The greatest volume of demolition material will arise from the decommissioning activities of the Project during civil works associated. The excavated materials will be re-used immediately as back fill material.

Wastewater

Water will be required for the decomissioning works, dust suppression among others.

Hazardous Waste

The decommissioning activities will generate hazardous wastes which may adversely impact on the local environment due to handling, storage, transport and disposal. These include, oil, grease etc. During the decommissioning period, waste oil will result from the maintenance of machines, equipment and construction vehicles.

Impact Assessment

Direct and indirect disposal of waste oils to the receiving environment is likely to adversely impact on the environment and human health. Without mitigation measures, it is anticipated that there will be potential major to moderate adverse impacts during decomissioning and moderate adverse impacts during the maintenance and operations periods. Wastewater if discharged indiscriminately into the environment, will lead to risks and impacts on water bodies, soil, vegetation and human health.

Table 8-23: Pre-Mitigation Impact Assessment

Impact	**Waste generation and hazards during decomissioning**			
Impact Nature	Negative	Positive	Neutral	
	Disposal of waste to the receiving environment is likely to adversely impact on the environment and human health.			
Impact Type	Direct	Indirect	Induced	
	Waste generated from the used materials during decommissioning activities that could cause land and groundwater contamination if spilled or not handled, stored and disposed of correctly.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is considered to be temporary for the duration of the decommissioning phase.			
Impact Extent	Local	Regional	International	

	Impact limited to the Study Area				
Impact Scale	The impact is considered as small scale since it is local to the decommissioning area.				
Frequency	The frequency is considered to be occasional considering that the decommissioning activities are localized.				
	Positive	Negligible	Small	Medium	Large
Impact	**Waste generation and hazards during Operation**				
Impact Magnitude	Based on the parameters above and considering the embedded measures, the magnitude is considered to be small.				
Resource/Receptor Sensitivity	Low		Medium	High	
	The sensitivity of the of the potential receptors- land and ground water is High				
Impact Significance	Negligible		Minor	Moderate	Major
	Considering the magnitude is small and sensitivity is high, the impact on the land and water resources during decommissioning is considered to be of **moderate** significance.				

Mitigation

The following mitigation measures should be employed to reduce any impacts on associated with waste generation.

- A Waste Management Plan must be prepared prior to commencement of decommissioning by the contractor (s).

Residual Impact

The impact significance is **Negligible** after mitigation measures during construction and **Minor** post mitigation for operations (**Table 8-24**).

Table 8-24: Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Poor waste disposal	Construction	Minor	Negligible
Poor waste disposal	Operation	Minor	Minor
Poor waste disposal	Decommissioning	Minor	Minor

8.1.8. Worker's Health and Safety

8.1.8.1. Construction Impacts on Worker's Health and Safety

The construction of the plant is likely to attract workers from within the project area and outside of the project area. The total number of work force cannot be estimated at this point and will be provided by the contractor. The total work force is going to be skilled and unskilled and sourced from project locality and outside of locality including internationally depending on the skill sets desired. The workers required by the contractor may include among others: -

a) Engineers-skilled experts (civil, mechanical, electrical) etc.
b) Supervisors, inspectors, foremen and operators–skilled experts.
c) Technicians (inspectorate, welders, masons, steel fixers, drivers etc.)- skilled experts; and
d) Unskilled-flagmen, diggers, cleaning, security, mixing, watering, help team.

The construction activities will also entail engagement of contractors, sub-contractors and third-party entities which will form part of the supply chain. Workers' rights including

occupational health and safety may be abused hence adverse impact and may include exposure to accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working conditions. These issues should be considered not only for those who are directly employed by the proponent but also its contractors (including sub-contractors) and within the supply chain. The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Kenyan law or international best practice. The potential for occupational health and safety incidents throughout the life cycle of the project is higher during construction phase.

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working conditions. These issues should be considered not only for those who are directly employed by NCCL but also its contractors (including sub-contractors) and within the supply chain. The Project could potentially lead to work force-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Kenyan law or international best practice.

Table 8-25 presents the potentially significant impacts associated with occupational health and safety and worker management during the decommissioning phases. The potential for occupational health and safety incidents throughout the life cycle of the project is higher during construction phase.

Table 8-25: Potential Impacts on Occupational Health and Safety and Worker Management

Construction Phase	Operation Phase
Impacts on workers' health and safety, in particular from road accidents, slip, and trip and falls hazards during construction activities, exposure to chemicals and inconsistent use of PPEs. Impacts on workers' rights from violations of labour laws in particular with respect to enforcement of health and safety measures by the employer such as the use of appropriate PPEs during construction of the plant. Workers are likely to be exposed to work related risks during the construction phase of the project. Typical activities for the construction of the plant include clearance of the site in vegetated areas, excavation work, erecting towers, working at height. The above activities could expose workers to injuries and even fatalities when for instance those working at height fall, towers collapse, objects fall on workers, electrocution etc. Similarly, the storage and disposal of hazardous waste and materials generated from the use of materials during the construction of plant may also pose a hazard to the health of the workforce if not handled properly. Equipment and worker transport along the access roads to the pole positions may also result in road accidents in the absence of a proper traffic management plan or if traffic safety rules are not enforced. The often-poor conditions of the existing roads may also increase the risk of accidents.	Impacts on workers' health and safety in particular during maintenance of the plant are from occupational hazards such as electrocution, noise, emissions, burn, and the exposure to chemicals. Impacts on worker's rights from lack of enforcement of health and safety measures by the employer such as the use of appropriate PPEs during maintenance of the plant

Impact Assessment

Construction

Worker's Health and Safety and Labour Rights

During construction, the direct interaction between the Project and the workforce if not managed properly, will result in negative impacts on the workers' working conditions and potentially permanent impacts on their health and safety. The impact is considered short-term and continuous over the 12 months' construction phase resulting in a medium impact magnitude. Since contractors are expected to operate according to international standards and considering the level of prior training of the workforce, receptor sensitivity is considered medium. Therefore, the impact is of ***moderate*** significance.

Table 8-26: Pre-Mitigation Impact Assessment

Impact	**Workers Health and Safety and Rights during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.			
Impact Type	Direct	Indirect	Induced	
	Resulting from a direct interaction between the Project (i.e., increased project traffic, working at height, open excavations, and demining) and the workforce.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Injuries and fatalities could have permanent impacts on workers and their families.			
Impact Extent	Local	Regional	International	
	The workforce will be primarily contracted from urban centres and potentially from peri-urban areas around.			
Impact Scale	As mentioned above the workers will be working on different sections of the line at different times. The impact scale is therefore medium.			
Frequency	The frequency is considered to be infrequent as the workforce and drivers are expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures.			
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the parameters above and considering the embedded measures in place the magnitude is considered to be medium.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the receptors (workforce working on site) is considered medium as some workers may not be aware of their rights.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since the magnitude is considered medium and sensitivity is medium, the impact on workers' health and safety during construction activities is considered to be of moderate significance.			

As stated previously, the Project during its lifetime will be subject to local labour laws and international standards with respect to the responsibility of the employer to safeguard the health and safety of its employees. The Project is therefore expected to abide by these regulations and develop and implement appropriate health and safety measures covering the construction and operation phase including the use of Personal Protetcive Equipment (PPE) by the workforce. As stated for the construction phase, compliance with NCCL's Environmetal Health and Socoal Safety (EHSS) policy aimed at safeguarding the health and

safety of its employees and subcontractors will additionally help prevent potential labour abuses and reduce the risk of health and safety incidents. Finally, all contractor contracts include explicit reference to the need to abide by Kenyan law and NCCL's standards and policies in relation to health and safety.

Table 8-27: Pre-Mitigation Impact Assessment

Impact	**Workers Health and Safety and Rights during Operations**				
Impact Nature	Negative	Positive	Neutral		
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.				
Impact Type	Direct	Indirect	Induced		
	Resulting from a direct interaction between the Project (i.e. increased project traffic, working at height, open excavations) and the workforce.				
Impact Duration	Temporary	Short Term	Long Term	Permanent	
	Injuries and fatalities could have permanent impacts on workers and their families.				
Impact Extent	Local	Regional	International		
	The workforce will be primarily contracted from urban and rural centres within the county and other Counties in Kenya as well as from other countries for some higher skilled jobs.				
Impact Scale	The impact scale is considered small during operations as the workforce size will be reduced and maintenance activities will be periodic.				
Frequency	The impact is considered to be infrequent since the operation activities will be limited to maintenance works. The workforce is expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures. Lessons learned from the construction phase are expected to enhance the safety conditions and thus reducing the frequency of safety incidents during the operation and maintenance phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the parameters above, and the embedded measures in place, the magnitude is considered small.				
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High		
	The sensitivity of the receptors is considered low as workers will be mostly skilled permanent employees.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Considering the magnitude is medium and sensitivity is low, the impact on workers' health and safety during operations activities is considered to be of Moderate significance.				

Mitigation Measures

The following mitigation measures will be implemented during the construction phase to reduce any impacts on workers' health and safety and labour rights. NCCL will develop and implement a **Workers Health and Safety Management System** covering all contractors and sub-contractors including the following measures:

- NCCL will require contractors to develop Human Resources Policy, which will outline worker rights to be included in all contracts including restrictions on working hours in line with applicable ILO standards, compensation including consideration of overtime, holidays etc.
- NCCL will require its contractors and subcontractors to put in place policies in line with national legislation and applicable international legislation and NCCL Code of Conduct and Policies.
- NCCL will establish contractual clauses to be embedded in the contracts of the contractors that require adherence to Kenyan law and international standards to be

upheld related to worker rights and providing the contractor and NCCL with the right of audit.

- NCCL require that contractors prohibit the use of alcohol or drugs, which could adversely affect the ability the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment.
- Pre-employment medical assessments will be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected benefits of conducting a pre-employment medical assessment include a safer working environment, reduction in workplace injuries, minimised downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction.
- NCCL will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities.
- NCCL will implement regular health and safety checks and audits of Workers, contractors and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards.
- NCCL will develop and implement a Workers Grievance Mechanism for the Project workforce including contractors and subcontractors.
- NCCL will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks.
- NCCL will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents.
- NCCL will ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers, including provision for disciplinary action for anti-social behaviour and non-compliance with health and safety regulations such as lack of use of PPE.
- NCCL will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation.
- NCCL will develop and implement a Traffic Management Plan covering aspect such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.
- NCCL will develop a Waste Management Plan for the construction phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.
- Recruitment will be undertaken in collaboration with local authorities and local agencies. NCCL will put in place measures to ensure no employee or job applicant is discriminated against on the basis of his or her gender, marital status, nationality, age, religion or sexual orientation.

8.1.8.2. Operation Impacts on Worker's Health and Safety

Similar to the construction phase, the operation phase may also lead to occupational health and safety issues in particular with respect to production processes in the plant. During the operation phase, NCCL will implement the following measures:

1. The Workers' Health and Safety Management System will be extended to the operation phase and adapted to address relevant aspects, including the following measures:
    - Identification and provision of appropriate PPE, training and monitoring, as well as ongoing safety checks and safety audits.
    - Prohibiting the use of alcohol or drugs, which could adversely affect the ability the employee to perform the work safely or adversely affect the health and safety of other employees, community members or the environment.
    - Ensuring that training on health and safety measures is provided to all operation workers prior to starting to work on the Project.
    - NCCL will undertake compliance monitoring of labour rights. KPIs will be developed around worker rights, discrimination and management, workforce grievance mechanism and monitoring of outcomes.
    - Implementing a Workers Grievance Mechanism for the Project workforce.
    - Establishing a procedure for the recording and analysis of lessons learned and implementation of additional actions to avoid or minimize occupational health and safety risks.
    - NCCL will develop a Waste Management Plan for the operation phase with clear guidelines for the safe storage and disposal of hazardous waste and handling of hazardous materials.
    - NCCL will put in place measures to ensure no employee or job applicant is discriminated against on the basis of his or her gender, marital status, nationality, age, religion or sexual orientation.

8.1.8.3. Decommissioning Impacts on Worker's Health and Safety

Similar to the operation phase, the decommissioning phase may also lead to occupational health and safety issues in particular with respect to maintenance of the plant. During decommissioning, the direct interaction between the Project and the workforce if not managed properly, will result in negative impacts on the workers' working conditions and potentially permanent impacts on their health and safety. The impact is considered short-term and continuous over the decommissioning phase resulting in a medium impact magnitude. Since contractors are expected to operate according to international standards and considering the level of prior training of the workforce, receptor sensitivity is considered medium. Therefore, the impact is of ***moderate*** significance. During the operation phase, NCCL will implement the following measures:

1. The Workers' Health and Safety Management System will be extended to the decommissioning phase and adapted to address relevant aspects.

Residual Impacts

The implementation of mitigation measures will contribute to reducing occupational health and safety risks and the risk of labour rights abuses significantly. However, the risk of

potential accidents still exists and may potentially lead to injuries or fatalities for the workforce during construction and operation. This risk will be long-term during operations. With the implementation of mitigation measures the remaining impact significance is considered minor significance during construction and negligible during operation. In fact, during operations, knowledge and lessons learned in terms of health and safety and labour rights during the construction phase may extend to the operation phase and contribute to strengthening local knowledge and practices in Kenya.

Table 8-28: Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Worker health and safety and labour rights	Construction	Moderate	Minor
Worker health and safety and labour rights	Operation	Moderate	Minor
Worker health and safety and labour rights	Decommissioning	Moderate	Minor

As stated previously, the Project during its lifetime will be subject to local labour laws and international standards with respect to the responsibility of the employer to safeguard the health and safety of its employees. The Project is therefore expected to abide by these regulations and develop and implement appropriate health and safety measures covering the operations phase including the use of Personal Protetcive Equipment (PPE) by the workforce. As stated for the construction phase, compliance with NCCL's Environmetal Health and Socoal Safety (EHSS) policy aimed at safeguarding the health and safety of its employees and subcontractors will additionally help prevent potential labour abuses and reduce the risk of health and safety incidents. Finally, all contractor contracts include explicit reference to the need to abide by Kenyan law and NCCL's standards and policies in relation to health and safety.

Table 8-29: Impact Assessment

Impact	**Workers Health and Safety and Rights during Operations**			
Impact Nature	Negative	Positive	Neutral	
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.			
Impact Type	Direct	Indirect	Induced	
	Resulting from a direct interaction between the Project (i.e. increased project traffic, working at height, open excavations) and the workforce.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Injuries and fatalities could have permanent impacts on workers and their families.			
Impact Extent	Local	Regional	International	
	The workforce will be primarily contracted from urban and rural centres within the county and other Counties in Kenya as well as from other countries for some higher skilled jobs.			
Impact Scale	The impact scale is considered small during operations as the workforce size will be reduced and maintenance activities will be periodic.			

Frequency	The impact is considered to be infrequent since the operation activities will be limited to maintenance works. The workforce is expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures. Lessons learned from the construction phase are expected to enhance the safety conditions and thus reducing the frequency of safety incidents during the operation and maintenance phase.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the parameters above, and the embedded measures in place, the magnitude is considered small.				
Resource/ Receptor Sensitivity/Value/ Importance*	Low		Medium		High
	The sensitivity of the receptors is considered low as workers will be mostly skilled permanent employees.				
Impact Significance	Negligible		Minor	Moderate	Major
	Considering the magnitude is medium and sensitivity is low, the impact on workers' health and safety during operations activities is considered to be of Moderate significance.				

8.1.9. Community Health and Safety Impacts

8.1.9.1. Community Health and Safey Impacts during Construction Phase

The presence of the Project could affect the health, safety and wellbeing of the communities in the project area of influence. Increased Project-related traffic, civil works for site preparation including site clearance and excavation work, change to the environment due to increased noise, decreased air quality, inappropriate waste handling or disposal, and accidental leaks and spills, and the presence of the Project workforce all present potential hazards for the health and safety of local communities.

Construction activities are likely to expose the local communities to health and safety related risks. Local community members could be exposed to accidents which could lead to injuries or fatalities. Falling objects, road accidents caused by construction vehicles, exposure to hazardous wastes from the construction sites among others are potential community health and safety impacts. Further as discussed external workers could bring with them communicable diseases including sexually transmitted diseases (STDs) that could be passed on to local communities. **Table 8-30** presents the potentially significant community health, safety and security impacts that may occur during the construction, operation and decommissioning phases.

Table 8-30. Potential Impacts on Community Health and Safety

Construction and Decommissioning Phase	Operation Phase
Potential impacts on community safety, in particular road accidents, trespass on the sites, and demining activities potentially resulting in accidents leading to injuries or fatalities. Environmental health: changes to the environment due to increased noise and vibrations, decreased air quality and, inadequate management of waste. Impact from workers presence and potential interaction with local populations.	Community health over exposure to air pollutants

Residual Impacts

The significance of the residual impacts on community health and safety after the implementation of mitigation measures is presented in **Table 8-31** below.

Table 8-31: Residual Impact Significance

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Community Safety (Road Accidents, Site Trespass)	Construction	Moderate	Minor
Environmental Health (Noise and Air)	Operation	Moderate	Minor
Interaction with Project Workforce	Operation	Moderate	Minor
Community Safety (Road Accidents, Site Trespass)	Operation	Moderate	Minor
Environmental Health (Noise and Air)	Operation	Moderate	Minor
Interaction with Project Workforce	Operation	Moderate	Minor
Community Safety (Road Accidents, Site Trespass)	Decommissining	Moderate	Minor
Environmental Health (Noise and Air)	Decommissining	Moderate	Minor
Interaction with Project Workforce	Decommissining	Moderate	Minor

8.1.9.2. Community Health and Safey Impacts during Operational Phase

Similarly, communities and stakeholder concerns around the safety of the plant once they are operational including exposure to emissions, noise, and traffic also have the potential to affect communities. Operational activities are likely to expose the local communities to health and safety related risks. Local community members could be exposed to accidents which could lead to injuries or fatalities. Falling objects, road accidents caused by construction vehicles, exposure to hazardous wastes from the sites among others are potential community health and safety impacts. **Table 8-32** presents the potentially significant community health, safety and security impacts that may occur during the construction, operation and decommissioning phases.

8.1.9.3. Community Health and Safey Impacts during Decommissioning Phase

Decommissioning activities are likely to expose the local communities to health and safety related risks. Local community members could be exposed to accidents which could lead to injuries or fatalities. Falling objects, road accidents caused by vehicles, exposure to hazardous wastes from the sites among others are potential community health and safety impacts.

8.1.9.4. Gender-Based Violence

An influx of in-migrants may also lead to Gender-Based Violence (GBV) and/or Sexual Exploitation and Abuse (SEA), although the project is not expected to have a large influx of workers, the in-migration may increase the demand for sex work or the risk of forced early marriage in a community where marriage to an employed man is seen as the best livelihood strategy for an adolescent girl. Furthermore, higher wages for workers in a community can lead to an increase in transactional sex. The risk of incidents of sex between laborers and minors, even when it is not transactional, can also increase. The Project may create changes in the project affected communities and can cause shifts in power dynamics between the community members and within households. Male jealousy, a key driver of GBV, can be triggered by labor influx on a project when workers are believed to be interacting with community women. Hence, abusive behavior can occur not only between project-related staff and those living in and around the project site, but also

within the homes of those affected by the project. Potential resettlement for civil works may equally render women vulnerable to GBV.

Mitigation Measures
The following mitigation measures will be implemented during the construction phase to reduce any impacts on GBV.

- NCCL will extend the Worker Code of Conduct to include guidelines on worker-community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process.

8.1.9.5. Violence against Children

The recruitment of children under the age of 18 during the construction of the cement plant is a potential risk and considered VAC. Based on current conditions in the sector it is assessed that the risk of child or forced labor is negligible, and already managed through national legislation and the proponent's corporate requirement.

Mitigation Measures
The following mitigation measures will be implemented during the construction phase to reduce any impacts on VAC.

- NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process.

8.1.10. Unplanned Events

The following section presents the assessment of impacts resulting from unplanned or non-routine events and those which are a result of accidents. These are different to impacts that would reasonably be predicted to occur in the normal course of activities (including the application of in-built control measures) during construction and operations. Unplanned and accidental events have the potential to occur during Project activities and therefore the evaluation of impacts for unplanned and accidental event takes into account the likelihood of the event occurring into the impact magnitude. Likelihood is determined as unlikely, possible, or likely based in professional judgement and quantitative information (statistical frequency) where available. Given the nature of Project activities, unplanned and accidental events relate to potential accidental spills of equipment fuel and oils and vehicle traffic accidents. If unplanned and accidental events did occur, there would be effects on the biophysical and social environment. The risks of unplanned and accidental events are described in this section.

8.1.10.1. Potential Impacts to Soil and Surface Water from Spill Events

During construction there is the potential for spills of fuels and oils during construction activities, fuelling, maintenance of machinery and vehicles. Spills could occur in a number of locations of the project footprints. Spills have the potential to affect terrestrial environments and could lead to the deterioration of soil, water and sediment quality. This could lead to knock on effects for flora and fauna and local community users.

Impact Assessment

If hazardous materials such as fuel were to be released to the soil and surface water resources, this would be limited to the local extent, depending on the volume spilt and rate of spillage. Within the Project AoI there are surface water resources such as streams which could be impacted if the spill were to occur within proximity of the resource.

Likelihood

Incidental spills of fuels are infrequent but do occur; most frequently due to malfunction of handling systems, poor practice of workers and force majeure. Spills are most likely to occur during refilling and transportation of substances. Large releases of hazardous materials are rare and it is considered unlikely that a spill would occur of emergency scale.

Significance of Impacts

For impacts to soils, the spatial scale is considered to be local. The impact could be long term and is a direct negative impact. The overall magnitude is considered to be medium. There are areas within the site which are used for cultivation/landscaping and therefore the sensitivity is considered of medium sensitivity. This results in a potential negative impact of Moderate significance (Table 8-49 below).

Table 8-32: Potential Impacts from Spillages

Construction Phase	Operation Phase
Soil and surface water degradation due to fuel spills during construction activities (refuelling, maintenance machinery)	Soil and surface water degradation as a result fuel spills due to maintenance activities of the plant

For surface water, the impact of the spill would be short to medium term as the release of fuel or oil is likely to be a discrete (i.e.: non-continuous) event and the effects on water quality naturally mitigated through dilution and natural attenuation. The magnitude of the impact is considered medium and the potential impact is therefore of moderate significance (**Table 8-33**).

Table 8-33: Pre-Mitigation Impact Assessment

Impact	**Accidental Fuel Spills on Soils**			
Impact Nature	Negative	Positive	Neutral	
	Reduction in local soil quality as a result of spillage during maintenance of machinery, improper storage of hazardous materials, spillage during transfers of fuel and general construction activities.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities soil resources Project AOI			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is long term due to time for remediation or natural attenuation expected for contaminated soils			
Impact Extent	Local	Regional	International	
	The impact will be limited to the AoI			
Impact Scale	The impact is considered as medium scale. If a spill occurs, it will be locally– usually at a construction site			
Frequency	Not Applicable			

Likelihood	Possible				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Based on the above the impact magnitude is considered medium				
Resource/ Receptor Sensitivity	Low		Medium		High
	While some areas are in periurban areas other sections include cultivated areas and therefore the significance is medium.				
Impact Significance	Negligible		Minor	Moderate	Major
	Considering the impact magnitude is medium and the sensitivity is medium the overall significance is considered to be moderate.				

Mitigations

The following management measures will be implemented in the Project's ESMP:

- Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration or removed by an authorised local contractor. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hardstanding surface.
- Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release.
- Hydrocarbon spill clean-up kits shall be available at all locations where refuelling or maintenance of vehicles and equipment is done, and responsible people shall be trained in the use thereof.

Residual Impact

The impacts on soils are considered Minor post mitigation, largely because parts of the site occur in cultivated /landscaped areas and spills of hazardous substances here are likely to have a greater impact than spills in unutilized areas. Based on the surface water context, impacts on surface water will be of minor significance post mitigation.

Table 8-34: Residual Impact Significance

Impact	Project Phase	Significance (Pre-mitigation)	Residual Impact Significance (Post-mitigation)
Reduction in local soil quality	Construction and Operation	Moderate	Minor
Reduction in surface water quality	Construction and Operation	Moderate	Minor

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project and possible mitigation measures. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability.

9.1 Mitigation Measures

Mitigation Hierarchy for the Planned Project Activities

Avoid at source: Reduce at source

Avoiding or reducing at source is essentially "designing" the project so that a feature causing an impact is designed out or altered (e.g., reduced working width). Often this is called minimization.

Abate on site

This involves adding something to the basic design to abate the impact for example, pollution controls fall in this category. This is often called end-of-pipe.

Abate at receptor

If an impact cannot be abated on-site, then measures can be implemented off-site an example of this would be to install double-glazed windows to minimize the impact of noise at a nearby residence.

Repair or Remedy

Some impacts involve unacceptable damage to a resource, e.g. agricultural land during plant upgradation construction. Repair essentially involves restoration and re-instatement type measures.

9.2 Pre-Construction

The majority of mitigation measures and in particular mitigations to protect and enhance the physical environment are most effectively incorporated during the design phase. There are four key elements:

- Development of sustainable designs with the lowest possible environmental impact within the constraints of the project funding and the socio-economic setting.
- Incorporate the recommendations and requirements of the ESMP to be an integral part of the Bidding and Contract Documents thereby building in enforceable measures to protect the environmental and social matters throughout the construction phase.
- Provide adequate grievance redress procedures to address the concerns of local people and stakeholders to ensure satisfactory resolution of any grievance arising from the project.
- Ensure adequate and fair compensation for involuntary resettlement for any party suffering inconvenience, financial or loss of livelihood due to being moved to

accommodate the works, principally the construction of the plant and associated facilities.

For each of the identified impacts, mitigation measures have been suggested in accordance with a general rule defining mitigation criteria as:

1. Avoidance of major impacts: major impacts are generally considered unacceptable, ones that would endure in the long-term or extend over a large area.
2. Reduction of major and moderate impacts to as low as reasonably practicable (ALARP) by planning, designing and controlling mitigation measures. This implies that mitigation measures will be applied until the limitations of cost effectiveness and practical application have been reached. The limitations are established by international practice
3. Implementation of good practices for impacts rated as minor, in order to ensure that impacts are managed within good reason.

There will only be localized short-term impacts during construction due to the implementation of the civil works. Impacts have been addressed at the design stage by choosing engineering solutions that, as far as is possible, minimize the impacts during construction and operational phase. The impacts which could not be eliminated by the design, mostly impacts during construction, will be reduced or eliminated by mitigation and monitoring measures specified in the ESMP. These construction related impacts can be mitigated by (i) the contractors' work practices, especially those related to maintenance of access, methods of trench excavation, the storage of construction materials and cleanliness of the work sites; (ii) cooperation by the local authorities with the contractor in terms of traffic management and use of public space and utilities; (iii) project management's strict enforcement of the correct construction practices and standards; (iv) the incorporation of the mitigation measures identified in the ESIA into the bid documents and specifications; (v) public awareness including liaison at ward level shortly in advance of work in each work location; and (vi) close monitoring of the contractor's implementation of the required mitigation measures. Environmental impacts and proposed mitigation measures during project pre-construction, construction and operation phases are described in the following sections.

9.3 Environmental and Social Management Plan

The ESIA includes an ESMP which details the mitigation measures, environmental monitoring activities, institutional responsibilities, and environmental management capacity building. The relevant ESMP provisions are included in bid documents for contractors. During construction, the project management team will closely monitor the works contractors' environmental performance and overall ESMP implementation.

Table 9-1: Environmental and Social Management Plan

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
Construction Phase				
A1. Construction Air Impacts	Impact on sensitive receptors Impact on workers' health and safety Impact on community health and safety Impact on flora and fauna	**A1-1:** Develop a Dust Management Plan **A1-2:** Record all dust and air quality complaints, identify cause(s), take appropriate measures **A1-3:** Liaise with local communities to forewarn of potentially dusty activities **A1-4:** Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring **A1-5:** Undertake inspections to ensure compliance with the Dust Management Plan **A1-6:** Plan potentially dusty activities so that these are located as far from receptors as feasible **A1-7:** Erect solid screens if feasible around stockpiles and concrete batching **A1-8:** Avoid run off of mud and water and maintain drains in a clean state **A1-9:** Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible **A1-10:** Impose speed limits on haul routes and in construction compounds to reduce dust generation **A1-11:** Minimise drop heights when loading stockpiles or transferring materials; and **A1-12:** Avoid waste or vegetation burning.	Contractor Cost	Contractor
		<u>For traffic on unpaved roads:</u> **A1-13:** Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
		A1-14: On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity.		
		For earthworks: **A1-15:** Revegetate exposed areas as soon as feasible **A1-16:** Revegetate or cover stockpiles if feasible **A1-17:** Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow	Contractor Cost	Contractor
		For track out: **A1-18**: Where track out is onto paved roads, use wet road cleaning methods to remove dirt and mud build up **A1-19:** Avoid dry sweeping of large areas; and **A1-20:** Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.	Contractor Cost	Contractor
A2. Noise and Vibration Impacts	Impact on sensitive receptors Impact on workers' health and safety Impact on community health and safety Impact on fauna	**A2-1:** Siting noisy plant and equipment as far away as possible from NSRs, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable **A2-2:** Where practicable noisy equipment will be orientated to face away from the nearest NSRs **A2-3:** Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only;	Contractor Cost	Contractor
		A2-4: Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable;	Contractor Cost	Contractor
		A2-5: Where practicable, stationary equipment will be located in an acoustically treated enclosure	Contractor Cost	Contractor
		A2-6: For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals;	Contractor Cost	Contractor
		A2-7: Throttle settings will be reduced, and equipment and plant turned off, when not being used **A2-8:** Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and **A2-9:** Fitting of mufflers or silencers of the type recommended by manufacturers	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
A3. Soil erosion and contamination impacts	Impacts on water quality (sediment run-off/contamination) leading to deterioration of quality. Deteriorated water quality will impact on fauna if consumed. Deteriorated water quality will impact on community health if consumed.	**A3-1:** Vegetation clearing, and topsoil disturbance will be minimized. **A3-2:** Contour temporary and permanent access roads/laydown areas so as to minimise surface water runoff and erosion **A3-3:** Sheet erosion of soil shall be prevented where necessary through the use of sandbags, diversion berms, culverts, or other physical means. **A3-4:** Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. Wherever possible construction work will take place during the dry season.	Contractor Cost	Contractor
		A3-5: Topsoil shall be evenly spread across the cleared areas when reinstated. **A3-6:** Accelerated erosion from storm events during construction shall be minimised through managing storm water runoff (e.g., velocity control measures).	Contractor Cost	Contractor
		A3-7: Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. Material (e.g., fuel or chemicals).	Contractor Cost	Contractor
		A3-8: Spread mulch generated from indigenous cleared vegetation across exposed soils after construction.	Contractor Cost	Contractor
A4. Surface Water Quality Impacts	Impacts on water quality (sediment run-off/contamination) leading to deterioration of quality. Deteriorated water quality will impact on fauna if consumed. Deteriorated water quality will impact on community health if consumed.	**A4-1:** Activities shall be conducted >100m away from water bodies, except where crossings are required.	Contractor Cost	Contractor
		A4-2: All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment	Contractor Cost	Contractor
		A4-3: Domestic wastewater shall be treated and disposed of in accordance with an approved waste management plan. Park vehicles preferably on paved platforms	Contractor Cost	Contractor
A5. Impact on Flora and Vegetation	Loss of biodiversity.	**A5-1:** Vegetation will be removed only as absolutely necessaryas the project site does not have vegetation.	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
		A5-2: Water bodies shall be kept clear of felled trees, vegetation cuttings and organic waste and debris from clearing;	Contractor Cost	Contractor
		A5-3: Alien invasive vegetation should be removed immediately and disposed of properly, at a licensed waste disposal facility as necessary	Contractor Cost	Contractor
		A5-4: There should be no deviation from the access road position without prior discussions with the authorities.	Contractor Cost	Contractor
		A5-5: Materials and equipment should not be delivered to the site prematurely, as this could result in need for laydown or storage areas and additional areas being cleared or affected unnecessarily; and	Contractor Cost	Contractor
		A5-6: Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible	Contractor Cost	Contractor
A6. Impact on Fauna	Disturbance due to noise, vibrations and vehicle presence.	**A6-1:** Speed of project vehicles should be controlled at a maximum limit of 40 km/h to minimise roadkill **A6-2:** Guidance shall be given to all staff that they are not allowed to harm any animals during any routine maintenance of the project's infrastructure.	Contractor Cost	Contractor
A7: Solid and Liquid Waste Impacts	-Impact on storm water quality and thus water quality in the water bodies in project areas -Impact on soil quality -Impact on surface water quality	**A7-1:** The Contractor should prepare a Solid Waste Management Plan.	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
	-Impact on ground water quality; and -Impact on ecological receptors or human health.			
A8: Landscape and visual amenities risks	-Impacts on aesthetics of the surroundings with the possibility to affect the neighbouring residents.	**A8-1:** Any excavated or cut and fill areas will be landscaped and revegetated. **A8-2**: No debris or waste materials will be left at the work sites, good housekeeping on site to avoid litter and minimise waste **A8-3:** Towers and other tall structures should have a non-reflective finish. **A8-4:** Night lighting of sites should be minimized within requirements of safety and efficiency. **A8-5:** Ongoing rehabilitation of cleared areas to minimise visual scarring and maintenance clearing will be kept to the absolute minimum and should not extend beyond the construction site;		Contractor
A9: Worker's ealth and Safety and Workers Management	-Workers are likely to be exposed to work related risks during the construction phase of the project.	**A9-1**: NCCL will develop a Human Resources Policy, which will outline worker rights to be included in all contracts including restrictions on working hours in line with applicable ILO standards, compensation including consideration of overtime, holidays etc.	Contractors Cost	Contractor
		A9-2: NCCL will require its contractors and subcontractors to put in place policies in line with national legislation and applicable international legislation and NCCL Code of Conduct and Policies.	Contractors Cost	Contractor
		A9-3: NCCL will establish contractual clauses to be embedded in the contracts of the EPC and all sub-contractors that require adherence to Kenyan law and international standards to be upheld related to worker rights and providing the contractor and NCCL with the right of audit.	Contractors Cost	Contractor
		A9-4: Pre-employment medical assessments will be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected bents of conducting a pre-employment medical assessment include a safer working environment, reduction in workplace injuries, minimised downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction. **A9-5:** NCCL will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities.		Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
		A9-6: NCCL will implement regular health and safety checks and audits of Workers, contractors and subcontractors and implementing sanctions in case of breaches of nationals **A9-7:** NCCL will develop and implement a Workers Grievance Mechanism for the Project workforce including contractors and subcontractor's standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. **A9-8:** NCCL will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. **A9-:9** NCCL will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. **A9-10**: NCCL will ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers, including provision for disciplinary action for anti-social behaviour and non-compliance with health and safety regulations such as lack of use of PPE. **A9-11:** NCCL will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation.		
A10: Community Health and Safety Impacts	-Increased noise decreased air quality, inappropriate waste handling or disposal, and accidental leaks and spills, debris and movement of heavy equipment may pose a safety risk to the general public. -Potential impacts on community safety, in particular road accidents, trespass on the sites, and demining activities potentially resulting in accidents	**A10-1:** NCCL will develop and monitor the implementation of a Community Health and Safety Management Plan which will include the following measures: • Ensure that all workers are housed in accommodation camps rather than in the local settlements in order to minimize interaction with local communities and related health and safety impacts. • Ensure all workers including contractors and subcontractors undergo pre-employment screening and regular health screening including voluntary screening for STDs. • Ensure any trucking companies employed to work on the Project will have policies around health screening of their workers in line with Project requirements. • Ensure all workers including contractors and subcontractors receive education around project area and symptoms of communicable diseases of concern and STDs. • Provide access to health care for those injured by its activities. • Ensure that work sites are fenced and that signs are put up around work fronts and construction sites advising people of the risks	Contractors ' Cost	Contractor Contractor Contractor Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
	leading to injuries or fatalities. ~ Environmental health: changes to the environment due to increased noise and vibrations, decreased air quality and, inadequate management of waste. ~ Impact from workers presence and potential interaction with local populations	associated with trespass. When work fronts are less than 100 metres from a community or house, employ security guards from the local community to prevent trespass. • Undertake a programme of stakeholder engagement and consultation to educate local communities of the risks of trespassing onto sites, the meaning of signs, and the dangers of playing on or near equipment or entering fenced areas. Special attention to be paid in primary and secondary schools near the project area and in areas close to residential or school areas.		
		A10-2: NCCL will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. • NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process. • NCCL will provide primary health care and first aid at construction camp sites to avoid pressure on local healthcare infrastructures. • NCCL will implement a Community Grievance Mechanism. • NCCL will develop and implement a Traffic Management Plan covering aspect such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations	Contractors ' Cost	
A11: Gender-based violence at the community level	-Gender-based violence at the community level -Forced Early Marriages -Sexual Exploitation and Abuse -Transactionnel sex. -Shift in power dynamics in the community or family. -Abusive behavior among project-related staff	**A11-1:** NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process	Contractors ' Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
A12: Violation of children rights by contractor and labour force on site	-Violation of children rights by contractor and labour force on site	**A12-1:** •NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process		Contractor
A13: Unplanned Events	-Impacts to soil and surface water from spill events	**A13-1:** Develop a detailed Oil Spill Response Plan (OSRP) which includes community notifications of any significant spills that have the potential to affect communities. **A13-2:** Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. **A13-3:** Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. **A13-4:** Hydrocarbon spill clean-up kits shall be available at all locations where refuelling or maintenance of vehicles and equipment is done, and responsible people shall be trained in the use thereof.	Contractors ' Cost	Contractor

Table 9-2. Environmental and Social Management Plan

PHASE/ IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
Operation Phase				
B1. Air pollution Impacts		**B1-1: <u>Develop a Dust Management Plan;</u>** **B1-2:** Record all dust and air quality complaints, identify cause(s), take appropriate measures **B1-3:** Liaise with local communities to forewarn of potentially dusty activities **B1-4:** Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring **B1-5:** Undertake inspections to ensure compliance with the Dust Management Plan **B1-6:** Plan potentially dusty activities so that these are located as far from receptors as feasible **B1-7:** Erect solid screens if feasible around stockpiles and concrete batching **B1-8:** Avoid run off of mud and water and maintain drains in a clean state **B1-9:** Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible	NCCL Cost	NCCL

PHASE/ IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
		B1-10: Impose speed limits on haul routes and in construction compounds to reduce dust generation **B1-11:** Minimise drop heights when loading stockpiles or transferring materials; and **B1-12:** Avoid waste or vegetation burning.		
		For traffic on unpaved roads: **B1-13:** Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and **B1-14:** On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity.	NCCL Cost	NCCL
		For earthworks: **B1-15:** Revegetate exposed areas as soon as feasible **B1-16:** Revegetate or cover stockpiles if feasible **B1-17:** Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow/	NCCL Cost	NCCL
		For track out: **B1-18**: Where track out is onto paved roads, use wet road cleaning methods to remove dirt and mud build up **B1-19:** Avoid dry sweeping of large areas; and **B1-20:** Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.	NCCL Cost	NCCL
B2. Noise Emissions and Vibration Impacts	Intermittent noise from equipments grinder, pressure release valves	**B2-1:** Siting noisy plant and equipment as far away as possible from NSRs, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable **B2-2:** Where practicable noisy equipment will be orientated to face away from the nearest NSRs **B2-3:** Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only;	NCCL Cost	NCCL
		B2-4: Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable;	NCCL Cost	NCCL
		B2-5: Where practicable, stationary equipment will be located in an acoustically treated enclosure	NCCL Cost	NCCL

PHASE/ IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
		B2-6: For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals;	NCCL Cost	NCCL
		B2-7: Throttle settings will be reduced, and equipment and plant turned off, when not being used **B2-8:** Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and **B2-9:** Fitting of mufflers or silencers of the type recommended by manufacturers	NCCL Cost	NCCL
B3. Surface Water Quality Impacts	-Minimal or no water pollution	**B4-1:** Activities shall be conducted >100m away from water bodies, except where crossings are required.	NCCL Cost	NCCL
		B4-2: All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment; and	NCCL Cost	NCCL
		B4-3: Domestic wastewater shall be treated and disposed of in accordance with an approved waste management plan. Park vehicles preferably on paved platforms	NCCL Cost	NCCL
B5. Impact on Flora and Vegetation	-No large impact on existing flora and vegetation.	**B5-1:** Avoidance of impacts should be prioritized. it is strongly recommended to avoid vegetation areas. Where impact avoidance is not possible, existing indigenous vegetation must be kept intact, where possible. Vegetation will be removed only as absolutely necessary.	NCCL Cost	NCCL
		B5-2: Rivers, watercourses and other water bodies shall be kept clear of felled trees, vegetation cuttings and organic waste and debris from clearing;	NCCL Cost	NCCL
		B5-3: Alien invasive vegetation should be removed immediately and disposed of properly, at a licensed waste disposal facility as necessary;	NCCL Cost	NCCL
		B5-4: Materials and equipment should not be delivered to the site prematurely, as this could result in need for laydown or storage areas and additional areas being cleared or affected unnecessarily; and	NCCL Cost	NCCL

PHASE/ IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
B8: Solid and Liquid Waste Impacts	Minimal or no solid or liquid waste	**B8-1:** Implement Solid Waste Management Plan, as described in this report.	NCCL Cost	NCCL
B11: Worker's Health and Safety and Workers Management	Potential impacts to workers health and safety -respect for labour rights during construction	Develop and implement a Worker's Health and Safety Management System covering all contractors and subcontractors including the following measures: • HR Policy in line with Local labour laws and ILO standards o Training on H&S Risks o H&S Audits for workers o Workers Grievance Mechanism o Incident and Accident Reporting • Code of conduct to regulate behaviour		NCCL
		• Access to clean water	NCCL Cost	NCCL
		• Traffic Management Plan o Vehicle Safety o Drug and alcohol use o Rest periods o Traffic safety o Accident Reporting	NCCL Cost	NCCL
		• Non-Discrimination on basis of gender, marital status Age, Religion or sexual orientation	NCCL Cost	NCCL
B12: Community Health and Safety Impacts	-Exposure to noise and dust -Exposure to accidents (road accidents)	**B12-1:** NCCL will develop and monitor the implementation of a Community Health and Safety Management Plan which will include the following measures: • Undertake a programme of stakeholder engagement and consultation to educate local communities of the risks of trespassing onto sites, the meaning of signs, and the dangers of playing on or near equipment or entering fenced areas.	NCCL Cost	NCCL NCCL NCCL NCCL
		B12-2: NCCL will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals.		

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
Decomissioning Phase				
C1. Construction Air Impacts	Impact on sensitive receptors	**C1-1:** Develop a Dust Management Plan **C1-2:** Record all dust and air quality complaints, identify cause(s), take appropriate measures	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
	Impact on workers' health and safety Impact on community health and safety Impact on flora and fauna	**C1-3:** Liaise with local communities to forewarn of potentially dusty activities **C1-4:** Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring **C1-5:** Undertake inspections to ensure compliance with the Dust Management Plan **C1-6:** Plan potentially dusty activities so that these are located as far from receptors as feasible **C1-7:** Erect solid screens if feasible around stockpiles and concrete batching **C1-8:** Avoid run off of mud and water and maintain drains in a clean state **C1-9:** Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible **C1-10:** Impose speed limits on haul routes and in construction compounds to reduce dust generation **C1-11:** Minimise drop heights when loading stockpiles or transferring materials; and **C1-12:** Avoid waste or vegetation burning.		
		For traffic on unpaved roads: **C1-13:** Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and **C1-14:** On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity.	Contractor Cost	Contractor
		For earthworks/Demolitions: **C1-15:** Revegetate exposed areas as soon as feasible **C1-16:** Revegetate or cover stockpiles if feasible **C1-17:** Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow	Contractor Cost	Contractor
		For track out: **C1-18**: Where track out is onto paved roads, use wet road cleaning methods to remove dirt and mud build up **C1-19:** Avoid dry sweeping of large areas; and **C1-20:** Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
C2. Noise and Vibration Impacts	Impact on sensitive receptors Impact on workers' health and safety Impact on community health and safety Impact on fauna	**C2-1:** Siting noisy plant and equipment as far away as possible from NSRs, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of demolition/decommissioning noise at receptors wherever practicable **C2-2:** Where practicable noisy equipment will be orientated to face away from the nearest NSRs **C2-3:** Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only;	Contractor Cost	Contractor
		C2-4: Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable;	Contractor Cost	Contractor
		C2-5: Where practicable, stationary equipment will be located in an acoustically treated enclosure	Contractor Cost	Contractor
		C2-6: For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals;	Contractor Cost	Contractor
		C2-7: Throttle settings will be reduced, and equipment and plant turned off, when not being used **C2-8:** Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and **C2-9:** Fitting of mufflers or silencers of the type recommended by manufacturers	Contractor Cost	Contractor
C3. Soil erosion and contamination impacts	Impacts on water quality (sediment run-off/contamination) leading to deterioration of quality. Deteriorated water quality will impact on fauna if consumed.	**C3-1:** Vegetation clearing, and topsoil disturbance will be minimized. **C3-2:** Contour temporary and permanent access roads/laydown areas so as to minimise surface water runoff and erosion **C3-3:** Sheet erosion of soil shall be prevented where necessary through the use of sandbags, diversion berms, culverts, or other physical means. **C3-4:** Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. Wherever possible construction work will take place during the dry season.	Contractor Cost	Contractor
		C3-5: Topsoil shall be evenly spread across the cleared areas when reinstated.	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
	Deteriorated water quality will impact on community health if consumed.	**C3-6:** Accelerated erosion from storm events during construction shall be minimised through managing storm water runoff (e.g., velocity control measures).		
		C3-7: Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. Material (e.g., fuel or chemicals).	Contractor Cost	Contractor
		C3-8: Spread mulch generated from indigenous cleared vegetation across exposed soils after construction.	Contractor Cost	Contractor
C4. Surface Water Quality Impacts	Impacts on water quality (sediment run-off/contamination) leading to deterioration of quality. Deteriorated water quality will impact on fauna if consumed. Deteriorated water quality will impact on community health if consumed.	**C4-1:** Activities shall be conducted >100m away from water bodies, except where crossings are required.	Contractor Cost	Contractor
		C4-2: All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment	Contractor Cost	Contractor
		A4-3: Domestic wastewater shall be treated and disposed of in accordance with an approved waste management plan. Park vehicles preferably on paved platforms	Contractor Cost	Contractor
C5. Impact on Flora and Vegetation	Loss of biodiversity.	**C5-1:** Vegetation will be removed only as absolutely necessaryas the project site does not have vegetation.	Contractor Cost	Contractor
		C5-2: Water bodies shall be kept clear of felled trees, vegetation cuttings and organic waste and debris from clearing;	Contractor Cost	Contractor
		C5-3: Alien invasive vegetation should be removed immediately and disposed of properly, at a licensed waste disposal facility as necessary	Contractor Cost	Contractor
		C5-4: There should be no deviation from the access road position without prior discussions with the authorities.	Contractor Cost	Contractor
		C5-5: Materials and equipment should not be delivered to the site prematurely, as this could result in need for laydown or storage areas and additional areas being cleared or affected unnecessarily; and	Contractor Cost	Contractor
		C5-6: Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible	Contractor Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
C6. Impact on Fauna	Disturbance due to noise, vibrations and vehicle presence.	**A6-1:** Speed of project vehicles should be controlled at a maximum limit of 40 km/h to minimise roadkill **A6-2:** Guidance shall be given to all staff that they are not allowed to harm any animals during any routine maintenance of the project's infrastructure.	Contractor Cost	Contractor
C7: Solid and Liquid Waste Impacts	-Impact on storm water quality and thus water quality in the water bodies in project areas -Impact on soil quality -Impact on surface water quality; -Impact on ground water quality; and -Impact on ecological receptors or human health.	**A7-1:** The Contractor should prepare a Solid Waste Management Plan.	Contractor Cost	Contractor
C8: Landscape & Visual amenities risks	-Impacts on aesthetics of the surroundings with the possibility to affect the neighbouring residents.	**C8-1:** Any excavated or cut and fill areas will be landscaped and revegetated. **C8-2**: No debris or waste materials will be left at the work sites, good housekeeping on site to avoid litter and minimise waste **C8-3:** Towers and other tall structures should have a non-reflective finish. **C8-4:** Night lighting of sites should be minimized within requirements of safety and efficiency. **C8-5:** Ongoing rehabilitation of cleared areas to minimise visual scarring and maintenance clearing will be kept to the absolute minimum and should not extend beyond the construction site;		Contractor
C9: Worker's Health and Safety and Workers Management	-Workers are likely to be exposed to work related risks during the decommissioning phase of the project.	**C9-1**: NCCL will develop a Human Resources Policy, which will outline worker rights to be included in all contracts including restrictions on working hours in line with applicable ILO standards, compensation including consideration of overtime, holidays etc.	Contractors Cost	Contractor
		C9-2: NCCL will require its contractors and subcontractors to put in place policies in line with national legislation and applicable international legislation and NCCL Code of Conduct and Policies.	Contractors Cost	Contractor
		c9-3: NCCL will establish contractual clauses to be embedded in the contracts of the EPC and all sub-contractors that require adherence to Kenyan law and international standards to be upheld related to worker rights and providing the contractor and NCCL with the right of audit.	Contractors Cost	Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
		C9-4: Pre-employment medical assessments will be put in place as a workforce risk management tool to screen individuals for risk factors that may limit their ability to perform a job safely and effectively. Expected bents of conducting a pre-employment medical assessment include a safer working environment, reduction in workplace injuries, minimised downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction. **C9-5:** NCCL will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities. **C9-6**: NCCL will implement regular health and safety checks and audits of Workers, contractors and subcontractors and implementing sanctions in case of breaches of nationals **C9-7:** NCCL will develop and implement a Workers Grievance Mechanism for the Project workforce including contractors and subcontractor's standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. **C9-8:** NCCL will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. **C9-:9** NCCL will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. **C9-10**: NCCL will ensure that its Code of Conduct is followed to regulate the performance and behaviour of all workers, including provision for disciplinary action for anti-social behaviour and non-compliance with health and safety regulations such as lack of use of PPE. **C9-11:** NCCL will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation.		Contractor
C10: Community Health and Safety Impacts	-Increased noise decreased air quality, inappropriate waste handling or disposal, and accidental leaks and spills, debris and	**C10-1:** NCCL will develop and monitor the implementation of a Community Health and Safety Management Plan which will include the following measures: • Ensure that all workers are housed in accommodation camps rather than in the local settlements in order to minimize interaction with local communities and related health and safety impacts.	Contractor Cost	Contractor Contractor Contractor Contractor

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
	movement of heavy equipment may pose a safety risk to the general public. -Potential impacts on community safety, in particular road accidents, trespass on the sites, and demining activities potentially resulting in accidents leading to injuries or fatalities. ~ Environmental health: changes to the environment due to increased noise and vibrations, decreased air quality and, inadequate management of waste. ~ Impact from workers presence and potential interaction with local populations	• Ensure all workers including contractors and subcontractors undergo pre-employment screening and regular health screening including voluntary screening for STDs. • Ensure any trucking companies employed to work on the Project will have policies around health screening of their workers in line with Project requirements. • Ensure all workers including contractors and subcontractors receive education around project area and symptoms of communicable diseases of concern and STDs. • Provide access to health care for those injured by its activities. • Ensure that work sites are fenced and that signs are put up around work fronts and construction sites advising people of the risks associated with trespass. When work fronts are less than 100 metres from a community or house, employ security guards from the local community to prevent trespass. • Undertake a programme of stakeholder engagement and consultation to educate local communities of the risks of trespassing onto sites, the meaning of signs, and the dangers of playing on or near equipment or entering fenced areas. Special attention to be paid in primary and secondary schools near the project area and in areas close to residential or school areas.		
		C10-2: NCCL will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. • NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process. • NCCL will provide primary health care and first aid at construction camp sites to avoid pressure on local healthcare infrastructures. • NCCL will implement a Community Grievance Mechanism. • NCCL will develop and implement a Traffic Management Plan covering aspect such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations	Contractors Cost	

IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	COST	RESPONSIBILITY
C11: Gender-based violence at the community level	-Gender-based violence at the community level -Forced Early Marriages -Sexual Exploitation and Abuse -Transactionnel sex. -Shift in power dynamics in the community or family. -Abusive behavior among project-related staff	**C11-1:** NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process	Contractors Cost	Contractor
C12: Violation of children rights by contractor and labour force on site	-Violation of children rights by contractor and labour force on site	**C12-1:** NCCL will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process		Contractor
C13: Unplanned Events	-Impacts to soil and surface water from spill events	**C13-1:** Develop a detailed Oil Spill Response Plan (OSRP) which includes community notifications of any significant spills that have the potential to affect communities. **C13-2:** Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. **C13-3:** Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. **C13-4:** Hydrocarbon spill clean-up kits shall be available at all locations where refuelling or maintenance of vehicles and equipment is done, and responsible people shall be trained in the use thereof.	Contractors Cost	Contractor

Table 9-3. Environment and Social Monitoring Indicators

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
A. General	**A-1** Planning	• Workforce briefed about the relevant environmental issues, including pollution control and site management	NCCL	
	A-2 Implementation Oversight Capacity	• EHS Manager • Environmental Officers	NCCL	

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	**Frequency**
		• Social Officers • Health and Safety Officer		
	A-3 Site Implementation Capacity	• Site EHS Officer	Contractor	
B. Labour Influx	**B-1** Higher rates of violence, injury, **B-2** Alcohol and drug consumption and **B-3** sexually transmitted diseases in the local population. **B-4** social conflicts within and between communities	Development/Implementation • HR Policy • Labour influx plan • HR records on the percentage of local versus non-local employment. • Number/attendance records of Sensitization meetings held on GBV, SEA, HIV/AIDS • Review of training attendance records of capacity enhancement and transfer of knowledge that local personnel have received. • Code of conduct included in contracts	HSE Manager Human Resource Manager Contractor/NCCL	• Prior to construction commencing for Local Content and Procurement Plan. • Continuous during construction phase for employment and procurement-related measures. • Quarterly for training-related measures.
C. Air Quality/ Atmospheric Conditions	**C-1** Dust Emissions associated with construction activities	Dust deposition in adjoining areas to be physically monitored using NEMA accredited labs to ensure compliance	Contractor/HSE	• At least once during excavation and casting
D. Noise	**D-1** Noise from construction activities (*to be managed by equipment choice and arrangement of*	• Part of the subcontractors' contract	Contractor	• Each schedule of construction activities

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	**Frequency**
	construction activities)			
E. Soils	**E-1** Dumping of construction material outside the project construction footprint **E-2** Erosion and compaction **E-3** Contamination due to spill of civil construction material	• Visual checks at construction site • Visual inspection during casting	Contractor	• At least once per construction site
F. Ecology	**F-1** Disruption to existing flora and fauna **F-2** Loss of Vegetation **F-3** Disturbance to fauna due to movement in forest areas	• Sensitization trainings to worker on local ecology and extent of care • Signs and warnings against hunting • Number of revegetated areas. • % area of site cleared vs. remaining un-cleared land.	Contractor	• Continuous
G. Waste	**G-1** accumulation of waste on site causing nuisances such as odor, pest control problems and general litter.	• Construction Waste Management Plan • Routine weekly checks of waste management arrangements should be undertaken.	Contractor	• Continuous
H. Traffic and Transport	**H-1** Increase in traffic	• Development/implementation of traffic management plan		• Continuous
I. Landscape and Visual Amenity	**I-1** Visual scarring of the landscape	Inspection on a daily basis	Contractor	• Continuous throughout the construction phase

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	**Frequency**
J. Workers Heath, Safety and Labour Rights	**J-1** Workers health and safety Respect for labour rights	• Worker Health and Safety Management System • Human Resources Policy. • Traffic Management Plan • Verify contractual clauses of Contractor and all sub-contractors requiring adherence to Kenya law and international standards. • Records of incidents and accidents. • Record on training sessions and attendance on health and safety measures • Record of lessons learned to minimize occupational health and safety. • Code of Conduct document	Contractor	• Continuous
K. Community Impacts	**K-1** Labour Influx (Health impacts including risks of STDs, HIV/AIDS) **K-2** Community expectation for local benefits	• Number of meetings held • Attendance records of Sensitization meetings held on GBV, SEA, HIV/AIDS • HR records on the percentage of local versus non-local employment. • Code of conduct included in contracts	Contractor	Continuous throughout the construction phase
	K-3 Violence against children	• Policies against VAC in place • HR Policy • Records of employees with National ID card indicated	Contractor	
	K-4 Gender Based Violence and Domestic Violence	• Policies against GBV in place • HR Policy • Attendance records of Sensitization meetings held on GBV	Contractor	Continuous throughout the construction phase

9.3.1 Construction Environment and Social Management Plan

For an effective integration of environmental and social safeguards into the project implementation the Contractor will need to adopt this ESMP and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance. The environmental supervision will also adopt the C-ESMP. Construction Environment and Social Management Plan (C-ESMP) is an upgraded ESMP illustrating realities of the project works to be prepared by the Contractor. The Contractor is expected to finalize the work plan and upon approval, list the works items and for each item present practical actions that will be undertaken to realize achievement of the ESMP. The actions on works items should address environmental and social aspects associated with the works and in line with guidelines from the ESMP. Based on these ESMP outline, the Contractor will be instructed to develop a Construction Environment and Social Management Plan (C-ESMP) for each component of the project and submit these plans to the NCCL.

9.3.1.1 NCCL Project Management Team

The Project will be implemented by NCCL which has a long experience of implementing similar projects under the safeguards policies. NCCL has experienced environmental and social safeguards specialist on staff. The project implementation arrangements have been established and the proponent has appointed the NCCL project implementation team including: -

- Project manager
- Environmentalist
- Community liaison Officer

The core functions of the team will be to coordinate and facilitate oversight for technical, environmental and social safeguards, health and safety and social risks supervision.

9.3.1.1.1 Project Supervision Engineer

The Project Supervision Engineer will be required to recruit a qualified Environmental and Social Expert who will be charged with the responsibilities of supervision, review of site reports, preparation of monthly progress reports, prepare and issue appropriate instructions to the Contractor and monitor ESMP implementation.

9.3.1.1.2 Contractor

The Contractor will ensure that the established mitigation measures are integrated and implemented throughout the project works as per the C-ESMP. The Contractor will internalize the ESMP/C-ESMP, prepare monthly progress reports and implement instructions issued by the Supervision Consultant. The Contractor, therefore, will engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the Counterpart Personnel for the Supervision Expert.

9.3.1.1.3 National Environment Management Authority

The National Environment Management Authority (NEMA) is responsible for ensuring environmental compliance in the country and has offices in Kilifi Counties with staffing

who will further ensure that the ESMP is implemented as part of their mandate, functions and responsibilities. NEMA will undertake surveillance on the project implementation and review compliance performance based on the supervision monitoring reports.

9.3.1.2 Management and Monitoring

9.3.1.2.1 Management Plans

The ESMP has identified some additional plans that will be prepared by the procured contractor prior to construction commencing the construction site:

- Traffic and Transportation Management Plan
- Construction Environmental and Social Management Plan
- Waste Management Plan
- Emergency Preparedness and Response Plan
- Stakeholder Engagement Plan
- Labour Recruitment Plan
- Community Health and Safety and Security Plan
- Occupational Health and Safety Plan

The specific management plans are listed in Table 9.4 along with links to how these relate to the activities and impacts described within the ESIA as well as the identified responsible party for each. Together with this ESMP, these specific plans will form the overall Environmental and Social Management Plans for the Project.

Table 9-4. Management Plans

Plan Name	Includes	Plan Owner
Specific Management Plans		
Traffic and Transportation Management Plan	Controls over prescribed routes, driver training, vehicle maintenance, speed restrictions, appropriate road safety signage, and vehicle loading and maintenance measures and vetting procedures. Will also include specification for community awareness and safety programmes.	Contractor
Construction Management Plan	Plan for the management of the establishment process, including logistics and site management	Contractor
Waste Management Plan	Project-related waste handling procedures for hazardous and non-hazardous wastes.	Contractor
Emergency Preparedness and Response Plan	Administration (policy, purpose, distribution, definitions, etc.), organisation of emergency areas (command centres, medical stations, etc.), roles and responsibilities, communication systems, emergency response procedures, emergency resources, training and updating, checklists (role and action list and equipment checklist) and business continuity and contingency. The plan will also include specifications for emergency communications as well as on-going public and community communication and disclosure.	Contractor

Stakeholder Engagement Plan (SEP) including GBV Action Plan	SEP will build on engagement undertaken to date and specify interactions with community and other stakeholders, as well as finalizing the grievance procedure to be used throughout the Project. Community and Employee awareness training and code of conduct procedures.	Contractor
Employment and Workforce Management Plan	Plan for local training and procurement for operations. Also specifies requirements for contractors during construction. The Plan will include policies and procedures for hiring of local labour, unskilled, semi- skilled and skilled labour.	Contractor
Community Health and Safety and Security Plan	The purpose of the CHSSP is to provide a clear set of actions and responsibilities for the control of impacts affecting the health and safety of the communities within the Project's area of influence. The plan includes measures to respond to exposure to diseases due to worker interaction, environmental change and safety (traffic, unplanned events, etc.)	Contractor
Occupational Health and Safety Plan	Procedures on chemical hazards, fire and explosions, confined spaces and on site-traffic hazards. Communication and training programmes. Safety analysis and industrial hygiene surveys procedures. Monitoring, record-keeping and audit procedures.	Contractor

NCCL will delegate certain responsibility but retain oversight and supervision role to construction contractors and supervising engineers as specified in this ESIA/ESMP section that highlights the roles of the contratcors. During this phase NCCL will manage its contractors to ensure that this ESMP is implemented and monitored effectively through contractual mechanisms regular direct oversight. As a contractual requirement, the contractors will be required to demonstrate compliance of their activities against the ESMP. This includes providing resources to ensure compliance of next tier contractors and a process for emergency stop-work orders in response to monitoring triggers. Contractors will be responsible for performing all work:

- In compliance with relevant national and international EHS legislation and regulations, and with other requirements to which the Project subscribes
- In conformance with the Project ESMP, and related management plans for specific aspects; and
- In accordance with contractual technical and quality specifications.

The Project's ESMP and related documentation will be the main contractual documentation to which the contractor(s) will be bound. Contractors will be required to develop their own management plans which show how they will comply with these environmental and social requirements.

In this way, the ESMP will be implemented and controlled using both NCCL and the contractor management systems. The contractor management systems will therefore:

- Provide the framework that regulates their activities.
- Define responsibilities and reporting relationships for expediting, mitigation and monitoring actions detailed in the ESMP; and
- Specify the mechanisms for inspecting and auditing to ensure that the agreed actions are implemented.

Contractors will be required to self-monitor against their plan and compliance with the plan will be routinely monitored by NCCL directly or by third parties. Contractors will be required to submit regular reports of monitoring activities and the Project will review these on a regular basis. NCCL is ultimately responsible for the management and supervision of all Project activities and will have principal responsibility for implementing this ESMP and the mitigation measures.

9.3.1.2.2 Training and Awareness

NCCL will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social conditions. NCCL recognises that it is important that employees at each relevant function and level are aware of the Project's environmental and social policy; potential impacts of their activities; and roles and responsibilities in achieving conformance with the policy and procedures. Training and awareness-raising therefore forms a key element of both EHS and the expediting of this ESMP. Key staff will, therefore, be appropriately trained in key areas of EHS management and operational control with core skills and competencies being validated on an on-going basis. The identification of training and awareness requirements and expediting of the identified training/awareness events will be the responsibility of the HSE Manager.

Training and awareness are not a requisite solely of contractor's personnel (and subcontractors). It would be important to include an assessment of the need for training and capacity building of NCCL staff (before and during the construction phase) and at the conclusion of the construction phase and handover of the ESMP, SEP and grievance mechanism. This will be achieved through a formal training process. Employee training will include awareness and competency with respect to:

- environmental and social impacts that could potentially arise from their activities (including, biodiversity and noise);
- legal requirements in relation to environmental and social performance
- necessity of conforming to the requirements of the ESIA and ESMP, in order to avoid or reduce those impacts
- activity-specific training on waste management practices, documentation systems and community interactions; and
- roles and responsibilities to achieve that conformity, including those in respect of change management and emergency response.

Employees responsible for performing site inspections will receive training by drawing on external resources as necessary. Training will be coordinated by the HSE Manager prior

to commissioning of the facilities. Upon completion of training and once deemed competent by management, staff will be ready to train other people. Similarly, the Project will require that each of the contractors' institute training programs for its personnel. Each contractor is responsible for site EHS awareness training for personnel working on the job sites. The contractors are also responsible for identification of any additional training requirements to maintain required competency levels. The contractor training program will be subject to approval by NCCL and it will be audited to ensure that:

- Training programs are adequate
- All personnel requiring training have been trained; and
- Competency is being verified

9.3.1.2.3 Communication

NCCL will maintain a formal procedure for communications with the regulatory authorities and communities. Dealings will be transparent, and stakeholders will have access to personnel and information to address concerns raised. The Project will implement a grievance mechanism whereby community members can raise any issues of concern. Grievances may be verbal or written and are usually either specific claims for damages/injury or complaints or suggestions about the way that the Project is being implemented. When a grievance has been brought to the attention of the Project team it will be logged and evaluated. The person or group with the grievance is required to present grounds for making a complaint or claiming loss so that a proper and informed evaluation can be made. Where a complaint or claim is considered to be valid, then steps are required to be undertaken to rectify the issue or agree compensation for the loss. In all cases the decision made and the reason for the decision will be communicated to the relevant stakeholders and recorded. Where there remains disagreement on the outcome then an arbitration procedure may be required to be overseen by a third party (e.g., government official). Local community stakeholders will be informed on how to implement the grievance procedures.

9.3.1.2.4 Documentation

NCCL will control EHS documentation, including management plans; associated procedures; and checklists, forms and reports, through a formal procedure. All records will be kept on site and will be backed up at several offsite locations (including secure cloud storage facilities). Records will be kept in both hard copy and soft copy formats. And all records will be archived for the life of the project.

Furthermore, the document control procedure will describe the processes that the Project will employ for official communication of both hardcopy and electronic (through the internet) document deliverables. In addition, it will describe the requirement for electronic filing and posting and for assignment of document tracking and control numbers (including revision codes). The EHS Manager is responsible for maintaining a master list of applicable EHS documents and making sure that this list is communicated to the appropriate parties. The EHS Manager is responsible for providing notice to the affected parties of changes or revisions to documents, for issuing revised copies and for checking that the information is communicated within that party's organisation appropriately. The

contractors will be required to develop a system for maintaining and controlling its own EHS documentation and describe these systems in their respective EHS plans.

9.3.1.2.5 Operational Control Procedures

Each activity for which a potentially significant environmental or socioeconomic risk or impact is expected will have an operational control associated with it that specifies appropriate procedures, work instructions, best management practices, roles, responsibilities, authorities, monitoring, measurement and record keeping for avoiding or reducing impacts. Operational controls are monitored for compliance and effectiveness on a regular basis through a monitoring and auditing procedure described in the ESMP. Operational control procedures will be reviewed and, where appropriate, amended to include instructions for planning and minimising impacts, or to at least reference relevant documents that address impact avoidance and mitigation.

9.3.1.2.6 Managing Changes to Project Activities

Changes in the Project may occur due to unanticipated situations. Adaptive changes may also occur during the course of the project life cycle. The Project will implement a formal procedure to manage changes in the Project that will apply to all project activities. The objective of the procedure is to ensure that the impact of changes on the health and safety of personnel, the environment, plant and equipment are identified and assessed prior to changes being implemented. The management of change procedure will ensure that:

- Proposed changes have a sound technical, safety, environmental, and commercial justification
- Changes are reviewed by competent personnel and the impact of changes is reflected in documentation, including operating procedures and drawings
- Hazards resulting from changes that alter the conditions assessed in the ESIA have been identified and assessed and the impact(s) of changes do not adversely affect the management of health, safety or the environment
- Changes are communicated to personnel who are provided with the necessary skills, via training, to effectively implement changes; and
- The appropriate NCCL person accepts the responsibility for the change.

As information regarding the uncertainties becomes available, the Project ESMP will be updated to include that information in subsequent revisions. Environmental and social, as well as engineering feasibility and cost, considerations will be taken into account when choosing between possible alternatives.

10 GRIEVANCE MANAGEMENT

Grievance redressal is a critical component of effective ESMP implementation. The purpose of GRM is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with the project. Such a mechanism would provide the stakeholders with one project personnel or one channel through which their queries will be channeled and will ensure timely responses to each query. This will allow for trust to be built amongst the stakeholders and prevent the culmination of small issues into major community unrest. The GRM will be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM will be communicated to all relevant stakeholders and will also be applicable for any contractor that will occupy and/or use land during the construction and operations phase.

WBG standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies. This section contains the following:

- Grievance definition and categories and GRM principles; and
- The process of receiving, documenting, addressing and closing grievances.

10.1 Grievance Definition and Categories

As stated earlier, a grievance is a concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations and may be filed in the same manner and handled with the same procedure. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts or perceived impacts. Based on the understanding of the project area and the stakeholders, an indicative list of the types of grievances have been identified for the project, as can be seen below: -

Internal Grievances: Grievances from employees (including both direct and indirect employees, including local workers and migrant workers through contractors):

- Complaints pertaining to amount of wage, salary, other remuneration or benefits as per Company's Human Resource policy
- Gender discrimination
- Sexual harassment
- Sexual exploitation and abuse by project workers against community members
- Violence against children
- Gender-based violence
- Issues related to workers organization
- Labour Accommodation
- Health and Safety issues; and
- Extended working hours.

External Grievances: Grievances from community members:

- Issues related to sexual exploitation and abuse
- Issues related to gender-based violence at the community-level
- Issues related to child labour and protection
- Issues related to transportation and traffic
- Increase in environment pollution
- Impact on community health
- Disturbances to locals due to influx of migrant workers in the area
- Issues arising out of sharing of employment and business opportunity; and
- Concerns over the impact on local cultures and customs.

10.1.1 Internal Grievance Mechanism

The contractor will also be required to recruit CLO to handle project related grievances. The grievance mechanism will be advertised and announced to affected stakeholders so that they are aware of their rights to submit comments and how to go about it. The grievance mechanism will be founded on the following principles:

- Responsibilities will be adequately assigned: A responsible person or team will be constituted and mandated to organise the resolution of grievances. This will enable the system run without undue impediments.
- The process will be accorded due importance: It is important for affected communities and other stakeholder groups seeking to have their complaints resolved, to perceive the grievance management process as transparent and fair. The NCCL grievance management process will enhance outcomes and give people satisfaction that their complaints have been heard, even if the outcome is less than optimal.
- The grievance procedures will be readily understandable, accessible and culturally appropriated by the local population. From the outset, clarification will be made on who is expected to use this procedure. The people will be assured that there will be neither costs nor retribution associated with lodging a grievance. The entire process (from how a complaint is received and reviewed, through to how decisions are made and what possibilities may exist for appeal) will be made as transparent as possible through good communication.
- The mechanism will be scaled as needed for the Project: The NCCL grievance mechanisms will be designed to fit the context and needs of the project. As much as possible, it will have relatively simple means of addressing complaints, such as through community meetings, community liaison personnel and suggestion boxes allowing for anonymity. It may also need a more formalized process and mechanism, and a higher level of dedicated resources for receiving, recording, tracking, and resolving complaints. The grievance mechanisms will not be taken as a substitute for community engagement process or vice-versa. The two are complementary and will be made mutually reinforcing. Not all grievances shall be handled in the same way. NCCL will consider creating different levels of redress within the grievance mechanism that correspond to the scale and seriousness of the complaint.
- The process will be documented and publicized: The process will be put in writing and publicized. NCCL recognizes that the GRM cannot be effective if nobody knows about it. Thus, the grievance procedures will be put into writing, publicized, and explained to

relevant stakeholder groups. The people will be informed on where to go and whom to talk to if they have a complaint and understand what the process will be for handling it. As with all information, it will be provided in a format and language readily understandable to the local population and/or communicated orally where it's established that literacy levels are low. It will not be overly complicated to use nor will it require legal counsel to complete.

- The process will be made accessible: Projects that make it easy for people to raise concerns and feel confident that these will be heard and acted upon can reap the benefits of both a good reputation and better community relations. One of the best ways to achieve this is to localize your points of contact. Hire people with the right skills, training, and disposition for community liaison work and get them into the field as quickly as possible. Maintaining a regular presence in the local communities greatly helps to personalize the relationship with the company and engender trust. Talking with a familiar face who comes to the village regularly, or lives nearby, creates an informal atmosphere in which grievances can be aired and sorted out, or referred up the chain of command. This is usually more convenient and less intimidating to people than having to travel distances to the company offices during business hours to file a formal complaint.
- Response time will be defined, and transparency upheld: NCCL will publicly commit to a certain time frame in which all recorded complaints will be responded to and ensure this response time is enforced. This will help allay frustration by letting people know when they can expect to be contacted by NCCL personnel and/or receive a response to their complaint. Combining this with a transparent process by which stakeholders can understand how decisions are reached will inspire confidence in the NCCL system. During critical times such as construction, there will be immediate responses to time-sensitive complaints. A related issue is making sure that the community liaison officer has the authority to resolve basic complaints herself, as well as a direct reporting line to senior managers if the issue is more serious or costly to address.
- Good record-keeping and feedback: a grievance logbook will be kept where necessary, and a sophisticated database will be maintained where required. Written records of all complaints will be kept as this is critical for effective grievance management. The record shall contain the name of the individual or organization; the date and nature of the complaint; any follow-up actions taken; the final result; and how and when this decision was communicated to the complainant. Overly personal data such as national identity and phone numbers will be optional and kept confidential unless required to disclose to authorities. In addition to informing the complainant of the outcome (in writing where appropriate), as part of the broader community engagement process NCCL will report back periodically to communities and other stakeholder groups as to how the company has been responding to the grievances it has received.
- There will be a separate reporting mechanism for GBV, SEA and SH cases that are discrete and anonymous. The liaison officer will be the focal point and will establish the system to handle these complaints that will include reference to confidentiality, safety and survivor-centered approach. All registration of the data will be confidential and anonymized.
- Access to legal remedies will not be impeded: If the project is unable to resolve a complaint, it may be appropriate to enable complainants to have recourse to external

experts. These may include public defenders, legal advisors or NGOs. The client may find that it can work in collaboration with these third parties and affected communities to find successful resolution of the issues. However, this is not always possible, and situations may arise where complainants will choose to pursue legal recourse. In this case, NCCL will not impede access to these mechanisms.

Table 10-1: Sample Grievance Recording Form

GRIEVANCE REGISTRATION	
CASE No.	**DATE**
Name	
Department/Contractor Name	
Phone Number	
Details of Grievance	
Name of Person Recording Grievance	
Designation of Person Recording Grievance	
Proposed Date of Response to Grievance	
Signature of Recording Person	Signature of Complainant
GRIEVANCE REDRESS RESPONSE	
Date of Redress	
Decision of CLO (Give full details)	

10.2 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. The format for the grievance register shall be as follows.

Table 10-2. Sample Grievance Recording Form

Date	GR #	Name of Grievant	Ward/Village	Grievance Details	Concerned Department	Name of Recording Person	Present Status	Remarks

This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register, a preliminary analysis shall be undertaken by the Community Liaison Officer to ensure that the grievance is within the scope of the GRM.

10.2.1 External Grievance Mechanism

The process to be followed for the redressal of the external stakeholder grievances is summarized below.

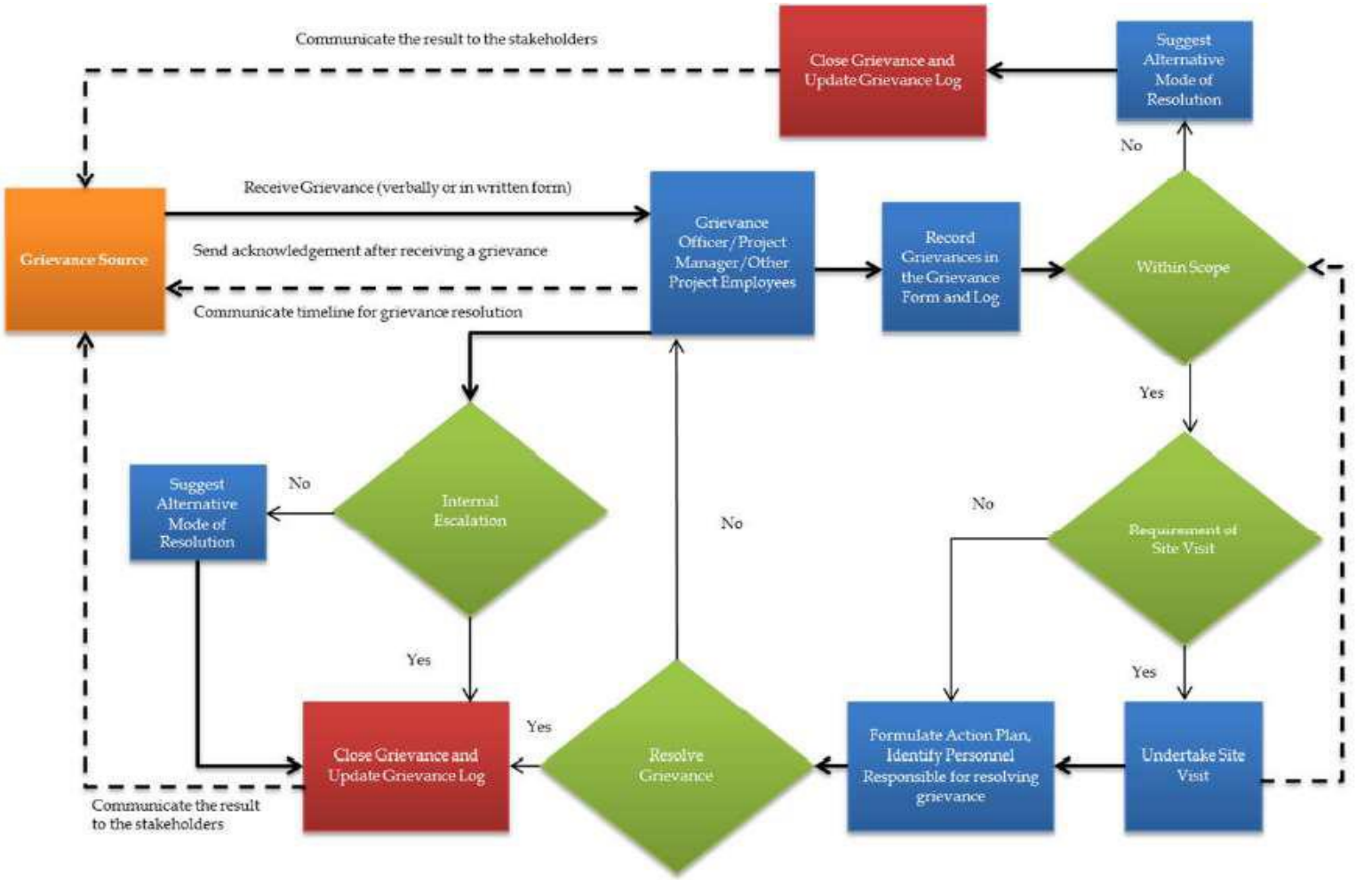


Figure 10-1: GRM Steps

10.3 Publicizing and Disclosure of the GRM

The GRM will be disclosed to the stakeholders through written and verbal communication. The mediums to be used for this purpose are public meetings, group discussions, and provisioning of the GRM in the manner outlined in the previous section. The GRM disclosure will be done along with the disclosure of other management plans.

10.4 Receiving and Recording Grievances

As part of the GRM, the grievances from the stakeholder or their representatives may be communicated verbally (in person or over a telephonic conversation) or in written form (in the format given below) to the project representatives or to the CLO directly. If the grievance is received directly by the CLO or other project representatives, it will be recorded directly into the Grievance Form as soon as the personnel return to site. A sample grievance form is as follows.

Table 10-3: Sample Grievance Recording Form

GRIEVANCE REGISTRATION	
CASE No.	**DATE**
Name	
Department/Contractor Name	
Phone Number	
Details of Grievance	
Name of Person Recording Grievance	
Designation of Person Recording Grievance	
Proposed Date of Response to Grievance	
Signature of Recording Person	Signature of Complainant
GRIEVANCE REDRESSAL RESPONSE	
Date of Redress	
Decision of CLO (Give full details)	

All project staff will be informed that they must pass all grievances, communications to the Grievance Officer (discussed in the following section) on site as soon as possible after they are received. Details of the person lodging the grievance shall be noted and passed along with the grievance. The CLO in turn will communicate all grievances to the Environmental and Social Officers for the contractor or NCCL. For assisting the communication of grievances, a register will be maintained at the project office at which any individual/group can come have their complaint registered. Village leaders and government departments will also be advised to pass any complaints they receive to the site level community liaison officer.

10.5 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. The format for the grievance register shall be as follows. This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register, a preliminary analysis shall be undertaken by the social officer to ensure that the grievance is within the scope of the GRM.

10.6 Acknowledgment of Grievance

Upon the completion of the recording of the grievance, the stakeholder will be provided with an acknowledgment of the receipt, along with a summary of the grievance.

Box 10-1: Sample Acknowledgement Receipt for Claimant

This receipt is acknowledgement of grievance registration by _____,resident of village _____ on date _____ His case number is _____ and the date for response is _____

Full name & signature of recording person_____

In case the grievance is assessed to be out of the scope of the GRM, a communication towards the same shall be made to the grievant, and an alternative mode of redressal shall be suggested.

10.7 Site Inspection and Resolution

For the purpose of verifying and resolving the grievances received, site inspection may not be required in all the cases. Depending upon the sensitivity of the issue, requirement of a site inspection will be identified. A site inspection will be undertaken by the site level community liaison officers or the project member assigned by the contractor's Environment and Social officer. The purpose of the site inspection will be to check the validity and severity of the grievance. For this purpose, the personnel may also undertake discussions with the concerned external stakeholder. The inspection will be undertaken within ten days of receiving the grievance. The assigned individual will then work with other relevant members of the Project team to investigate the problem and identify measures to resolve the grievance as appropriate. The personnel to be involved in the grievance resolution shall be dependent upon the nature of the grievance.

10.8 Resolution, Escalation, and Closure

Based on the understanding thus developed, the CLO, in consultation with the concerned departments, shall identify a suitable resolution to the issue. This could involve provision of information to clarify the situation, undertaking measures to remedy actual problems or compensate for any damage that has been caused either by financial compensation or compensation in-kind, and introduction of mitigation measures to prevent recurrence of the problem in the future. This resolution shall be accordingly communicated to the grievant within 10 working days of completing the site investigation.

10.9 Update of Records

The records of the grievance register shall be updated every working week with the present status of the grievance. Once the grievance is resolved, and the same has been communicated to the grievant, the grievance shall be closed in the grievance register. The grievance register should also provide an understanding of the manner in which the grievance was resolved. These instances shall then serve as references for any future grievances of similar nature.

10.10 GRM Monitoring and Implementation

It is important to monitor GRM to ensure that the grievances are addressed and resolved. The monitoring of the GRM implementation will be undertaken on a monthly basis by the NCCL team. Monitoring will include:

- Auditing the implementation of the GRM
- Monitoring the formal and informal consultation activities conducted with the stakeholder groups with respect to GRM
- Tracking feedback received from engagement activities
- Recording and tracking commitments made to communities; and
- Assessing the efficacy of the engagement activities in terms of the desired outcomes and the participation of the stakeholder groups.

10.10.1.1 GRM Reporting

The performance of the GRM will be reviewed on a quarterly basis during the implementation period. For the purpose of review, the quarterly reports will be considered for analysis and discussion. On the basis of these reports, a Grievance Redressal Report will be prepared.

11 CONCLUSIONS

This report presents a comprehensive environmental and social impact assessment for the proposed NCCL Kaloleni ntegrated upgradation Project and proposed measures for mitigating the adverse impacts while enhancing the positive ones during the phases of construction, operation and maintenance. An evaluation of the possible alternatives for the project activities was also performed. The following conclusions have been arrived at regarding the NCCL Kaloleni ntegrated upgradation Project. The anticipated benefits of the construction and operation and maintenance of the Project are immense. The project will increase cement production in the country. For the project components, which are suggested to be maintained and those where alternatives were provided, an evaluation of the positive and negative impacts was performed, and an Environmental and Social Monitoring Plan (ESMP) drawn. All negative impacts can be mitigated following the ESMP.

The negative impacts identified in this ESIA during the planning, construction, operation and decommissioning phase of the project, including waste generation, air pollution, noise pollution, occupational health and safety impacts, community health and safety impacts, traffic, labour influx and gender impacts will be limited to the project area/site and can be mitigated using the measures proposed in the ESMP as well as the preparation and implementation of C-ESMPs including but not limited to:-

- ✓ Health and Safety Plan
- ✓ Labour Management Plan
- ✓ Child Protection Strategy
- ✓ Waste Management Plan
- ✓ Contractors Code of Conduct, specific provisions for VAC, SEA and SH
- ✓ Gender Inclusivity Strategy
- ✓ HIV/Aid Prevention Strategy
- ✓ GBV Action Plan, including:
    - ✓ *SEA Prevention and Response Strategy*
    - ✓ *SH Policy*
    - ✓ *GBV (at the community level) Mitigation Plan*
    - ✓ *SEA Redress Mechanism*

Other plans to aid the implementation of the safe project implementation will be included as the project continues. The adverse impacts on the physical and natural environment will be "in sum total," not significant, and can be handled through the provided mitigation measures. There are incremental costs required to achieve these. The contractor will be legally bound to implement this ESMP and any subsequent C-ESMP that will be developed during the construction process. This obligation will be explicitly stated in the ToR, bidding documents and the final executed contract. Based on the immense project benefits, which have been stated above, and the identified negative impacts which can be mitigated in the proposed ESMP, we strongly contend that NEMA will find this ESIA study satisfactory and the project environmentally and socially viable to be permitted to take off.

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13 ANNEXES

ANNEX A. LIST OF PARTICIPANTS CONSULTED

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI, RABAI, KILIFI COUNTY

PUBLIC PARTICIPATION LIST

Date: 16/12/20

Name	Telephone No	Signature
Michael Bidii Katana	0724870433	[signature]
Carolyne Johanna	0792210025	Caroline
Daniel Kalagisa	0743591302	[signature]
Janet J Sephu	N/A	[signature]
Alice Salmu	N/A	[signature]
Aliy Mbosa	0713732045	[signature]
Sarah Mwero	0723628530	[signature]
Issa Khamisi		[signature]
Kenga Ngumbau Machia	N/A	[signature]
Mohammed Said Boya	0703186175	[signature]
Saphy Abdalla	N/A	[signature]
Ali Said	0705864816	[signature]
Albert Polah	0705879570	[signature]
Humphrey Bimunga Ulunje	N/A	[signature]
SANGA TABIA MANGI	0708557415	[signature]
Iwalim Hamisi Bora	0114245392	[signature]
Swaleh Kombo	0719709204	[signature]
Saumu Namketani	0717693235	[signature]

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI, RABAI, KILIFI COUNTY

PUBLIC PARTICIPATION LIST

Date: ……..

Name	Telephone No	Signature
MWADAISHA B. BATA	0727751825	
REVINCE JIMBO	0711648493	
RAPHAEL KISAGHI	0727366780	
POLYCARP Oliedo	0705924028	
Julian Otieno	0707115000	

ANNEX B. QUESTIONNAIRES

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

The environmental impact Assessment and audit regulation 2003. Public participation and consultation is a key input in this process. Consultations are held with members of immediate community and he interested or affected parties. Inorder to obtain their views regarding he project. As a valuable stakeholder, we kindly request you to provide us with opinion regarding the environmental and social impact assessment associated with the proposed expansion of Maisha Mineral Fertilizer plant

Name	Michael Bidii Kakina
ID NO	Not Provided.
Signature	
Date	
Mobile No.	0724870433.

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or ~~No~~
   If yes kindly mention
   - There will be dust generation from operation
   - Noise from operations

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or ~~No~~
   If yes kindly mention,
   - The plant will mechanize system hence reduce labour force

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      - Air Pollution from the Chimney.

- Water treatment in the plant percolates to the surrounding borehole for drinking.

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

(1) Provide Shuttle for proposed by the site in phase 2 of the Project.
(2) Provide CSR to the nearby schools ie Malaw Mwamdodo Nsamani e.t.c
(3) Improve the access roads from Quarry site to the company to minimize dust.
(4) Provide fence to the chiefs camp of Mombasa Cement which provide such to the community.

PUBLIC PARTICIPATION AND CONSULTATION FORM

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Name	Daniel Kekaisa
ID NO	10690627
Signature	
Date	16/12/20
Mobile No.	0743591302

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention
   - Dust from the plant will destroy plant and vegetation
   - Air Pollution from the plant may lead to diseases to people around.

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,
   - Employment of the ready youth
   - Increase income in the area due to employment and small business generation

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      - Increased noise generation from the plant operation

- Increased Payment to workers onsite.

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

- All employment should be based on people within the community
- Provision of CSR by the Society i.e should provide water to the community members
- Provide monitoring point to Community water.
-

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	ISSA KHAMISI
ID NO	07263458?
Signature	
Date	
Mobile No.	N/A

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? ~~Yes~~ or NO
   If yes kindly mention
   Dust Generation from the integral Production
   Generation of waste within the community
   Noise

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income) ~~Yes~~ or No
   If yes kindly mention,
   Employment Provision to the youth at
   reduced crime rate

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
   Noise generation from plant operation

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

- Provide water to the society at a free cost
- Improved access to disposal service

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Alice Sumu
ID NO	N/A
Signature	
Date	16/12/20
Mobile No.	N/A

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention
   - Air pollutant from production Process.
   - Dust Generation

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income) Yes or No
   If yes kindly mention,
   Employment Generation to the Nearby youths

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
   - Noise Generation at night due to intensive operation

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

.....

.....

.....

.....

.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Janet Josephine
ID NO	N/A
Signature	
Date	16/12/20.
Mobile No.	N/A

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? ~~Yes~~ or NO
   If yes kindly mention
   ① Increased dust generated

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,
   Increased employment to youth

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
   - Generation of waste to the society
   - Increased noise generated at night

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

.....

- Wide Provision to the society.

- Subsidize Payment in the dispensary

.....

.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	A. G. Mbuga.
ID NO	N/A
Signature	
Date	
Mobile No.	0713432045

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention
   - Dust production May lead to increased diseases
   - Insecurity risk due to increased people in the area.

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income) Yes or No
   If yes kindly mention,
   - Increased employment to locals
   - Increased $ in the Community

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      - Noise generation in production

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

- Provide Help to the Community members
- Provide dispensary services at for (...)

.....

.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Sarah Mweu
ID NO	32304807
Signature	
Date	
Mobile No.	0723628830

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? ~~Yes~~ or NO
   If yes kindly mention
   - Increased pressure due to increased ppl.
   - Increased dust affects every business

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income) ~~Yes~~ or No
   If yes kindly mention,
   - Enhanced business opportunity to small scale traders
   - Employment opportunity to locals

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      - Increased noise pollution from production

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

- With Permission of the Community Members
- Expand the area.

.....

.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Swaleh Kombo
ID NO	21618571
Signature	
Date	16/12/2020
Mobile No.	0719709204

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention

Madhara utakuwa na madhara manaake
mtaendo hawajakuwa tayari Kwa
hiyo hakuna maana yambayo
naweza kusaidi zaidi kukataa
madini yanayo ni kwamba sina
maoni ya kuandika

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,
   .....
   .....
   .....
   .....
   .....
3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
   ..... provide improved technology to minimize pollution.....

+ Improved health to the residents

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

1) Provide Water services to the Community

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Swaleh Mamisi Bora
ID NO	9626930
Signature	
Date	
Mobile No.	0114245392.

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention
   - Dust Pollution which may increase diseases for the ruidents and visitors
   - Increased noise levels to the community
   - Poor effect pollution due to dust from product packages

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,
   - Paid employment for youths of the vicinity

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

.....

- Minimize dust emission

- Comply with the Sec. Rules

.....

.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

The environmental impact Assessment and audit regulation 2003. Public participation and consultation is a key input in this process. Consultations are held with members of immediate community and he interested or affected parties. Inorder to obtain their views regarding he project. As a valuable stakeholder, we kindly request you to provide us with opinion regarding the environmental and social impact assessment associated with the proposed expansion of Maisha Mineral Fertilizer plant

Name	Sanga ~~Mwita~~ Mangi
ID NO	28293705
Signature	
Date	16/12/2020
Mobile No.	tm 0708557415

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention

① Air pollution will be caused by the plant.
② Road accidents will increase due to the large number of t.v trucks passing through.

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,

① Employement opportunities.

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion

① Current water source is polluted.

② Road bumps should be erected to combat speeding.

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

① A clean water source.
② Provision of water storage facilities.
③ A dispensary should be built and open to the public to combat any arising health cases in direct relations with the plant.

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

The environmental impact Assessment and audit regulation 2003. Public participation and consultation is a key input in this process. Consultations are held with members of immediate community and he interested or affected parties. Inorder to obtain their views regarding he project. As a valuable stakeholder, we kindly request you to provide us with opinion regarding the environmental and social impact assessment associated with the proposed expansion of Maisha Mineral Fertilizer plant

Name	Asmphrey Remuga Ubuje
ID NO	53132186
Signature	
Date	16/2/20
Mobile No.	N/A

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention
   - Increased dust from production activities which has distracted our health and livestock.

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,
   - Increased job opportunity to many youths.

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion

.....
.....
.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

= provide youth of the area employment
.....
.....
.....
.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Kenga Ngumbau Machia.
ID NO	~~11875477~~ 11875499
Signature	
Date	16/12/2020
Mobile No.	

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention

   There might be water pollution due to the dust sediments settling on water sources.

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,

   Will Create alot of employment
   Will enhance security since people will be employed.

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion

   None

.....
.....
.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

.....
Should provide water storage facilities to counter the water pollution that is expected.
.....
.....

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

The environmental impact Assessment and audit regulation 2003. Public participation and consultation is a key input in this process. Consultations are held with members of immediate community and he interested or affected parties. Inorder to obtain their views regarding he project. As a valuable stakeholder, we kindly request you to provide us with opinion regarding the environmental and social impact assessment associated with the proposed expansion of Maisha Mineral Fertilizer plant

Name	MOHAMMED SAID BUYA
ID NO	27255802
Signature	
Date	16/12/2020
Mobile No.	0703156175

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention

-> YES, Huleta maradhi Tofauti tofauti e.g kifua kikuu, ALS.a.S namefajineo
.....
-> Kelele ilihali watu wengine wana pressure
.....
->.....
.....
.....

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,

.....
① Creation of jobs
② Will create better shopping Centres due to increased cash flow
.....
.....

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      .....
      .....

N/A.

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

①Consider training the locals on jobs that might be outsourced.

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	ALBERT POLAH
ID NO	9206179
Signature	
Date	16/12/2020
Mobile No.	0705879570

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or ~~NO~~
   If yes kindly mention

   Waters pollution, farming areas destructed with stones and some waste from the factory. Currently No dust but in the longrun dust pollution may occur.

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or ~~No~~
   If yes kindly mention,

   Promoting business in the area. Job opportunities to our youth and community as a whole.

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion

   Involve community forums all times. listen and adhere to there views.

Promote school health programes
Creat new sources of water around the factory to help the entire community

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

Security Steughtening around the walls
Sensitize the Neighboring community on what the company is doing

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Sophy Abdalla.
ID NO	P/A
Signature	
Date	
Mobile No.	N/A

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? ~~Yes~~ or NO
   If yes kindly mention
   - Increased dust generation
   - Pollution of water bodies

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income) ~~Yes~~ or No
   If yes kindly mention,
   - Increased employment
   - Increased income levels due to employment

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      - Noise generation from operations

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

- from Glory Committee to give comment / address
- Suggestion box where the community can also and customer care for Glass.

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

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Name	Mr. Ali Said
ID NO	0689666
Signature	
Date	16/12/20
Mobile No.	0705866816

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? ~~Yes~~ or NO
   If ~~yes~~ kindly mention
   - Insecurity due to increase people in the region
   - Increased dust due to Army operation
   - Noise from operation

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income) ~~Yes~~ or No
   If yes kindly mention,
   - Employment to Nearby youth to minimize unemployment rate in the area

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

- Water Provision to the nearby community.
- Provide job to the community.

PUBLIC PARTICIPATION AND CONSULTATION FORM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT FOR PROPOSED NATIONAL CEMENT COMPANY LIMITED KALOLENI

The environmental impact Assessment and audit regulation 2003. Public participation and consultation is a key input in this process. Consultations are held with members of immediate community and he interested or affected parties. Inorder to obtain their views regarding he project. As a valuable stakeholder, we kindly request you to provide us with opinion regarding the environmental and social impact assessment associated with the proposed expansion of Maisha Mineral Fertilizer plant

Name	Samuel Wamkatani
ID NO	30958790
Signature	
Date	16/12/20
Mobile No.	0717693235

1. Environmental Health and Safety issues
   Do you think the project will poses any environmental , health and safety risks to you or the public? Yes or NO
   If yes kindly mention
   Increased dust pollution from operation of the new industry

2. Socio – economic issues
   Will the project generate any socio economic benefits within the neighbourhood e.g (employment , source of income)Yes or No
   If yes kindly mention,
   .....
   .....
   .....
   .....
   .....

3. General Concerns
   a. What other issues or considerations do you have in regard to the proposed plant expansion
      .....
      .....

.....

.....

.....

b. Propose ways on how the proposed project expansion in collaborations with the community can enhance a sound environment as well as health and safety if the neighbourhood

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ANNEX C. SELECTED PHOTOGRAPHS

	
Lockable site storage yard	Materials inside storage yard
	
Two onsite diesel generators used as back up option incase of power failure	Resevoir onsite for storage and usage of treated water, site runoff

	
Existing worn out buildings onsite	Sample domesticated animals within the project area
	
Access roads to the upgardation area	Indigenous trees onsite

	
Site perimeter wall	Existing water sprinklers for minimizing on dust during operation

Appendix 4: Expert License

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/14165

Application Reference No: NEMA/EIA/EL/19175

M/S **Joel Tito Kodiaga**
(individual or firm) of address

P.O. Box 9648-00100, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **0160**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **2/18/2021** Expiry Date: **12/31/2021**

Signature…..

(Seal)

Director General
The National Environment Management Authority

P.T.O.

Appendix : Minutes and Consultations

Minutes of Stakeholder Consultations Meeting Held at Kaloleni Sub Chief Office on 16/12/20 Starting at 09.00 a.m.

Preparation of Environmental and Social Impact Assessment (ESIA) for the Upgradation of National Cement Company Limited–Kaloleni, Rabai Sub County, Kilifi County

Participants

1. Assistant chief
2. NCCL Representatives
3. Consultants

Agenda

1. Opening of the meeting and introductions
2. Discussions on potential impacts of the NCCL Upgradation plant
3. AOB/ Closing of the meeting

Minute1: Introductions
The meeting commenced after a short word of prayer by the consultant. Members were given an opportunity to introduce themselves. Mr Odiedo facilitated the meeting. He gave a brief over-view of the intended project and the purpose and objectives of this meeting.

Minute 2: Discussions on potential impacts of the project
Mr Odiedo proceeded to the next meeting agenda by giving a detailed project description and enumerating the objectives of the assignment. He then called on members present to voice their concerns, ask any questions and make general comments on the proposed project. The table below summarizes comments raised and the consultants' responses.

Discussions / questions/comments	Responses
The chief wanted to know if there will be employment opportunities, and what would be the criteria for employment. Particularly, she wanted to know if local people would be given priority whenever opportunities arose The officials inquired about the nature of benefits that communities would receive from the project as part of CSR. They indicated their desire to partner with the project proponent in implementing such activities. The official were concerned about social impacts such as the increase of instances of SGBV, SH, child labour and the spread of	The team informed them that the proponent will put in place a labour recruitment plan to guide all matters touching on employment. The chief was informed that indeed the project will have CSR activities to the public, there was a consideration so far to provide water kiosks where the residents can afford fresh clean water The team will develop and implement and SEA action plan with an Accountability and Response Framework

HIV/AIDs	

Minute 3: AOB /Closing Remarks

There being no other business the meeting ended at 10.30 p.m

Signed by:

---------- Date……

Mr. Polycarp Odiedo

EMC Consultants

Minutes of Community Consultations Meeting Held at Kaloleni Sub Chief Office on 16/12/20 Starting at 11.00 a.m.

Preparation of Environmental and Social Impact Assessment (ESIA) for the Upgradation of National Cement Company Limited–Kaloleni, Rabai Sub County, Kilifi County

Participants

1. Assistant chief
2. Village elders
3. NCCL Representatives
4. Consultants
5. Community members

Agenda

1. Opening of the meeting and introductions
2. Project Brief
3. To discuss potential impacts of the upgradation of National Cement Company Limited (NCCL) on the community
4. AOB
5. Closing of the meeting

Minute 1: Introductions

The meeting kicked off at 11:30am with a word of prayer from one of the community members present at the venue. The area assistant chief thereafter made an introduction of all those who are present and elaborated on the reason the exercise. She stressed on the importance of public participation exercise on any project that's undertake within community neighbourhoods since any positive and negative impacts that results from the process is experienced by them. She informed the community to offer the consultants maximum cooperation and seek for any clarification about the upgradation exercise, as it's the only opportunity that their views can be incorporated into the report to be submitted to the clients concerning the public views. She thereafter invited the consultants to give a brief about the project.

Minute 2: Project Brief

The client representatives introduced themselves and elaborated on the proposed plant upgradation and activities that will be taking in case the project is approved. He further illustrated on the benefits the community will accrue in essence to the project upgradation. He assured the members that as part of the community, the plant is well in tune with local community concerns and was happy to serve them. He proceeded to explain the project terms of reference to the community and invited members to ask any questions or raise any concerns.

Minute 3: Discussions on potential impacts of the project

The Consultants were invited to facilitate this part of the meeting. The team leader; kicked off the session by giving a detailed project description and the objectives of the assignment. Following this explanation, he called on the community members to voice their concerns, ask any questions and make general comments on the proposed project. The table below summarizes comments, questions, concerns raised, and the consultants' responses.

Theme	Comments and Issues	Response
Waste Generation	Stakeholders were concerned about waste generation and methods of waste disposal during project implementation.	The consultants informed community members that the ESIA report will recommend that a waste management system be put in place; Waste will also be handled and transported by NEMA certified waste handlers.
Noise and Vibration	Questions concerning potential air and sound pollution arising from excessive noise and vibration also arose from community members	The Consultants informed the stakeholders that the project will be using up to date technologies to improve efficiencies to reduce noise and vibrations and further mitigation measures will be recommended in the ESMP.
Air Pollution	Some of the stakeholders feared that the project will generate emissions and generate dust leading to air pollution.	The consultants informed the members that the project will be using up to date technologies to improve efficiencies to reduce emissions and mitigation measures will be put in place to reduce emissions in line with national air quality regulations and international best practice.
Employment	Community members inquired whether there will be employment opportunities and what would be the criteria for gaining access to such opportunities. They decried an ongoing pattern of contractors hiring persons who don't reside in their localities to carry out tasks that locals are capable of doing and requested that, in this project, they be given first priority whenever employment opportunities arise.	The consultants informed stakeholders that they have incorporated the development of a Labour Recruitment Plan in the ESIA. These plans will cover all employment issues ranging from recruitment, dismissal, hours of work, non-discrimination, child labour, fair remuneration and grievance management. Stakeholders were however cautioned that where specialist skills are required for the project and the skills are not locally available, specialist would be hired from other jurisdictions through a competitive process.
Social impacts	It was a concern of the community members that the proposed project will increase the population in the project area and its surroundings which could lead to socio-cultural diversification and cultural contamination	The consultants and the clients' team informed the community that it will put in place sufficient safeguards to mitigate such incidences through for instance, developing and implementing a grievance redress mechanism; putting in place a sexual harassment policy and a HIV/AIDs

	There were fears that with the increase in population, there will be an increase in the spread of HIV and AIDS, teenage pregnancies, drug and alcohol abuse and prostitution. Further they stated that enhanced economic status particularly among the women and youth would lead to increased occurrences of SGBV. Concerns were also raised about competition for limited resources due to population influx. This would particularly manifest in inadequate housing and shortage of water supply.	prevention and awareness plan. The proponent will also work closely with other government agencies, in particular law enforcement and social protection offices to curb increase in crime in the project area.

Minute 4: AOB

The community members inquired whether there were going to be further consultations on the project. They were informed that the consultants would remain behind after this consultation meeting as they had various meetings scheduled with a number of stakeholders in the county. The consultations would therefore go on past this meeting. Community members were invited to make further contributions in future planned forums if they desired.

Minute 5: Closing Remarks

There being no other business the meeting ended at 2.15pm with a word of prayer from the village elder.

Signed by:

---------- Date……

Polycarp Odiedo

---------- Date……

Raphael Kisochi

NCCL Kaloleni