

ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED EXPANSION OF SUGAR PLANT CRUSHING CAPACITY FROM 1500TCD TO 5000TCD



Geo. Ref. Coordinates: latitudes 00.81794°S and longitude 034.37871°E.

PROPONENT: SUKARI INDUSTRIES LIMITED
P O Box 237-40302
NDHIWA

APRIL 2017

This Report has been prepared in accordance with the requirements of the Environmental (Impact Assessment and Audit) Regulations, 2003, pursuant to the Environmental Management and Coordination (amendment) Act (EMCA) 2015

SUBMISSION OF DOCUMENTATION

This Environmental Assessment Report was prepared in accordance with the EMCA 2015 and the Environmental Impact Assessment and Audit Regulations 2003 for the proposed expansion of sugar plant crushing capacity from 1500tcd to 5000tcd, Homabay County. We, the undersigned confirm that the contents of this report are an accurate and truthful representation of all findings as relating to the project.

Experts

Name: Mitchel O. Odidi (Lead Expert)

Registration Number: 7963

Telephone Number: 0723 107 987

Signature: ...

Name: George O. Ageng'o (Lead Expert)

Registration Number: 7118

Signature:..

FOR PROPONENT (SUKARI INDUSTRIES LIMITED)

Name:

Designation:

Signature:

ACKNOWLEDGEMENT

The EIA/Audit Experts are very grateful to Sukari Industries Limited, Homabay County for commissioning us to conduct this Environmental Impact Assessment. We further acknowledge the support of the area chief and anyone who either direct or indirect, from the various parties who assisted the EIA/EA experts' team towards the successful completion of this report.

TABLE OF CONTENTS

SUBMISSION OF DOCUMENTATION	i
CHAPTER ONE: INTRODUCTION AND SCOPE OF STUDY	9
1.0 Introduction	9
1.1 Background and Rational of the EIA	10
1.2 Scope	10
1.3. Terms of Reference	10
1.4 Methodology	11
CHAPTER TWO: PROJECT DESCRIPTION	12
2.1 Project Objectives	12
2.2 On-going Plant Activities	13
2.4 Project Implementation	16
2.4.1 Design Phase	17
2.5. The Equipment installation Phase	17
2.4. Equipment to be installed	17
2.5. Decommissioning Phase	20
3.1.2 Soils & Geology and Geomorphology	20
3.1.3 Climate: Hydrology & Meteorology	21
3.1.4 Flora and Fauna	24
CHAPTER FOUR: ENVIRONMENTAL LEGISLATIVE AND REGULATORY FRAMEWORK.....	26
4.0 Introduction	26
4.2. Institutional and Regulatory Framework	28
4.2.1. NEMA	28
Table 1: Legislative Framework	29
CHAPTER FIVE: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	39
Impact description & mitigation	39
5.1 Legal and regulatory compliance	39
5.3. Operation Stage	45
5.3.1. Operational Phase Negative Impacts	45
5.4. Decommissioning	49
5.4.1. Decommissioning phase Negative Impacts	50
Decommissioning stage	59
CHAPTER SIX PROJECT ALTERNATIVES.....	61
6.0 The Proposed Alternatives	61
6.1 Site alternative	61
6.2 Alternative Technologies	61
6.3 Alternative Equipment	62
6.4 “No Project” Alternatives	62
CHAPTER SEVEN: ENVIRONMENTAL MANAGEMENT PLAN.....	63
7.0 Introduction	63
CHAPTER EIGHT: CONCLUSIONS.....	79
References	80
Annexure	82

NON TECHNICAL SUMMARY

The study was carried out in Sukari Industries Limited; located on L.R. No. West Nyokal/Kanyikela/1511 & 1512, Ndhwa, Homa Bay County. The plant provides a long-term supply of high quality sugar into the local, national and regional markets. This is the only major agro based industry in the county supporting livelihoods to more than 2000 families, directly or indirectly. About 10000 cane growing farmers in the surrounding area are prosperous due to this institution that has helped them to grow a commercial crop that is socially and environmentally friendly. The institution has a vision to produce renewable source of energy to be supplied to the national electricity grid.

In today's competitive market, efficiency in every front is crucial for survival. The prosperity of local citizens is directly linked to the prosperity of this unique rural industry. The economic scale of operation i.e .sizing of the factory and implementation of advance and modern technology is a must. The whole process of expansion is capital intensive and will be implemented in phases. This shall be synchronized with producing more cane in field. Presently the management is focusing on implementation of stand by equipment with up graded technology .This will help the factory to run with reduced stoppage, that shall help the farmers to supply his product with regularity.

The study focuses on carrying out comprehensive environmental impact assessment with reference to sugar industry expansion. The facility currently operates sugar milling plant; within a crushing capacity of about 1500tcd (ton cane per day).The proponent intends to increase this capacity to 5000tcd by installing additional equipment/machinery and upgrading/replacing some current ones. The equipment and machinery to be installed will include:

1. Shredder
2. Cane carrier
3. Pressure feeders
4. Installation of new boiler of improved design.
5. FFE-Falling Film Evaporator
6. CVP-Continuous vacuum pan
7. Centrifugal machine
8. Grader
9. Spray pond
10. Molasses tank.

The process of factory expansion shall be carried out within the present premises of the factory. The operational phase of the project will involve the production of sugar with bagasse and molasses being produced as by products. Other by-products will include filter mud and boiler ash. Main inputs will be sugarcane, water, bagasse and electricity. Decommissioning phase will consider restoring the site to its nearest original status if necessary. The full environmental impact assessment and public participation activities will provide input to the final design (as part of an interactive process of design and environmental/public assessment which is required by GoK in order to obtain an optimally environmentally acceptable and cost effective design).The final design will incorporate mitigation measures to address potential adverse impacts and significant public concerns. Mitigative measures within the final design will include machinery installation details and operations and management plans.

This Environmental Assessment study was undertaken pursuant to the requirements stipulated by the National Environmental Management Authority (NEMA) under the Environmental Management and Coordination (amendment) Act (2015) that requires all proposed development projects listed under Schedule II of the EMCA, to undergo an Environmental Impact Assessment Study to determine the potential adverse impacts of a project and thereby devising appropriate mitigation measures. The study assesses the impacts of the proposed development and proposes mitigation measures as well as an Environmental Management Plan (EMP). It was carried out through desk research, field visits, and consultations. The team conducted extensive literature review including information sourced from the internet, in relation to the proposed project. During field investigations, information on physical, ecological and socio-economic aspects of the project area and its environs were determined.

This study analyzed the potential adverse impacts of the project in terms of the possible effect to the environment and on the interested and affected parties. The study looked at the different stages of the development, namely;

- Project design;
- Project equipment installation phase;
- Project operational phase involving use of the premises; and
- Project decommissioning phase.

The study examines the project in terms of the components it entails and the services the project will avail the end users and those to which its use will impact on. It has also considered the natural aesthetics and scenic beauty of the property while also maintaining the environmental quality and supporting investment value. To identify, predict, and analyze the various impacts that may emanate

from the project, various study methods and tools were incorporated. These included checklists, matrices, expert opinion and observations.

An in-depth analysis of public concerns from the interested and affected parties was undertaken and views incorporated in the development of the Environmental Management Plan. This involved discussions and dialogue with the neighbours adjacent to the project site and lead agencies relevant to the installation of machinery. The baseline data collection was primarily investigated through desktop studies and sites visits, photographic capture, direct interviews and public meetings with the interested and affected stakeholders. What was found to be of significant environmental concern for investigation was;

- Incessant noise and dust levels during the machinery installation and operation phase;
- The potential air, visual, water and soil contamination during the machinery installation and operation phase
- Pressure on existing water resources during the machinery installation and operation phase
- health and safety hazards during the machinery installation and operation phase

However the above potentially adverse impacts identified are expected to occur during the construction and operation phases but will be ameliorated through the proposed mitigation measures. The positive impacts identified include creation of short and long term employment across the board.

The impact matrix below highlights the summary of impacts anticipated.

Impact matrix

ENVIRONMENTAL IMPACT	IMPACT TYPE								MITIGATION		
	Positive		Negative								
	Significant	Not Significant	Significant	Not Significant	Short Term	Long Term	Irreversible	Cumulative	No mitigation	Mitigation required	
CONSTRUCTION/MATERIAL INSTALLATION PHASE IMPACTS											
Soil erosion-Land degradation				X	X					X	
Accumulation of solid waste storage & disposal – Waste management			X		X					X	
Construction works noise – Auditory nuisance			X		X					X	
Dusting – Air quality degradation			X		X					X	
Equipment/vehicle maintenance – Spillage/noise/visual impacts				X	X					X	
Fire outbreak – Environmental disaster			X		X					X	
Construction works induced traffic – traffic congestion			X		X					X	
Const. works water demand – supply depletion			X		X			X		X	
Loss of terrestrial habitat & biodiversity – Degradation of bio-diversity				X	X					X	
Solid waste accumulation – Environmental degradation			X		X			X		X	
Materials stockpiling & storage – contamination				X	X			X		X	

Impervious surfacing & paving – increased run off.			X			X					X
Sewage & litter – public health & contamination			X		X						X
Fuel & chemical spills – Soils & water contamination				X	X						X
Roadside vending – unsightliness & littering				X	X			X			X
Visual amenities - Unsightliness				X	X						X
Emergency situations – Lack of response				X	X						X
Employment	X				X			X	X		
Improved growth of economy	X					X		X	X		
Improved land value	X					X		X	X		

OPERATION PHASE IMPACTS

	Positive		Negative								
	Significant	Not Significant	Significant	Not Significant	Significant	Short Term	Long Term	Irreversible	Cumulative	No mitigation	Mitigation required
Increased infrastructural pressure – water abstraction			X				X		X		X
Pollution - Accidental Oil Spills				X			X		X		X
Pollution – Environmental degradation				X			X		X		X
Pollution – Alterations of soil property				X			X				X
Pollution – bagasse, filter cake			X				X				X
Pollution – Water contamination(effluent)			X				X				X

Pollution – Air pollution & noise levels			X			X				X
Increased traffic – unnecessary congestion				X		X				X
Drain blockages – Back flooding				X		X				X
Vector and rodents breeding – Increased vulnerability to diseases				X		X		X		X
Electricity consumption – pressure on supply			X			X				X
Social amenities – Cultural interference				X						X
Natural/Manmade disasters – Environmental degradation			X		X					X
Increase in sugar production capacity	X					X			X	
Employment opportunities	X					X		X	X	
Improvement in efficient factory processes	X					X			X	
Optimal use of land	X					X			X	

DECOMMISSIONING PHASE IMPACTS

	Positive		Negative								
	Significant	Not Significant	Significant	Not Significant	Significant	Short Term	Long Term	Irreversible	Cumulative	No mitigation required	Mitigation required
Solid Waste generation			X			X					X
Dust			X			X					X
Noise & vibration			X			X					X
Rehabilitation	X						X			X	
Employment opportunities	X					X				X	

Recommendations to mitigate resultant negative impacts have been put forward. These include proper management of by-products and both solid and liquid waste. An Environmental Management Plan (EMP) has been developed outlining the areas of impact and proposing measures to manage them sustainably.

Overall, the project is environmentally feasible and sound with minimal potential negative impacts, which can be minimized through incorporation of corrective, rehabilitation, and instituting of appropriate mitigation measures.

Acronyms

BQ	Bills of Quantities
CO	Carbon monoxide
CVP	Continuous Vacuum Pan
EAR	Environmental Assessment Report
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
FFE	Falling Film Evaporator
GOK	Government of Kenya
GRPF	Grooved Roller Pressure Feeder.
KFS	Kenya Forest Service
LVBC	Lake Victoria Basin Commission
LVSWR	Lake Victoria South Water Resources Management
NEMA	National Environmental Management Authority
NET	National Environmental Tribunal
NETF	National Environmental Trust Fund
NO _x	Nitrogen oxides
SO _x	Sulphur oxides
TCD	Tons Crushed per Day
WRMA	Water Resources Management Authority

CHAPTER ONE: INTRODUCTION AND SCOPE OF STUDY

1.0 Introduction

This study will constitute the Environmental Impact Assessment for the proposed expansion of sugar plant crushing capacity from 1500tcd (tonnes cane crushed per day) to 5000tcd on plot no: West-Nyokal/Kanyikela/1511 & 1512, Ndhiwa, Homabay County for the existing Sukari Industries Limited. Specifically on GPS coordinates latitudes 00.81794°S and longitude 034.37871°E. The expansion will be of the already existing and operating sugar plant in Nguku sub-location, South Kanyikela Location, Ndhiwa Sub County.

Sukari Industries Limited is determined to support Kenya in addressing the recurrent sugar production deficit in the country, and it's planning to expand its operations by increasing its capacity of total cane crushed per day by installing additional equipment/machinery and upgrading some current ones. The equipment and machinery to be installed will include; shredder, cane carrier, pressure feeders, installation of new boiler of improved design, CVP-Continuous vacuum pan, grader, spray pond, molasses tank, FFE-Falling Film Evaporator and centrifugal machine. The construction phase will employ between over 60 skilled and unskilled laborers'. Completion is estimated at a cost of Kenya Shillings 165,000,000.00 million for the total project.

In today's competitive market efficiency in every front is crucial for survival. The prosperity of local denizens is directly linked to the prosperity of this unique rural industry. The economic scale of operation i.e .sizing of the factory and implementation of advance and modern technology is a must. The whole process of expansion is capital intensive and will be implemented in phases. This shall be synchronized with producing more cane in field. Presently the management is focusing on implementation of stand by equipment with up graded technology .This will help the factory to run with reduced stoppage, that shall help the farmers to supply his product with regularity.

The operational phase of the project will ensure that the plant provides a long-term supply of high quality sugar into the local, national and regional markets and alleviate the problem of overstay of sugar cane in the farms. Main inputs will be sugarcane, water, bagasse and electricity. By-products will include bagasse, molasses, filter mud and boiler ash. Decommissioning phase will consider restoring the site to its nearest original status if necessary.

The full environmental impact assessment and public participation activities will provide input to the final design (as part of an interactive process of design and environmental/public assessment which is required by GOK in order to obtain an optimally environmentally acceptable and cost effective design). The final design will incorporate mitigation measures to address potential adverse impacts and significant public concerns. Mitigative measures within the final design will include construction details and operations and management plans.

1.1 Background and Rational of the EIA

To comply with the requirements of the Environmental Management and Co-ordination Act (EMCA) of 2015 and the Environmental Impact Assessment and Audit Regulations 2003, the project owner has commissioned us to prepare an Environmental Impact Assessment (EIA) Project Report. The environmental study was commissioned on 1st June, 2016. To initiate the public consultation process, standard public consultation forms were issued to the immediate neighbours, clients, staff of the proposed sites, and consultations were made with key lead agencies.

1.2 Scope

As a requirement by the Environmental Management and Coordination (amendment) Act 2015, of Kenya, a project proponent is required to undertake an Environmental Impact Assessment study before undertaking any project highlighted in Schedule 2 of the Act. This study undertakes to fulfil this requirement. This study is necessary at the planning stages of the undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation, and decommissioning of the facility. Screening of the activities of the project focussed on identifying the project's significant environmental impacts. These included the sensitivity of the area, public health and safety; the possibility of uncertain unique or unknown risks; the possibility of having individually insignificant but cumulatively significant impacts; proposals for solid and liquid waste disposal, etc. Scoping also focussed on identifying the key issues of environmental concern encompassing the significance of policy, legal, technical, economic and social impacts of the project.

1.3. Terms of Reference

The Terms of Reference for this assessment are based on the Environmental Impact Assessment and Audit Regulations dated June 2003. These were approved by NEMA.

1.4 Methodology

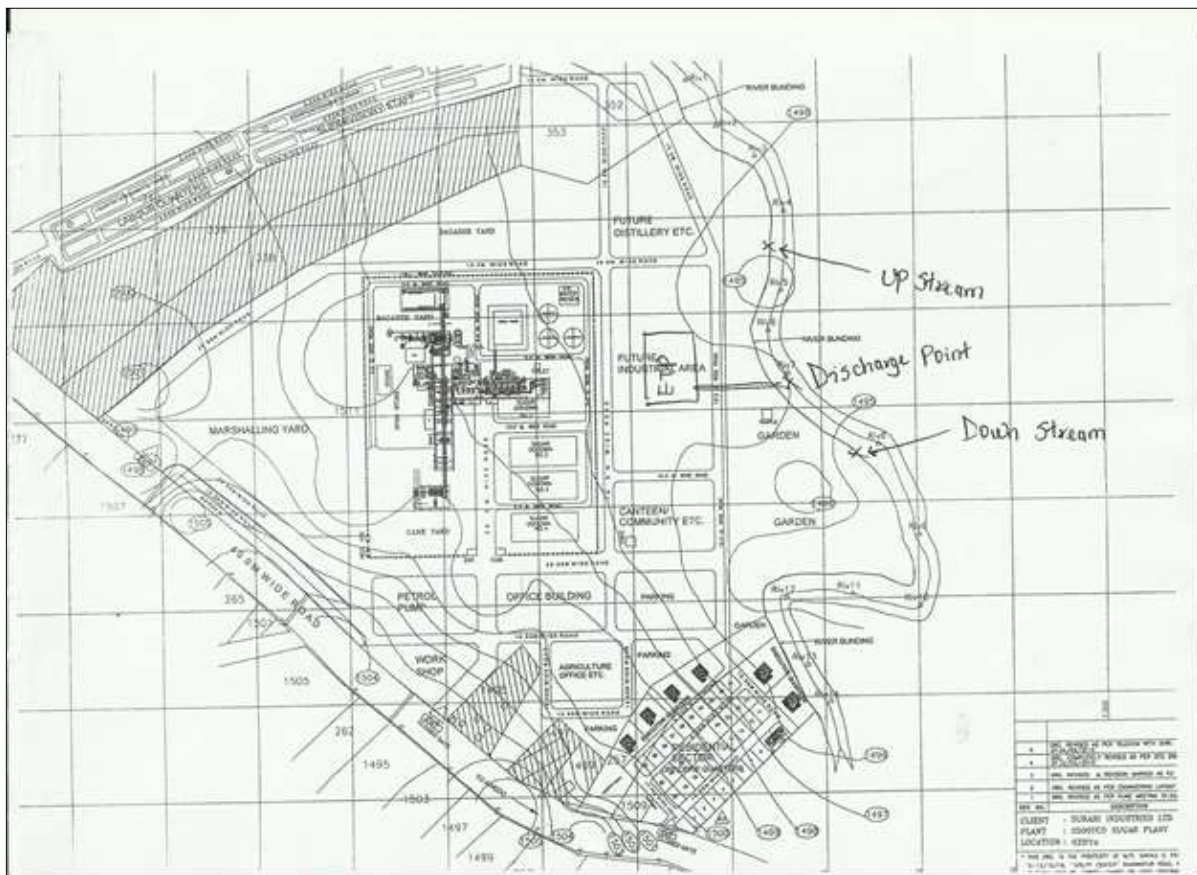
After preliminary visits to the proposed site, the following were carried out in the preparation of this document:

- i) Observations, discussions with stakeholders and lead agencies
- ii) Documentary review of the nature of the proposed project;
- iii) Policy and legal frameworks, social and environmental setting of the area;
- iv) Checklists were prepared to identify possible environmental and human safety issues, photography, etc;
- v) Review of the project designs and implementation plans and comprehensive discussions with the project proponent;
- vi) Report writing

CHAPTER TWO: PROJECT DESCRIPTION

2.0 Project Location

The project is located within Nguku sub-location, South Kanyikela Location, Ndiwa sub county, specifically on Plot No: West-Nyokal/Kanyikela/1511 & 1512, Ndiwa, Homa Bay County. It is about 12km from Ndiwa town along Rapethe-Awendo all weather road in Riat village. It is marked by latitudes 00.81794°S and longitude 034.37871°E.



Pictures showing the existing site lay out

2.1 Project Objectives

The primary objective of this Project is to install equipment and machinery that will increase the plants crushing capacity from 1500tcd to 5000tcd (tons of sugar cane crushed per day) with technologically upgraded machinery;

- That will reduce waste generation.
- That will reduce energy consumption.

- Improve conversion efficiency.
- Produce better quality product
- Increase sustainability.
- Help farming community to improve economy being added to sell their product in time.

2.2 On-going Plant Activities

Sukari Industries Limited is a registered company incorporated under the Companies Act (Cap. 486) to run a sugar milling plant at Ndiwa Town of Homabay County. The company's operations include the production of sugar cane mainly from out grower' fields as it has not yet established its own nucleus; and processing sugar from harvested sugar cane at its factory. The company has a factory sitting on a total area of about 40H. The Company currently crushes about 1500 tons of sugarcane per day, produces about 80-100 tons of sugar per day, 500 tonnes of bagasse per day, and about 52 tonnes of molasses per day. Other wastes produced include 50 tonnes of filter mud and about 22 tonnes of boiler ash per day.

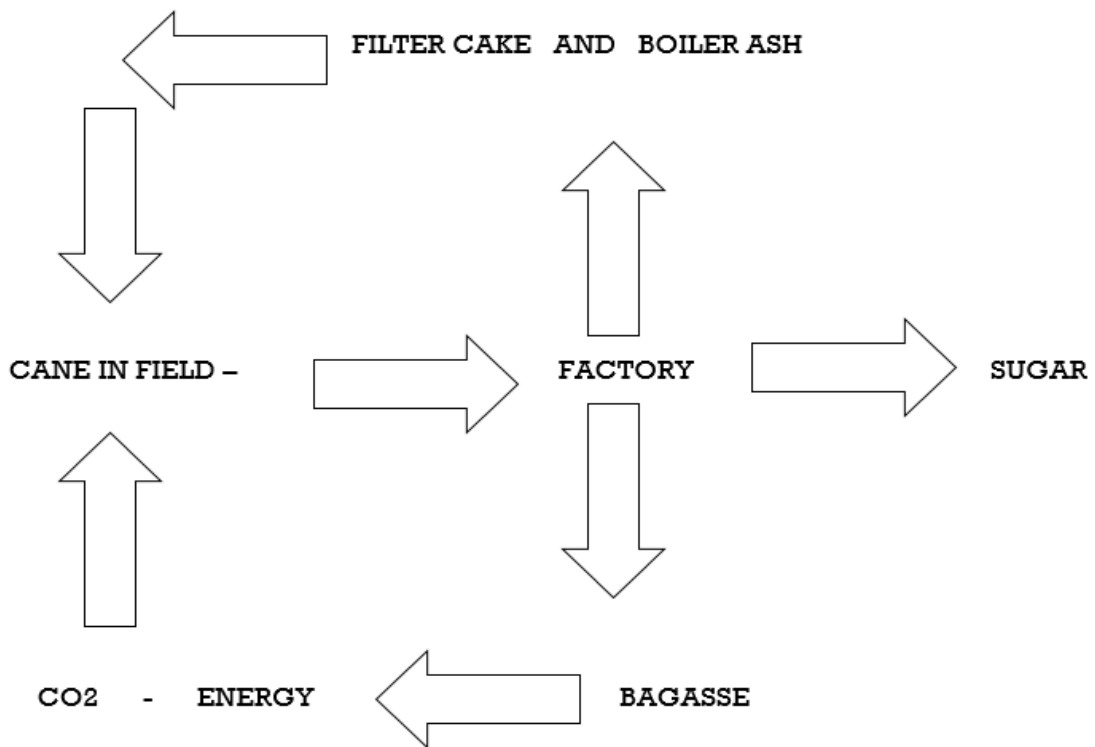
The main inputs are sugar cane, water, bagasse, and diesel and electricity fuels. Water is pumped from an intake point from River Kuja into reservoir tanks and is used for washing, steam generation and drinking. The factory has a wide range of equipment and structures all geared towards the production of sugar. Bagasse, a waste product from sugar processing, is re-used to generate about 3MW of energy, for use in the factory. The company has also installed a NEMA licensed effluent treatment plant that is used to treat the waste waters and other effluent from the factory before being used to irrigate a cane farm. It also operates 2 NEMA licensed filter cake and boiler ash dumping sites. The existing sugar processing plant consists of the following key installations among others:

- i. Parking and administration
- ii. Cane yard section
- iii. Mill house
- iv. Process house
- v. Boiler house
- vi. Spray pond
- vii. Water treatment facility

- viii. Bagasse holding facility
- ix. Effluent treatment plant (ETP)
- x. Workshop

The uniqueness of sugar factory is that it produces its own power and is mostly independent of electrical energy from national grid. It shall be seen later that further technology up gradation as has been envisaged by proponent in going produce surplus green energy that can contribute of national grid.

2.3. Current Cane Production Process



Summary of the process

2.3.1. Cane harvesting, receiving, milling

The cane is harvested by hand using machetes and is transported to the factory through various access roads that the company has been maintaining, opening up rural access roads which have been of great infrastructure improvement in the area. Before the milling, the cane is first evened in the kicker, cut

down to smaller pieces by series of rotating cutting knives, and then chopped further in the fibrizer, which shreds the cane and exposes the sugar containing cells.

Sukari Industries does not prewash the raw cane prior to juice extraction. At the milling station, the cane passes through a series of rollers that squeezes the crushed cane and extract the juice. Maceration or imbibition water (equal to 20-40% of cane weight passing through the mill) is added to the crushed cane prior to the final crushing mill to assist in extracting the cane juice. The juice flows through a screen (the machinery to a metal trough below the floor) and is pumped to a receiving tank. The bagasse fibre from sugar cane is conveyed to the boiler furnaces for burning as fuel. The objective is to optimize the milling operation via maximum cane preparation, maximum juice extraction, good mill settings and continuous even grinding rate.

2.3.2. Boiling and juice treatment

Three pan boiling system goes on here. "A" sugar is then fed with syrup under controlled conditions for crystal growth (a massecute), the massecute is then dropped in a crystallizer, and it is then separated in centrifugal into sugar crystals and molasses. The sugar crystals are dried by blowing hot air as it moves in a hopper. The dried sugar is then screened in a grader to remove under size and over size crystals. The sugar is then taken to the sugar bin. The is then weighed into batch marked 50kg using the automatic weigher and dispenser, stiched and ferried to the go down.

The molasses from the A massecute has high purities of > 72 purity. It is then used as a fed for B Massecute boiling. After purging, the B sugar is used as a footing for A sugar while the B molasses which still has high purity of about > 52 purity is used as a fed for C sugar boiling this maximum recovery. The B molasses is used for C massecutes boiling, this is then separated in continuous centrifugals into C sugar becomes the starting base (footing) for B massecte boiling and final molasses which has impurities below 33 purity and stored in a steel tank, sold out as molasses since it would commercially unviable for any further sugar recovery. The by-products of the milling process are bagasse, molasses, filter mud and fly ash.

2.3.3. Clarification

This is an organic process where no chemical other than lime is required to produce good quality sugar crystal. This is called "Defication process" from the receiving tank, batches of cane juice are pumped to the primary juice heater where it is heated to about 65 Deg c to 75Deg C. The heated cane juice is then pumped to a reaction tank where a lime solution is added to prevent sucrose inversion by increasing

the pH from 5.2 to 7.8. The lime solution is formed by adding powdered lime (calcium oxide) and water in the lime slacker. From the reaction tank, the cane juices are heated in the secondary heaters to 100 deg C to 105 deg C and are then pumped to a clarifier where the solids are allowed to settle out. The clarifier mud is collected pumped to vacuum filters, where bagacillo (fine bagasse particles) are used as a filter medium to extract the remaining juice and the Mud is called filter cake is collected and supplied to farmers as Bio fertilizer and the supernatant juice is called clear juice.

2.3.4. Evaporation

The clear juice from the clarifier is pumped to multiple effect evaporators where it is concentrated from about 85% water to 30 to 40% water .The concentrated juice is now called syrup and is pumped to the sulphitor where sulphur dioxide (SO₂) gas is bubbled through the syrup. The gas created in the sulphur burner by igniting powered sulphur, serves three purposes; it acts as a disinfectant, reduces the viscosity of the slurry and bleaches the syrup.

Syrup from the evaporators is treated with sulphur dioxide (SO₂) Gas for bleaching purposes. The SO₂ is generated in a reaction vessel and bubbled through the syrup in the "sulphitor" reaction tank, reducing the pH of the syrup from 6.8 to 5.5. Excess sulphur dioxide is discharged from a tank Vent to the roof. Approximately 0.3kg of sulphur is consumed per ton of crushed cane. The exhausted gas discharged from the reaction vessel is estimated to have a maximum SO₂ gas concentration of 0.2% of the gas used. Therefore, the SO₂ gas discharged from the sulphitor vessel will be a maximum of 0.98kg/day.

2.3.5. Sugar Centrifugation

Massecuite from crystallizers and receivers shall be released into the centrifugals via massecuite gutters and pug mills. From centrifugals spinning at a very high speed, molasses shall be ploughed and directed to the storage tanks while sugar depending on the type shall be ploughed and directed to the hopper or melted and re-boiled.

2.4 Project Implementation

The project will be implemented in the three phases: equipment installation, operation and decommissioning.

2.4.1 Design Phase

This phase is the concept of the planned development and the designing of a structure which was envisaged to be functional and to take care of every environmental concern such as liquid and solid wastes and security. This has already been completed.

2.5. The Equipment installation Phase

This phase has already begun and will be based on the building standards, code and all other relevant regulations applicable in Kenya. All the proposed works will follow standard environmental guidelines, health and safety measures.

2.5.1. Equipment installation Activities

i. Construction activities

This will have to be undertaken to provide support and shelter for the additional equipment to be installed. The construction of the building walls, foundation, floor pavement, and drainage system, among other component of the project will involve minimal masonry works and related activities. General masonry and related activities will include concrete mixing, plastering, slab construction, construction of foundation and curing of fresh concrete surfaces. These activities are known to be labour intensive hence may be supplemented by machinery such as concrete mixers.

ii. Roofing and sheet metal works

Roofing activities will include laying of iron sheets, and structural steel to the roof and fastening the roofing materials to the roof.

iii. Electrical Works

Electrical work during both construction and operation will involve installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc.

2.4. Equipment to be installed

The proponent intends to achieve its objectives by installing the following additional equipment to compliment the already existing ones:

1. Shredder

The additional shredder is designed to achieve very fine preparation of sugar cane by separating the fibres and opening the cell wall efficiently. This allows the subsequent extraction process to maximise the removal of the sucrose bearing juice from the prepared cane. It shall ensure;

- Excellent fibre particle size distribution
- Improved final bagasse moisture
- Higher imbibition efficiencies at each stage
- Improved boiler performance
- Consistently higher bagasse densities
- Lower bagasse pol loss

2. Cane carrier

Completely made from steel, the additional cane carriers will have adequate column and support hence facilitating to feed the required cane capacity.

3. Pressure feeders

The new pressure feeders will have built-in overload protection, besides ensuring smooth and safe operation. They will have a compact, low-weight design that fits the available space without costly adjustments.

4. Installation of new boiler of improved design.

The sugar mill boiler is used for steaming sugar canes in the process. As one kind of environmental protection industrial boiler, biomass fired boiler is widely are currently used in sugar factory, which can burn bagasse. With large quantity of sugar cane bagasse in sugar factory, a lot of fuel cost will be saved. Also new reliable operating steam boiler will decrease the failure rate and prolong serving life to create more profit for industry.

5. FFE-Falling Film Evaporator

Falling film evaporator concentrates the juice coming from the purification station and sends the concentrated juice (syrup) to the crystallization station. The way an evaporator plant works has a crucial impact on the heat economy of sugar factories and refineries. Perfectly tailored to the overall process, it allows effective action to increase the energy efficiency of upstream or downstream process steps. Falling-film evaporators that will be installed will have a higher juice distributor dome, making them

easier to inspect and clean. Whenever necessary, the juice distributor and heating tubes can be cleaned with a high-pressure water jet from the top tube plate, without opening the dome flange.

6. CVP-Continuous vacuum pan

The new CVP design produces high massecuite exhaustion, consistent crystal size and improves energy efficiency. The Continuous Vacuum Pan designs are suitable for A, B and C massecuites and are configured to optimise upstream and downstream plant capabilities. Importantly, the pan's vapour demand is surge-free and consistent with steady-state boiler operation and evaporator performance for extended periods.

7. Grader

Grader to be installed will provide vital grading functions that help in maintaining sugar cane quality and are known to improve the efficiency in grading processes. The grader shall be highly durable, corrosion resistance and will require low maintenance, thereby improving services and bringing greater efficiency in production.

8. Spray pond

The warm water from the condensers needs to be cooled to the lowest practical temperature before being re-used. The cooling process is carried out in spray ponds after which the water is pumped back to the condensers. While expanding the plant capacity there arises need for expansion of spray pond. However, this will be achieved by replacing old spray system in the existing spray pond only, saving considerable cost and space. This is achieved without compromising the original efficiency of the cooling system.

9. Molasses tank

Additional tanks shall be installed. These will be specially designed to suit the storage of molasses. The tanks will come complete with an inspection lid / manway access, and good ventilation (to reduce condensation and bacterial growth).

10. Centrifugal machine

The centrifugal machine will provide real and sustained process advantages to the user as they are more efficient and reduce processing costs through lower electrical power consumption and improved recovery of crystals from the massecuite.

2.5. Decommissioning Phase

At the end of the construction phase, all the equipment and waste materials from the construction/equipment installation will be removed from the site. The materials that can be reused will be separated and used for other construction work and others disposed of appropriately. The areas not intended for parking of vehicles will be landscaped and planted with beautiful vegetation to improve the aesthetics of the surrounding.

CHAPTER THREE: BASELINE INFORMATION

3.0 Project Location

The project is located within Nguku sub-location, South Kanyikela Location, Ndhiwa sub county specifically on Plot No: West-Nyokal/Kanyikela/1511 & 1512, Ndhiwa, Homa Bay County. Homa Bay is located in the former Nyanza Province, along the south shore of Lake Victoria's Winam Gulf.

Homa Bay County, Kenya. The County covers an area of 3,183.3 sq km with a population of about 963,794 people. Homa Bay borders five counties; Migori to the south, Kisii and Nyamira to the east, and Kericho and Kisumu to the north east. The county also borders Lake Victoria to the north and west.

3.1 Physical Environment

Herein, location of the area and characteristic of the proposed site and its neighborhood in terms of; Climate: hydrology and meteorology, Soils, Geology, Vegetation Type(s) within the project area, Current land use of project site and adjacent properties; have been discussed.

3.1.2 Soils & Geology and Geomorphology

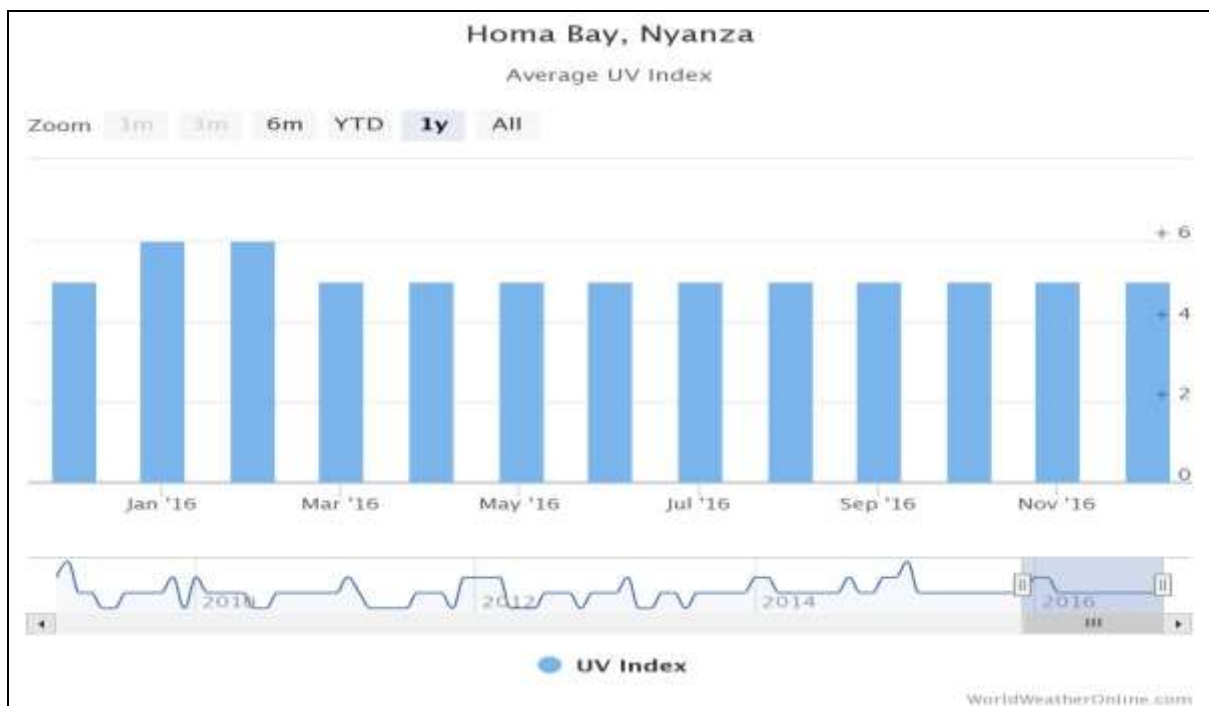
Deposits of Pleistocene to recent age include hill wash gravels (colluvium), semi consolidated river alluvium, quartz rubble and lateritic ironstone capping. Brown sandy soils with occasional and locally distributed deposits (laterites) occur in the project area. The subsurface geology of the project area comprises of intrusive rock. Outcrops of these granites are noted within the vicinity confirming them as the host rock. In hand specimen they are dense, coarse grained felsic rocks. Occasionally, minute feldspar crystals are recognizable to unaided eye. Those intrusions are mainly granite rocks that are locally sheared. The rocks have little primary porosity and secondary porosity may be due to fracturing, faulting or the existence of old land surfaces. Through time they may undergo repeated processes of

denudation and weathering and may have developed a weathered zone on the upper layer which sometimes retains water that can supply a well.

3.1.3 Climate: Hydrology & Meteorology

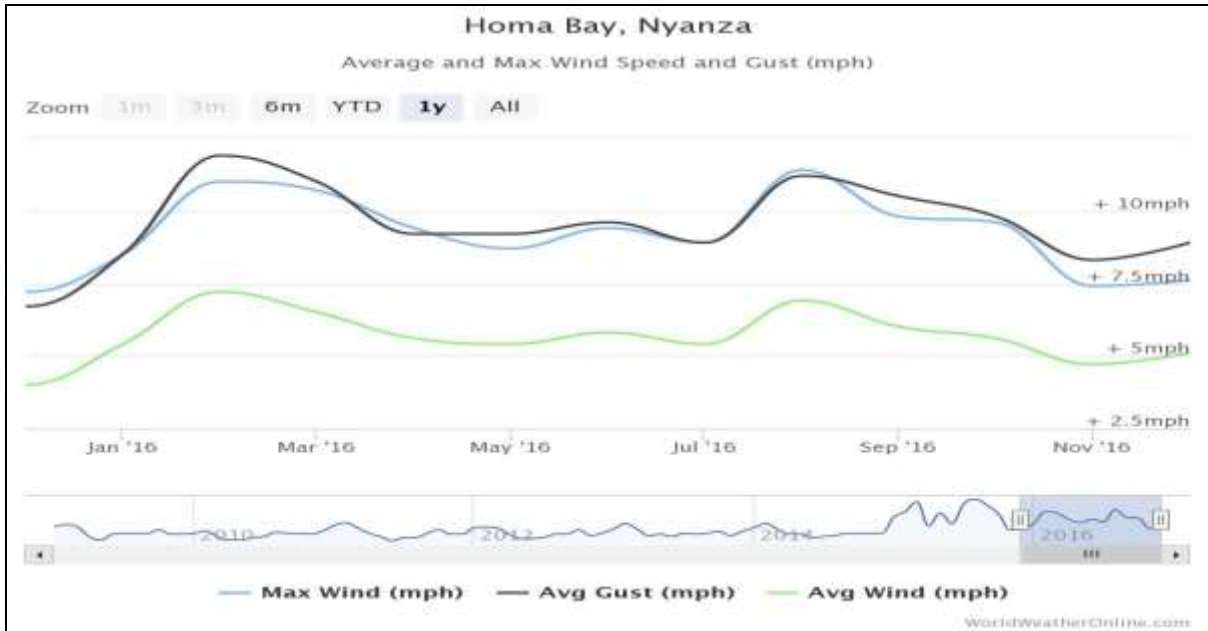
The area lies close to Lake Victoria basin with an altitude of 1150.5 meters above the sea level. Being 750 m above the sea level, its temperatures are tropical modified, but not torrid. The mean annual temperature is 22 degrees Celsius and the mean daily maximum and minimum temperature are 30 and 15 degrees Celsius respectively. Rainfall distribution across the year is typically bi-modal, but actual rainfall is immensely variable. The mean annual rainfall is 1080 mm, (it ranges from 800 mm – 1400 mm) short rains start from mid-December to March while long rains from March to May.

UV Index (Homa Bay County)



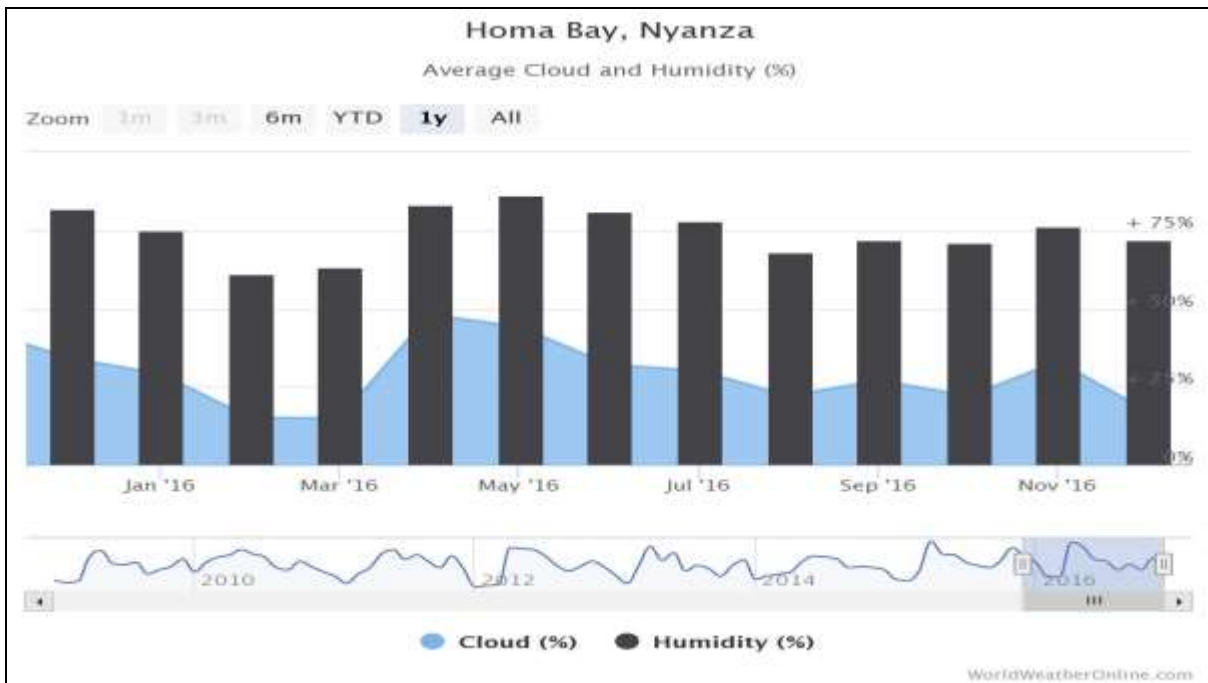
Source: worldweatheronline

Average and maximum wind speed and gust (Homa Bay County)



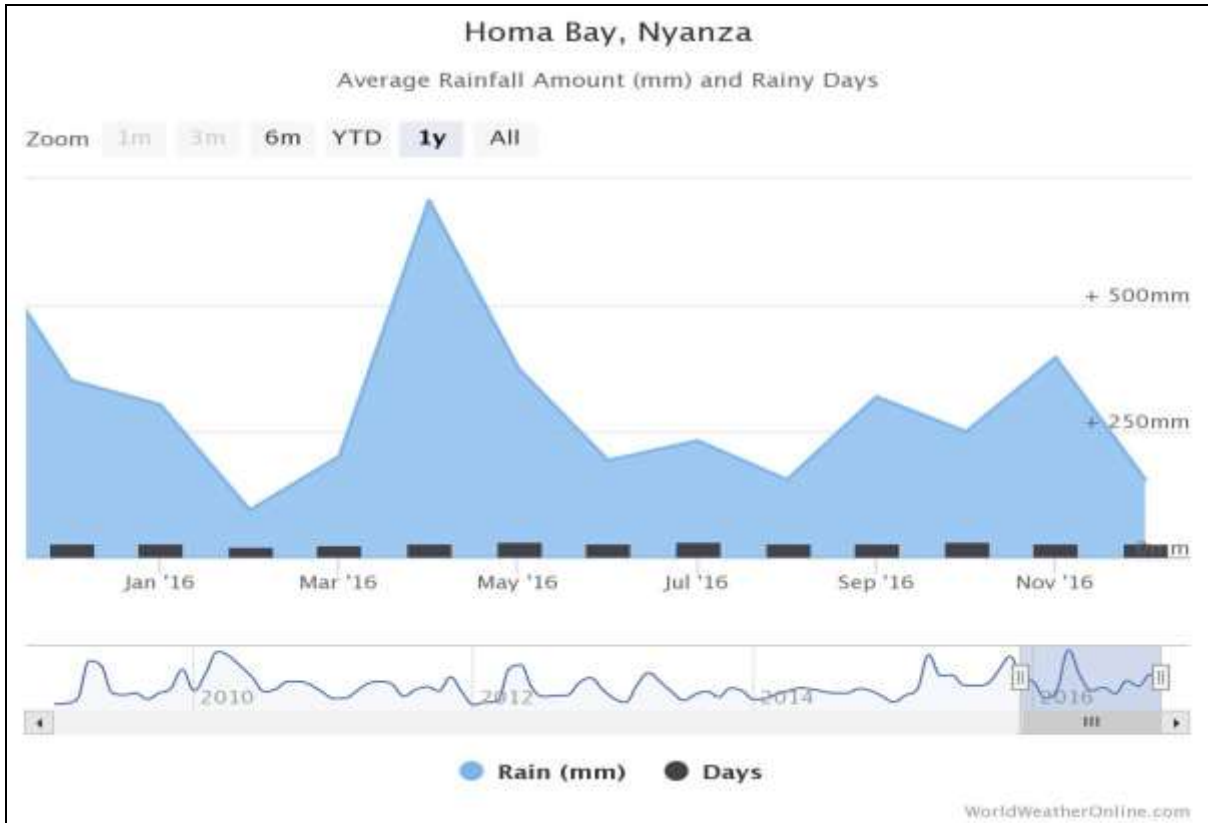
Source: worldweatheronline

Average cloud and humidity (Homa Bay County)



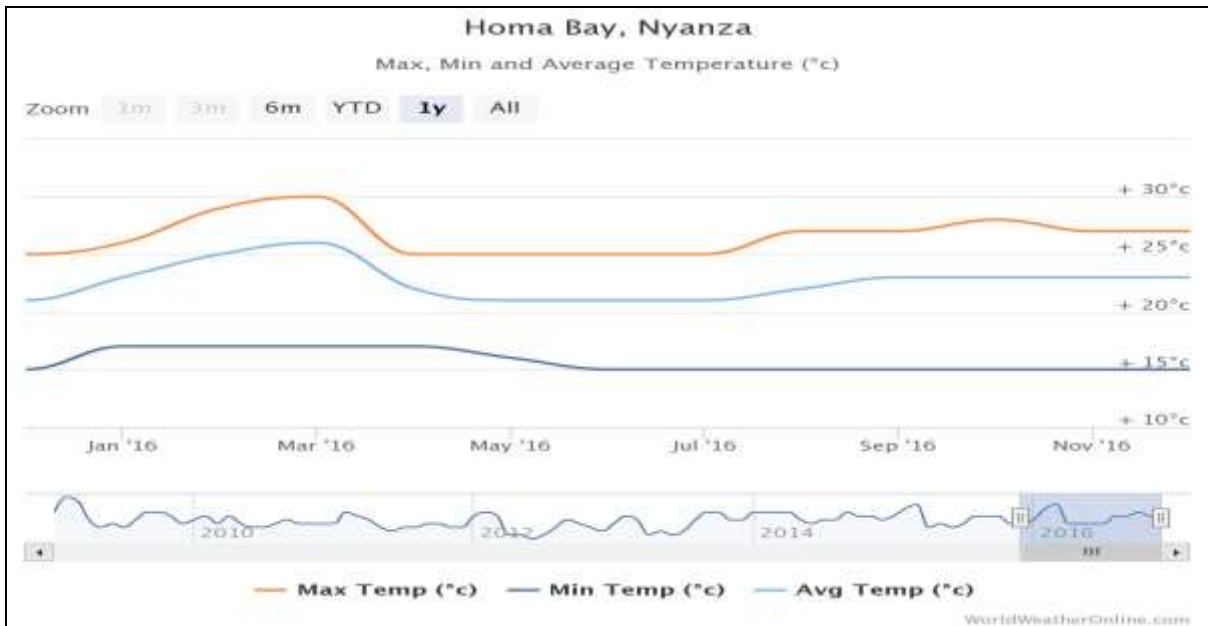
Source: worldweatheronline

Average rainfall amount (Homa Bay County)



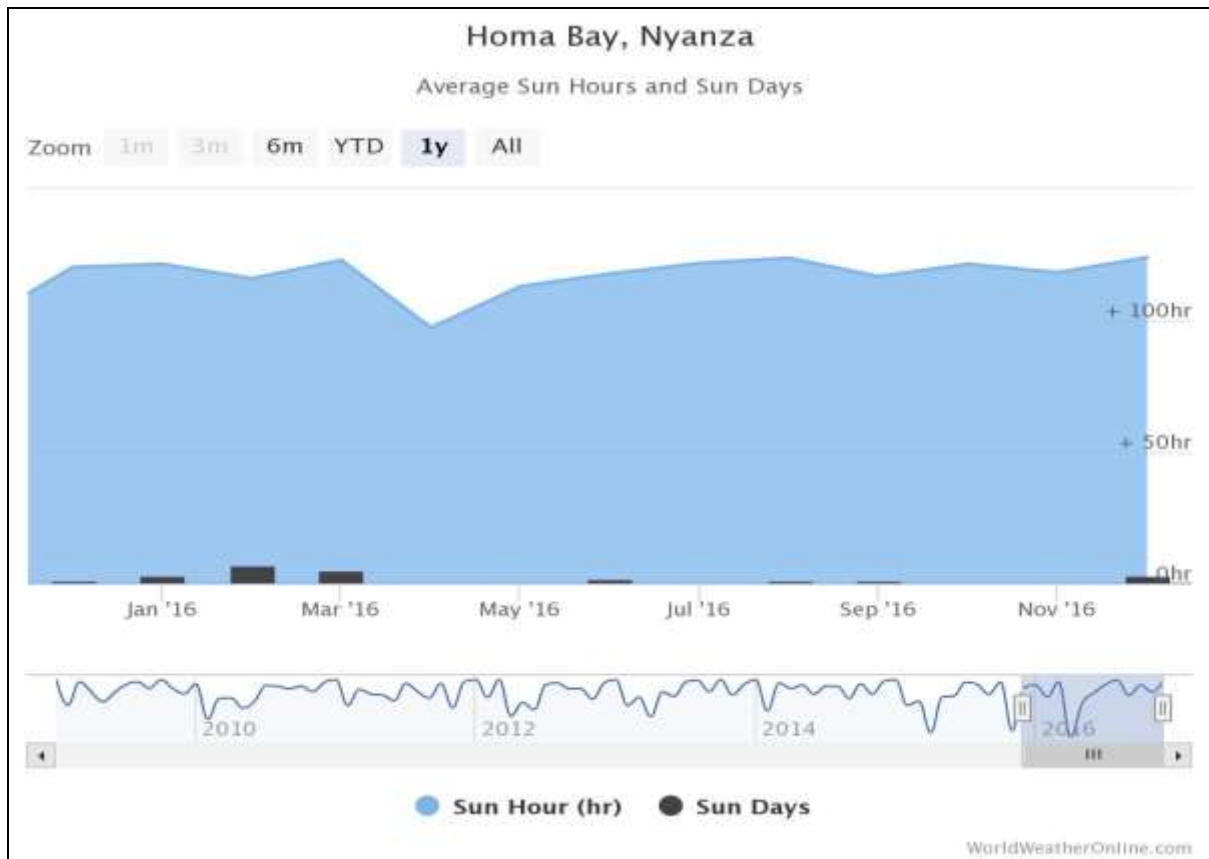
Source: worldweatheronline

Average temperature (Homa Bay County)



Source: worldweatheronline

Average sun hours (Homa Bay County)



Source: worldweatheronline

3.1.4 Flora and Fauna

Generally, Nguku area is significant for agricultural cultivation and several legume fodders are found here in crop-livestock systems. It is also the most resettled by human. The major grasses are Hyperenia and Cymbopogon, Themeda triandra, Panicum maximum, Seteria Sphacelata, Sporobolus pyramidalis, Bracharia brizantha (Congo signal), Bricharia siluta, Chloris gayana (Rhodes grass) and Cynodon dactylon (Star grass).

However, the affected project areas are heavily built with most of it being covered with developments and devoid of vegetation. The project area is not a cultural site, neither is it a sensitive environment, with no threatened flora or fauna.

3.2 Demography and economic patterns:

The neighbourhood of the site comprises a mixture of residential, commercial and industrial establishments. High unemployment rate, environmental degradation, insecurity, poverty and HIV/AIDS still remain major issues of concern in the centre.

Fishing and agriculture are the main economic activities in Homa Bay County. They produce some of the best fish in the world. Fishing is practised mainly by people living near the shores of Lake Victoria. Fish caught in the lake include Tilapia and Nile Perch, which is consumed locally, sold to other towns such as Kisumu and Nairobi and exported worldwide. Europe is a major consumer of Nile Perch from Lake Victoria.

Areas around Kasipul Kabondo, Rangwe and Ndhiwa are very fertile; producing bounty harvests of cotton, maize, sugar cane, cassava, banana, pineapples, sorghum, millet, sunflower, sorghum, ground nuts and potatoes. Sugar cane grown in the county is crushed at the Sony Sugar factory in Awendo, and construction is currently under way for a sugar factory in Ndhiwa. Tourism is also a major income-earner for Homa Bay, with tourist attraction sites such as Ruma National Park and Mfangano Island drawing thousands of visitors to the county.

3.3 Utilities and services

Electricity is obtained from the Kenya power and lighting company power supply network whereas water is pumped from an intake point from River Kuja into reservoir tanks and is used for washing, steam generation and drinking. The factory has a wide range of equipment and structures all geared towards the production of sugar. Bagasse, a waste product from sugar processing, is re-used to generate about 3MW of energy, for use in the factory. The company has also installed a NEMA licensed effluent treatment plant that is used to treat the waste waters and other effluent from the factory before being used to irrigate a cane farm. It also operates 2 NEMA licensed filter cake and boiler ash dumping sites.

3.4. Current land use of project site and adjacent properties;

The facility is a fully operational sugar plant with all related infrastructure. Electricity is obtained from the Kenya power and lighting company power supply network whereas water is pumped from an intake point from River Kuja into reservoir tanks and is used for washing, steam generation and drinking. The factory has a wide range of equipment and structures all geared towards the production of sugar. Bagasse, a waste product from sugar processing, is re-used to generate about 3MW of energy, for use in the factory. The company has also installed a NEMA licensed effluent treatment plant that is used to treat the waste waters and other effluent from the factory before being used to irrigate a cane farm. It also operates 2 NEMA licensed filter cake and boiler ash dumping sites.

CHAPTER FOUR: ENVIRONMENTAL LEGISLATIVE AND REGULATORY FRAMEWORK

4.0 Introduction

The implementation of this project is guided and governed by a number of laws and policies of the country and region. These determine the nature of the project in terms of siting, height of the structure as well as use to which it will be put. The government has long been concerned with environmental conservation and protection of human health. It has therefore; put in place all the frameworks necessary for the legislative and regulatory controls of environmental management. EMCA, 2015 was ammended to comprehensively address environmental issues which were being governed differently by the various sectoral acts in place.

4.1 Environmental policy framework

The Kenya Government's environmental policy is geared towards sound environmental management for sustainable development. This is envisaged in the principle of prudent use, which requires that the present day usage should not "compromise the needs of the future generations". The policy emphasis

is on environmental protection in order to ensure sufficient supplies for the present and future generations. The policy envisages the use of the “polluter pays principle”, where one is expected to make good any damage made to the environment.

The Kenya Government’s environmental policy aims at integrating environmental aspects into national development plans. The broad objectives of the national environmental policy include:

- Optimal use of natural land and water resources in improving the quality of human environment;
- Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations;
- Integration of environmental conservation and economic activities into the process of sustainable development; and
- Meeting national goals and international obligations by conserving bio-diversity arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth.

4.1.1. The Sugar Policy

The Sugar policy as established is in line with the national objectives of national food policy, which are ‘self-sufficient, food security, employment creation, income generation, foreign exchange earnings, stemming rural-urban migration, poverty alleviation and overall economic growth. Sugar plays a vital role in providing livelihoods, earning national revenues and incomes, creating employment and foreign exchange savings. It is an industry valued at approximately Kshs 15 billion, providing over 500,000 direct and indirect jobs and supporting the livelihoods of over 6 million people.

The Sugar sub-sector is a major enterprise in the Western and Nyanza and potential exists in the Eastern and Coastal belts. Further improvement of this vital industry will help alleviate unemployment through backward and forward linkages.

4.1.2. National Water Policy, 2000

The National Water Policy which was promulgated in April 1999 as Sessional Paper No. 1 of 1999 calls for decentralization of operational activities from the central government to other sectors, including local authorities, the private sector and increased involvement of communities in order to improve efficiency

in service delivery. It also tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector. According to the policy, in order to enable sustainable water supply and sanitation services, there is need to apply alternative management options that are participatory through enhanced involvement of others in the provision of these services but particularly the private sector.

The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social well-being of the people through sustainable water resource management.

4.2. Institutional and Regulatory Framework

4.2.1. NEMA

The National Environment Management Authority (NEMA) is the National body charged with coordinating matters of implementation of policy issues relating to the environment. This body was established under the Environmental Management and Coordination (amendment) Act (EMCA), 2015. Other departments that deal with environmental issues in the Sub County include Water Resources Management Authority (WRMA), Lake Victoria Environmental management Project (LVEMP II), the Kenya Forestry Service, Kenya Wildlife Services (KWS), National Construction Authority (NCA), Kenya Sugar Board (KSB), County Government of Homabay, among others.

Table 1: Legislative Framework

Principal Legislation	Requirements	Action
The Constitution of Kenya, 2010	<p>Article 42 of the Constitution states that every person has the right to a clean and healthy environment, which includes the right:</p> <ul style="list-style-type: none"> a) to have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and b) to have obligations relating to the environment fulfilled under Article 70. <p>Article 69(2) states that every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Article 70 (1) states that If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, 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.</p>	<p>Commission an Environmental Impact Assessment (EIA) study for all new projects</p> <p>Commissioning an Environmental Audit (E.A) for on-going projects</p>
The Environment Management and Coordination Act (EMCA)-1999 (rev.2015)	<p>Part VII on Environmental Audit and Monitoring section 58 specifically detail the need to undertake Environmental Impact Assessment of all projects likely to cause negative impacts to the environment as listed in the second schedule of the ACT. Further, Part V of the Environmental (Impact Assessment and Audit) Regulations 2003; detail the guidelines for Environmental Impact Assessment process.</p>	<p>Commission an Environmental Impact Assessment (EIA) study for all new projects</p>

		Commissioning an Environmental Audit (E.A) for on-going projects
The Environmental Impact Assessment and Audit Regulations, 2003 (Legal Notice No. 101)	Regulation 7 (3) states that a project report shall be prepared by an environmental impact assessment expert registered as such under these Regulations. Regulation 8 demands that a proponent shall submit at least ten copies of the project report to the Authority or the Authority's appointed agent in the prescribed form accompanied by the prescribed fees. Regulation 11 (1) states that an environmental impact assessment study shall be conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority. Regulation 13 (2) states that every environmental impact assessment study shall be carried out by a lead expert qualified in accordance with the criteria of listing of experts specified in the Fourth Schedule to these Regulations. Regulation 24 on EIA licensing states that environmental Impact License shall be issued after the authority approves the study report under regulations 23, and shall be issued in form and accompanied by the prescribed fee. Section 87 provides for the proponent to adhere to the disposal of wastes requirement in such a manner as not to cause pollution to the environment or ill health.	Commissioning an Environmental Impact Assessment (EIA) study for all new projects Commissioning an Environmental Audit (E.A) for on-going projects
The Customs and Excise Act	Section 90. (1), states that, No person shall manufacture excisable goods unless he is licensed by the Commissioner to manufacture them. Section 91. (1), states that, Subject to this Act, the Commissioner may on application grant a licence to a person to manufacture excisable goods; and the Commissioner may, without assigning any reason, refuse to grant the application.	KRA registration
Standards Act Chapter 496	Section 9 (2), states that, where a Kenya Standard has been declared under subsection (1), the	The proponent should seek a

	<p>Minister, on the advice of the Council, shall, by order in the Gazette, prescribe a date after which no person shall manufacture or sell any commodity, method or procedure to which the relevant specification or code of practice relates unless it complies with that specification or code of practice. (3) Where, after the publication of an order under section 9. Section 10 (2), states that, any person intends to manufacture any commodity to which that order refers after the date specified therein he shall notify the Bureau in the prescribed form of his intention and the Bureau, if it is satisfied that he is capable of manufacturing the commodity in accordance with the relevant Kenya Standard, shall issue him with a permit to use the standardization mark referred to in paragraph (a) of subsection (1).</p>	<p>permit from KEBS to use the standardization mark as per this act. (available)</p>
<p>Kenya Sugar Act, 2001 (rev.2012)</p>	<p>PART III – LICENSING AND REGISTRATION, 14. Requirement of licence to operate mill states that (1) No person shall operate a sugar mill or a jaggery mill unless he is a holder of a current licence issued by the Board for that purpose.</p> <p>The Act is the primary legal framework governing the structure, operations and relationships of stakeholders in the sugar industry and provides for:</p> <ul style="list-style-type: none"> a) Establishment, powers and functions of the Kenya Sugar Board, which is the industry regulator; b) Licensing and registration of sugar mills; c) Financial provisions – the Sugar Development Levy; d) Quality, health and safety; e) Offences and penalties; 	<p>Acquire a license from the Kenya sugar board</p>

	<p>f) Sugar industry agreements;</p> <p>g) Rights of growers;</p> <p>h) Establishment and Constitution of the Sugar Arbitration Tribunal</p>	
Agriculture, Fisheries and Food Authority Act, 2013	Control over soil conservation, land preservation and land development are mainly controlled within this Act, and many of the provisions can be generally applied beyond those lands suitable for agriculture	
County Governments By-laws	A county government may on receipt of an application under this Act grant a business permit to allow the conduct of a business or trade, including a profession or occupation within its area. Also provides for other easements required for such a project.	
Air Quality Regulations, 2014	Requires the plant to install sampling portholes and carry out continuous emission monitoring systems in the emission duct. Stack emission measurements are to be submitted to NEMA.	Implementation in progress
Solid Waste Management Regulations, 2006	<p>This subsidiary legislation creates rules to govern the handling, transportation, treatment and disposal of various wastes. It defines wastes broadly into industrial, biomedical, hazardous and toxic and stipulates the various ways of handling these waste streams.</p> <p>Regulation 4 (1) demands that no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.</p> <p>Regulation 4 (2) states that a waste generator shall collect, segregate and dispose such waste in the manner provided for under these Regulations. Regulation 5(1) states that a waste generator shall minimize the waste generated by adopting the following cleaner production methods:</p>	<p>Acquire waste transportation license from NEMA</p> <p>Keep waste tracking documents</p> <p>Acquire E.I.A. licenses for all proposed waste dumping sites (available)</p>
Wetlands, River Banks,	Section 14 of the regulations states: Duty of land owners users and occupiers. (1) Every owner,	Undertake E.I.A. before

Lake Shores and Sea Shore Management) Regulations, 2009	occupier or user of land which is adjacent or contiguous to a wetland shall, with advice from the Authority, have a duty to prevent the degradation or destruction of the wetland, and shall maintain the ecological and other functions of the wetland.	undertaking any development near a water source
Water Quality Regulations, 2006	These regulations apply to drinking water, water used for industrial purposes, agriculture purposes, fisheries and wildlife and water used for any other purpose. The objective of the water quality regulations is to prevent water pollution by prescribing threshold levels of various elements that are permissible in effluent water. Provides the permissible limits for wastewater discharge to environment i.e. water body, sewer and land. It is thus the benchmark for adoption of wastewater treatment technologies and best practice to avoid water pollution. It also creates riparian zones along rivers and streams alongside providing for the daily monitoring of effluent discharge both in terms of quality and quantity to the environment. The regulations provides for the sound and integrated management of waste across the sectors in Kenya. The First Schedule of the regulations gives quality standards for sources of domestic water. The Third Schedule of the regulations gives standards for effluent discharge into the environment.	<ul style="list-style-type: none"> -Acquire effluent discharge license for filling station -Acquire effluent discharge license for (effluent treatment plant) ETP -Install a water meter to measure the amount of water waste water released from the factory on daily basis Carry out quarterly analysis of the composition of the effluent through a NEMA registered laboratory -Continuously monitor the discharge as per the regulations
The Water Act, 2002 (rev.2016)	Part II, section 18, of the Water Act, provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Management	-undertake E.I.A. before drilling of boreholes

	<p>Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the authority. Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.</p>	<p>-obtain WRMA water extraction permits before drilling of bore holes or water abstraction from nearby rivers and streams</p>
Occupational Health and Safety Act, 2007	<p>This act was signed into law in October 2007 to repeal and replace the Factories and Other Places of Work Act Cap 514. It came into force on December 20, 2007. The Act makes provision for safety and health of workers in all workplaces in Kenya. All rules made under the previous Act remain in force under the new Act. The Act requires developers to notify the Director of Occupational Health and Safety of their intended development before commencement. The act also sets minimum standards that are to be maintained in such workplaces to safeguard health, safety and welfare of workers. These are all aimed at elimination of hazards from workplaces. The act further requires all workplaces to display the abstract of the act for all workers to read and remind themselves on how to protect themselves from hazards. The Act also makes it mandatory for occupiers or employers to provide personal protective equipment and all practicable means to prevent injury to health of workers who are exposed to any potentially harmful substances or conditions.</p>	<p>-notify the Director of Occupational Health and Safety of any intended development -registrar factory as a workplace and obtain a certificate</p>
Food Drugs and chemicals	<p>The Food, Drugs and Chemical Substances Act (CAP 254) whose purpose is to make provisions</p>	<p>The factory should be</p>

substances Act (Cap 254)	for the prevention of adulteration of food, drugs and chemical substances. This Act (which has been invoked for the consumption of genetically modified food), requires that food, drugs, cosmetics, devices and chemical substances should not be sold if they are unwholesome, poisonous, or adulterated. It further prohibits deceptive labelling. The statute also gives powers to authorized officers to inspect and examine any premises for evidence of contravention of the provisions of the law.	inspected by the public health officer and issued with a Food Drugs and chemicals substances license.
Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	Regulation 3(1) states that except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 (1) states that except as otherwise provided in these Regulations, no person shall- (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) Cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source; Regulation 4(2) states that any person who contravenes the provisions of this Regulation commits an offence.	Obtain noise and excessive vibrations permit for all noisy activities (where relevant)
The Malaria Prevention Act (Cap. 246)	Section 5 on Drainage System states that no occupations at the construction phase that shall obstruct flow of water into or out of any drainage. The contractor shall be required to maintain drainage system within the area of the project for removal of water from any land around the project to prevent larvae breeding.	Maintain drainage systems within the factory and prevent ponding of water within the factory compound
The Physical Planning Act,	Section 24 of the Physical Planning Act gives provision for the development of local physical	Development has been

	<p>development plans for guiding and co-coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council, and for specific control of the use and development of land. Section 29 of the Physical Planning Act gives councils power to prohibit and control the use of land, building, and subdivision of land, in the interest of proper and orderly development of its area. The same section also allows them to approve all development applications and grant development permissions as well as to ensure the proper execution and implications of approved Physical Development Plans. Section 30 states that any person who carries out development within an area of a local authority without development permission shall be guilty of an offence and the development shall be invalid. The act also gives the local authority power to compel the developer to restore the land on which such development has taken place to its original condition within a period of ninety days. If no action is taken, then the council will restore the land and recover the cost incurred thereto from the developer. At the same time, sub-section 5, re-enforce it further that, no licensing authority shall grant under any written law, a license for commercial use for which no development permission had been granted by the respective local authority.</p>	<p>approved by the physical planning department</p>
<p>The Land Registration Act, No.5 of 2012</p>	<p>An Act of Parliament to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes</p> <p>The Act has repealed the following land related laws:</p> <ul style="list-style-type: none"> i. The Indian Transfer of Property Act 1882 ii. The Government Lands Act, (Cap 280) 	<p>-verifying the land ownership status before acquiring any private land</p> <p>-provide proof of land ownership for lands of proposed projects</p>

	<ul style="list-style-type: none"> iii. The Registration of Titles Act, (Cap 281) iv. The Land Titles Act, (Chapter 282) v. The Registered Land Act, (Cap. 300) <p>Section 26 of the Act states that Certificate of title to be held as conclusive evidence of proprietorship, except:</p> <ul style="list-style-type: none"> a) on the ground of fraud or misrepresentation to which the person is proved to be a party; or b) Where the certificate of title has been acquired illegally, un-procedurally or through a corrupt scheme. 	(title deeds available)
Public Health Act	<p>An Act of Parliament to make provision for securing maintaining health.</p> <p>The act makes it the duty of every local authority (in the capacity of “health” authority) to take all lawful, necessary and reasonably practicable measures to safeguard and promote public health (s.13). Part IX of the act deals with sanitation and housing, and is of most significance for the control of polluting discharges. S.116 imposes a duty on every local authority to maintain its district in a clean and sanitary condition, to prevent nuisances and prosecute those responsible for nuisances. Nuisances include drains and sewers for the discharge of pollutants into watercourses and lakes.</p>	<ul style="list-style-type: none"> -undertake public health inspections for the factory -get public health approvals for all new developments
Wildlife (Conservation and Management) Act Cap 376 of 1976, 1989 & Bill, 2013 (GoK, 2013)	Section 30 of part VI: Prevention of adverse effects on the environment, including the seepage of toxic waste into streams, rivers, lakes and wetlands.	

The Employment Act, 2007	An Act of Parliament to repeal the Employment Act, declare and define the fundamental rights of employees, to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected with the foregoing.	
--------------------------	---	--

CHAPTER FIVE: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact description & mitigation

This chapter presents an assessment of environmental impacts from the planned project design and activities, and proposes mitigation and management measures to prevent and control these impacts.

The environmental impact assessment and analysis was done using a number of methods and tools. While identifying impacts, a checklist was used. This indicated all possible impacts that would accrue from implementation of this project.

5.1 Legal and regulatory compliance

The national laws and regulations relevant to the development and their relevance to the process project have been discussed.

5.2 Construction and Equipment installation

Key aspects to be considered during construction are:

- Procurement of construction materials.
- Installation of services and interiors of the building;
- Use of heavy and light machinery.
- Energy utilisation, major energy consuming activities include:
 - Lighting;
 - Excavation;
 - Transportation;
 - Hauling and hoisting of materials;
- Mixing raw materials;
- Waste handling trucking and disposal;
- Testing and commissioning of the development.
- Energy sources for these activities include grid electricity and diesel or petrol fuel for machinery/vehicles.
- Water utilisation, including use for the following activities:
 - Washing of machinery and equipment;
 - Preparing of mixtures, including water based emulsion paints;
 - Concrete works, including curing;

- General cleaning;
- Landscaping;
- Controlling dust on site;
- Domestic utilisation (sanitary facilities).
- Construction waste will include the following:
 - Timber from used formwork;
 - Paints, lubricants and petroleum wastes;
 - Containers, cement paper bags and other packaging materials;
 - Metal, glass, plastic containers and other unwanted materials.
- Socio-economic effects;
 - Labour;
 - Security;
 - Transport.
 - Archaeological findings and aesthetics.

Table 5-1: Summarises the anticipated impacts and recommended mitigation measures during construction and equipment installation stage.

Activity	Anticipated Impact	Recommended Mitigation Measures
Procurement of construction materials:	Natural resource depletion if not rationally done through activities such as quarrying, mining, timber logging.	<ul style="list-style-type: none"> • The tender documents should specify required standards and certification for procurement of all materials and appliances; • All construction materials should be from approved sources; for example, hardstone for building should be obtained from bona fide commercial quarries; • As far as possible, environmentally friendly and sustainable materials should be used. Materials not to be used for construction of the buildings include: <ul style="list-style-type: none"> • High alumina cement; • Wood wool slab in permanent formwork to concrete; • Calcium silicate bricks or tiles; • Asbestos in any form; • Asbestos substitutes or any naturally occurring or man-made mineral fibres; • Lead, lead paint or any other materials containing lead which may be inhaled, ingested or absorbed; • Vermiculite, unless it is established as being fibre-free; • Any products containing cadmium that are regarded as being injurious substances; • Any other substances regarded as being deleterious building materials which are not in accordance with statutory requirements or with current accepted good building practice at the time of specification or construction.

		<ul style="list-style-type: none"> • The Project Manager should ensure that the Contractors are instructed in the use of all materials that may have negative environmental (including health) effects; • If any material or substance is used that is at any point in the future deemed to be deleterious to health, then it must be replaced with an acceptable alternative.
Building works:	Health and safety risk from accident and incidents; Noise and dust.	<ul style="list-style-type: none"> • Adhere to safety regulations outlined in the Local Government Adoptive by-laws, Building Code and the Building Operations and Works of Engineering • The Project Manager should ensure strict safety management through close attention to design, work procedures, materials and equipment; • Schedule noisy construction • Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls; • All workmen should be provided with personal protective equipment (e.g. nose masks, ear muffs, helmets, overalls, industrial boots, etc); • There should be regular site reporting on health, safety and environment (HSE) issues by an appointed HSE representative, daily site inspections should be done to ensure safe work practises are adhered to; • All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate; • Statistical records on accidents and incidents should be collated and analysed on a monthly basis and forwarded to the Project Manager and / or displayed on the notice boards;

		<ul style="list-style-type: none"> • Site personnel should be encouraged to report “near-miss incidents” in order to avoid potential problems and increase safety awareness.
Energy utilisation:	Energy consumption.	<ul style="list-style-type: none"> • Develop an energy management plan; • Construction machinery and vehicles should be maintained and used in accordance with manufacturer’s specifications, to maximise efficiency and lower use of energy, e.g. drivers of construction vehicles should be instructed not to leave them idling for extended periods; • Construction workers should be sensitised on the importance of energy management.
Water utilisation:	Water consumption; Hygiene and sanitation challenges.	<ul style="list-style-type: none"> • Monitor water consumption and utilisation; • Sensitise construction workers on the importance of proper water management; • All wastewater should be drained into approved drainage facilities.
Waste production:	Littering, soil and surface water pollution potential.	<ul style="list-style-type: none"> • The tender documents should specify the proper disposal of waste during construction and should also ensure that the Contractor leaves the site in a clean and safe condition on completion of the Works; • The Contractor should be required to restore and landscape all areas to the satisfaction of the Project Manager; • All solid waste generated during construction should be collected, stored, and taken away for disposal; • There should be controlled use of raw materials; • Procedures for handling of special wastes, such as waste fuel oil, should be specified; • Comply with guidelines on solid waste disposal and Waste Management Regulations 2006.

Influx of construction workers into the area:	Proliferation of informal kiosks in the area; Increase in transport demand.	<ul style="list-style-type: none"> • Develop a catering program on site for construction staff; • Provide transportation for the workforce to and from the site.
Construction traffic:	Disruption of local traffic; Potential for accidents.	<ul style="list-style-type: none"> • The Contractor should plan itineraries for site traffic.
Archaeological findings:	Destruction of natural heritage / loss of archaeological findings.	<ul style="list-style-type: none"> • In the event of an archaeological finding, the Contractor should secure the location 'as is' and immediately call the National Museums of Kenya's Archaeology Section.

5.3. Operation Stage

The key environmental issues during commissioning and operation are as follows:

- Water supply and consumption;
- Energy consumption and management;
- Effluent Management
- Solid waste, bagasse, filter cake and boiler ash management;
- Stack emissions
- Property management;
- Transport & security;
- Health and safety;
- Noise.

5.3.1. Operational Phase Negative Impacts

5.3.1.1. Increased pressure on infrastructure – Stressed up service provision

The additional facility will lead to increased pressure on existing infrastructure such as roads, water abstracted from river Kuja, etc due to the increased number of users. In turn, this may directly translate into increased use of facilities and services.

Recommended Mitigation Measures

- i. Relevant authorities such as the Kenya Power and Lighting, WRMA should be informed of the capacity of expansion
- ii. The proponent will install water-conserving automatic taps and toilets, as well as energy saving electrical fittings to optimize use of public resources.
- iii. Water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff.
- iv. Occupants of the facility should be sensitized to use water efficiently.

5.3.1.2. Pollution – Environmental Degradation

Possible pollution may impact on alteration of soil structure by contaminations from introduced materials, bagasse, molasses, boiler ash, filter mud, waste water contamination, air pollution as well as noise levels from various sources within the premise.

a. Solid waste generation/by-products (bagasse, filter cake, boiler ash)

Once the proposed project is completed and operational, they are expected to generate a large amount of solid waste on a daily basis whose composition will be dominated by organic waste. These solid waste, if not disposed properly can cause the following impact on environment:

- Ground water contamination by bagasse leachate generated by non-scientific dumping
- Surface water contamination by the run off from the dumping site
- Bad odour, Pests, rodents and windblown litter in and around the collection site
- Generation of inflammable gases (e.g. Methane)

Impacts may also result from improper siting, inadequate design and poor operation of waste disposal facilities.

Recommended Mitigation Measures

- i. Clearly designate and construct an appropriate waste collection facility or provide covered refuse skips; (Filter cake and boiler ash dumping and composting sites are available)
- ii. NEMA licensed waste transport vehicles have been provided
- iii. Maintain a proper waste tracking document
- iv. Bagasse is used as a source of fuel in the boilers. However, the bagasse holding shades appear not to be adequate to hold additional bagasse. A larger shade may be needed.
- v. Ensure adequate fire warning, response and management systems are installed.
- vi. Provide well-structured engineering solutions to leachate and surface runoff.

b. Wastewater management

There will be an increase in effluent due to the increase cane crushing capacity. The EMCA Water Quality Regulations of 2006 requires all facilities that discharge any effluent to the environment to obtain an Effluent Discharge license and to continuously monitor the discharge. The fourth schedule of the Water quality regulations gives a guide on the quality parameters which should be monitored for different types of effluents. The parameters which should be monitored for Sugar Industry effluent include the following: Biochemical Oxygen Demand (BOD), Total suspended solids (TSS), pH, Fecal

Coliforms /Ecoli, Chemical Oxygen Demand (COD), Colour/Dye/Pigment, Organic Nitrogen as N, Flow, Copper, Zinc and Surfactants.

Recommendations (ETP)

- Apply for effluent discharge license from NEMA on time
- Install a water meter to measure the amount of water waste water released from the factory on daily basis
- Carry out an analysis of the composition of the effluent through a NEMA registered laboratory
- Continuously monitor the discharge as per the regulations
- The company to construct drainages throughout the factory to direct storm waters to the river after lab testing and treatment if necessary

c. Air pollution levels

Vehicular emissions from vehicles and stack emissions will be the major air pollution sources from the Project.

Recommended Mitigation Measures

- Regularly monitor stack emission
- Invest in bagasse drying mechanism along the delivery line
- Exhaust gas recirculation
- Selective non-catalytic/catalytic reduction
- Installation of wet scrubbers and thermal oxidizers
- Avoid overloading the bagasse for efficient burning
- use the correct fuel to air ratio by proper adjustment of air and fuel ratios
- Avoid carbon build-up in the boiler and furnace tubes and maintain the boiler and furnace settings in good condition

5.3.1.3. Increased traffic flow – Unnecessary congestion

An increase in the number of vehicles within the area is anticipated which may lead to congestion and pose a threat to accidental occurrences.

Recommended Mitigation Measures

- i. In case of heavy traffic, an attendant should be employed to direct vehicles during peak periods.

5.3.1.4. Drain blockages – Back flooding

Poor surface drain management or large amounts of effluents may lead to blockage of drains which in turn could result to flooding and unsanitary conditions within the neighborhood. Blocked drains produce bad odour and are a threat to general health, hence are environmentally unfriendly.

Recommended Mitigation Measures

- i. The proponent should ensure that there are adequate means of handling the large quantities of sewage generated at the facility.
- ii. It will also be important to ensure that septic pipes are not blocked or damaged since such occurrences can lead to release of the effluent, resulting in land and water contamination.
- iii. Such blockages or damages will be fixed expeditiously

5.3.1.5. Vector and rodents breeding grounds – Vulnerability to diseases

If the project does not have well designed storm water drains, the rain water may end up stagnating or intruding neighbouring facilities and hence creating conducive breeding areas for mosquitoes and other water based vectors leading to human diseases like malaria. Poor solid waste management practices may also lead to breeding grounds for pests such as rats and other scavenging animals.

Recommended Mitigation Measures

- i. The design of the construction should ensure that no space for stagnant water will be retained.
- ii. A well maintained trash collection point should be set aside.
- iii. The proponent should put in place efficient storm water and waste management systems that will prevent the accumulation of rain water and uncontrolled waste, as well as an efficient collection system and off-site disposal.
- iv. Proper monitoring of the premise should be effected for maintenance of health and hygiene.

5.3.1.6. Electricity consumption – pressure on supply

The project shall consume large amount of electricity due to activities that will take place once the project is complete. Since electric energy in Kenya is generated mainly through natural resources, namely water and geothermal resources, increased use of electricity have adverse impacts on these natural resources base and their sustainability.

Recommended mitigation measures:

- i. Maximize the contribution of daylight to reduce use of artificial lighting in the buildings;
- ii. Select the most efficient lighting system design and minimum lighting level appropriate for the required application;
- iii. Install energy saving appliances;
- iv. Select the most effective lighting controls for optimal operating efficiency and minimum energy wastage.
- v. The project design should consider use of solar energy for water heating.
- vi. Monitor energy consumption to establish trend;
- vii. Maintain records;
- viii. Develop an energy management plan.

5.3.1.7. Water supply and consumption

Table 5-3: The issues and recommended mitigation measures are:

Issue	Recommended mitigation measure
Water consumption:	<ul style="list-style-type: none">• Monitor water consumption• Install internal water meters.
Rainwater harvesting	<ul style="list-style-type: none">• Incorporate rainwater harvesting measures.
Estimated water demand:	<ul style="list-style-type: none">• Manage consumption rigorously.
Water conservation.	<ul style="list-style-type: none">• Installing plumbing fittings, appliances and devices to optimise water use efficiency;• Recycling of wastewater to reduce water consumption.

5.4. Decommissioning

Decommissioning is the process of shutting down an operational facility in a manner that leaves the area in a safe and stable condition that is consistent with the surrounding physical and social environment. The Contractor will ensure that:

- The process of closure occurs in an orderly, cost effective and timely manner with the allocation of adequate resources;
- The anticipated cost of decommissioning is adequately provided for in the project costs.

The Contractor will be expected to:

- Carry out consultations with stakeholders
- Develop the action plan for demolition including the assigning of roles for the demolition crew;
- Isolate power at the main switch and remove cables up to that point;
- Dismantle, remove and dispose of construction camp equipment and structures in an appropriate environmentally friendly manner;
- Request utility service providers to disconnect the power, water and telephones as may be appropriate;
- Reinstate the land to its natural condition by filling excavations and planting suitable saplings.

The Contractor must obtain a Certificate of Satisfactory Decommissioning from the relevant Authorities. In the unlikely event that the facilities is closed down decommissioning would comprise the reduction of all buildings and facilities to a safe condition and the restoration of the land to its original condition. The following will be done:

- Notification of intent to all relevant regulatory agencies;
- Liaise with project Consultants including architects, engineers, and environmentalists to ascertain guidelines, anticipated de-commissioning impacts and mitigation measures.

5.4.1. Decommissioning phase Negative Impacts

During the decommissioning phase, another comprehensive EIA study based on the intended new use of the site will be conducted. Decommissioning may involve one of the following options: facing out operations and evacuating the premise without carrying out any other plans; change of use of the facility; demolition of the property to restore it to the current or better status.

5.4.1.1. Solid Waste Generation

Demolition of the facilities and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

5.4.1.2. Dust

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighbouring residents.

5.4.1.3. Noise and Vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project.

Table 5-4: Summary of impacts and their proposed mitigation measures

Proposed project stage	Potential impact	Proposed mitigation
Pre-construction/equipment installation stage	Introduction of improper seeds to the sugar farmers	Use of short maturing sugar varieties which will enable the farmers to be able to meet their financial needs through short maturity period. Sugar varieties exist in Sudan which matures at 14 months. Other countries with short maturing varieties include; Pakistan 10-12 months, Java (Indonesia) 12-15 months, Mauritius 14-20 months, Philippines 11-14 months, Cuba 12-15 months and India 10-12 months
	Improper land preparation	Sukari through their designated office will sensitize the farmers on the standards of land preparation and methods of soil conservation so as to sustain the productivity of the soil over the long term
	Use of improper inputs	Sukari through their designated office will sensitize farmers on the need of applying all the inputs they are given so as to get higher yields instead of diverting the farm inputs to other uses
	Conflicts with other sugar millers	Sukari will carefully identify and contract their sugar farmers in collaboration with the local administration in order to avoid conflicts with other existing millers in the catchment area such as Sony Sugar Company
Construction/equipment	Noise and vibration pollution	<ul style="list-style-type: none"> Switching off machines while not in use.

installation stage		<ul style="list-style-type: none"> • Restrict working hours to periods which are not associated to human disturbances especially the recommended working hours 8.00 am – 5.00pm • Provide workers with ear masks. • Regular servicing of working machines
	Material and equipment Transport	<ul style="list-style-type: none"> • As far as possible, transport of construction materials should be scheduled for off-peak traffic hours. • Appropriate traffic warning signs, informing road users of a construction site entrance ahead and instructing them to reduce speed, should be placed along the main road in the vicinity of the entrance to the site during the construction period. • Flagmen should be employed to control traffic and assist construction vehicles as they enter and exit the project site. • Issue notices/advisories of pending traffic inconveniences and solicit tolerance by local residents before the commencement of construction works. • Assign traffic regulators to places during periods of chronic or potential traffic congestions. • Set relatively low speed limit within the site. • Encourage transport vehicle owner to insure their vehicles on regular basis. • Discourage parking near the entrance or exit routes.
	Material and equipment	<ul style="list-style-type: none"> • The stockpiling of construction materials should be properly controlled and

	stockpiling & storage	<p>managed. Fine-grained materials (sand, marl, etc.) should be stockpiled away from any surface drainage channels and features.</p> <ul style="list-style-type: none"> • Low berms should be placed around the piles of sand and marl and/or tarpaulin used to cover open piles of these materials to prevent them from being washed away during rainfall. • Safe storage areas should be identified and retaining structures put in place prior to the arrival and placement of material and equipment • Materials and equipment to be delivered on site in installments.
	Soil Erosion	<ul style="list-style-type: none"> • Stage site clearance works so as to minimize the area of exposed soil at any given time. • Re-cover exposed soils with grass and other ground cover as soon as possible. • Temporarily bund exposed soil and redirect flows from heavy runoff areas that threaten to erode or result in substantial turbid surface runoff to adjacent drainage waters. • Monitor areas of exposed soil during periods of heavy rainfall throughout the construction phase of the project to ensure that any incidents of erosion are quickly controlled. • Leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil, therefore avoid compaction where possible.
	Workers safety and health	<ul style="list-style-type: none"> • Provide workers with reflective garments. • Regular servicing of working machines.

		<ul style="list-style-type: none"> • Train workers on manual handling techniques. • Deploy an expert to lead first aid administration. • Provision of adequate safety garments and enforce on their usage. • Discourage trespass. • Put signage on the ongoing activities
	Construction debris and other rejected construction materials.	<ul style="list-style-type: none"> • Reduce wastes from the point of generation by purchasing high standard and recommended materials. • Instruct workers to avoid damage of working materials. • Contract NEMA registered garbage collector to collect waste on regular basis. • Embrace the 3R's concept (Reduce, Reuse and Recycle).
	Dust generation and aerosol emission	<ul style="list-style-type: none"> • Sprinkle water to harness dust level. • Provide workers with nose masks.
	Landscape and ecosystem change	<ul style="list-style-type: none"> • Once the project is completed any bare land will be re-vegetated with indigenous grass, shrubs and trees • Landscaping will be done to reduce any negative impacts • Only specified areas of construction will have vegetation cleared • protecting the existing individual trees as much as possible
	Water supply	<ul style="list-style-type: none"> • Provide adequate water storage reservoirs on the construction site to meet project needs during periods of high demand externally and refill the tanks during periods of low demand (e.g. late at night).

		<ul style="list-style-type: none"> Engaging water supply tankers in case of total supply failure.
Operation Stage	Cane fires	<ul style="list-style-type: none"> Sukari will encourage green cane harvesting to avoid the negative environmental impacts associated with can harvesting through burning
	Cane spillage	<ul style="list-style-type: none"> Sukari in partnership with Kenya Sugar Board, Kenya Roads Board, KENHA, KURA, KERRA and the County Government of Homabay will ensure the improvement of the road infrastructure within the cane growing area in order to reduce the level of cane spillage along the roads Sensitization of sugarcane loaders so as to allow for proper sugarcane loading avoiding protruding cane which inconvenience other road users The company should also institute measures of collecting all the spilled cane on the feeder roads
	Water use	<ul style="list-style-type: none"> A Sustainable Water Management System Plan should be developed in collaboration with WRMA to minimize impact to natural systems by managing water use, avoiding over-abstraction in Kuja River or the groundwater aquifers, and minimizing impacts to other water users. Sukari should also consider the harvesting, tapping and utilization of rainwater as well as reuse, recycling and treatment of process water where feasible Factory water use should be carefully monitored through the use of flow meters and timely identification and control of nay leakages The factory will be operated at optimum capacity and with minimum stoppages

		<p>because raw water consumption per ton of cane crushed increases when crushing lower than the optimum capacity and when hot water production is suspended during halts in operations (cleaning, restocking, and breakdowns).</p>
	<p>Waste water</p>	<ul style="list-style-type: none"> • Wherever possible, containment of water collected from areas with potential contaminants will be ensured. Such waste water should be reused. • Oil interceptors and sediment traps should be installed and maintained to ensure any discharge to the environment carries a low sediment load. • Storm water management canals and dams should be maintained and kept clean in order to ensure that the capacity of such systems is not compromised during the life of the operations • Sensitization of the clients who buy molasses of the environmental effects of the product so as to prevent spillage of the same • Apply for effluent discharge license from NEMA on time • Install a water meter to measure the amount of water waste water released from the factory on daily basis • Carry out an analysis of the composition of the effluent through a NEMA registered laboratory • Continuously monitor the discharge as per the regulations • The company to construct drainages throughout the factory to direct storm

		waters to the river after lab testing and treatment if necessary
	Solid waste generation/by-products (bagasse, filter cake, boiler ash)	<ul style="list-style-type: none"> • Clearly designate and construct an appropriate waste collection facility or provide covered refuse skips; (Filter cake and boiler ash dumping and composting sites are available) • NEMA licensed waste transport vehicles have been provided • Maintain a proper waste tracking document • Bagasse is used as a source of fuel in the boilers. The factory has also applied for (EIA) a new environmentally designed bagasse holding area. It also has plans for a cogeneration plant which will use up all the bagasse produced. • Ensure adequate fire warning, response and management systems are installed. • Provide well-structured engineering solutions to leachate and surface runoff.
	Air pollution levels	<ul style="list-style-type: none"> • Regularly monitor stack emission • Invest in bagasse drying mechanism along the delivery line • Exhaust gas recirculation • Selective non-catalytic/catalytic reduction • Installation of wet scrubbers and thermal oxidizers • Avoid overloading the bagasse for efficient burning • use the correct fuel to air ratio by proper adjustment of air and fuel ratios • Avoid carbon build-up in the boiler and furnace tubes and maintain the boiler

		and furnace settings in good condition
	Drain blockages	<ul style="list-style-type: none"> • The proponent should ensure that there is adequate means of handling large quantities of sewage blockages as well as related emergency situations. • Proper monitoring at waste generation points should be established. A site management plan should be put in place.
	Increased pressure on infrastructure	<ul style="list-style-type: none"> • The proponent should maintain close operations with service providers such as The Kenya Power and Lighting Company, WRMA e.t.c. • Principles of Cleaner Production should be applied to ensure optimal system performance.
	Fire outbreak.	<ul style="list-style-type: none"> • Install and regular maintenance of the firefighting equipment • Clearly labeling fire exit route. • Staff to be made clearly aware of fire hazards
	Vector breeding grounds	<ul style="list-style-type: none"> • Include an efficient storm water and waste management systems that will prevent the accumulation of rain water • All trenches and drains should be kept clear of all debris
Decommissioning stage	Loss and damage of properties during demolition activities	<ul style="list-style-type: none"> • Removal of properties that are not intended to be destroyed before the actual demolition process. • Proper supervision during demolition activities.
	Loss of employment opportunities	<ul style="list-style-type: none"> • A good phase out programme for employees should be put in place from the

		onset of the project
	Accidents to the demolishing team.	<ul style="list-style-type: none"> • Issue the workers with reflective garments. • Supervisors to instruct the worker and ensure that no one is at risk by falling objects.
	Loss of environmental aesthetics beauty.	<ul style="list-style-type: none"> • Ensure complete collection and disposal of wastes after demolition. • Landscaping the affected areas. • Conduct a decommissioning audit.

CHAPTER SIX PROJECT ALTERNATIVES

6.0 The Proposed Alternatives

This section discusses the potential impacts (both positive and negative) and proposes alternatives to the execution of the project based on the information generated by the analysis of the environmental issues above.

6.1 Site alternative

Alternatives for siting of the project may be limited to land ownership and appropriateness of the area. The current location provides a most suitable place. The relocation option to a different site is an option totally unavailable to the project as the factory already exists. Alternatives for siting of the project may be limited to land ownership and appropriateness of the area. The current location provides a most suitable place. The site is within the factory that hitherto mainly consisted of other factory development. This alternative will have minimal impact on the physical environment and has considered the necessary measures to almost eliminate the identified issues. The project is also in line with contemporary needs of the proponent.

Advantages:

- The property value appreciates.
- Investment made in the property will be productive. Proponent will have potential source of income in long term basis.
- Government earns revenue from fees, taxes, rent, rates and licenses.
- Employment opportunity for the workforce expands since the larger structure will require larger management services.
- Optimal economic and spatial land use
- Visual amenities will be improved.

6.2 Alternative Technologies

The design of the ETP has taken into account measures that can be implemented to minimise wastewater production through recycling, treatment and reuse. Its capacity shall be enhanced should it not be capable of handling larger amounts of effluent. No discharge of effluent shall be made to the Kuja River before satisfactory treatment. Sewage arising from the workforce at the plant will also be

discharged into septic tanks. Equipment for the development were preferred with reference to available capital, and function. The design of the facility was undertaken with a view to providing the most suitable, modern and practical facilities for the expected users.

6.3 Alternative Equipment

Equipment for the development were preferred with reference to available capital, and function. The design of the facility was undertaken with a view to providing the most suitable, modern and practical facilities for the expected users.

6.4 “No Project” Alternatives

The No Project alternative would be a loss to the expected gap that would be filled by with the increase in sugar production at the sugar factory. The no project expansion alternative in respect to the proposed Project implies that the status quo is maintained. Under the no project expansion alternative, the proponent's proposal would not receive the necessary approval from NEMA. The proposed sugar factory complex Project would not be constructed and the expectations attached to the Project would not be met. The no project construction alternative is the least preferred from the socio-economic perspective.

6.5. Preferred option

For this project, there are limited alternatives for the project site because the proponent already operates a sugar plant. Therefore, emphasis is now placed on the technological approaches that the proponent will adopt in constructing and managing the proposed development.

CHAPTER SEVEN: ENVIRONMENTAL MANAGEMENT PLAN

7.0 Introduction

The Environmental Management Plan involves the protection, conservation and sustainable use of the various elements of the environment. The EMP for the proposed project provides all the details of its activities, impacts, mitigation measures and expected costs during implementation and decommissioning phases of the project. This project bears the potential of a number of negative impacts on the environment. With proper environmental management procedures in place and adhered to then there should be minimal negative impact of concern emanating from it. Key areas that require mitigation measures include wastewater, solid wastes, maintaining good air quality, safety, and storm water management.

Table 7-1 below indicates measure for Environmental Management Plan

Table 7-1: Environmental Management Plan (EMP)

Environmental parameter	Impact	Mitigation measure	Responsible party	Cost (Ksh.)
Construction/equipment installation phase				
Extraction of raw material	<ul style="list-style-type: none"> ▪ Landscape change ▪ Poor visual quality ▪ Depressions leading to human and fauna health impact ▪ Deforestation ▪ Natural resource depletion ▪ Water abstraction 	<ul style="list-style-type: none"> ▪ Source material from suppliers that use environmentally friendly processes in their operation. ▪ Ensure accurate budgeting and estimation of actual construction material requirement to ensure that the least amount of material necessary is ordered. ▪ Ensure that damage or loss of material at construction site is kept minimal through proper storage. ▪ Use at least 5%-10% recycled, refurbished, or salvaged materials to reduce the use of raw material and divert material from land fill. ▪ WRMA permit to be obtained if water abstraction is done ▪ The tender documents should specify required standards and certification for procurement of all materials and appliances; ▪ Steel scaffolding should be used in preference to timber and the Contractor should ensure that sufficient quantities of scaffolding are available for hire at the time of construction. ▪ All construction materials should be from approved sources; for example, 	Proponent and contractor WRMA NEMA	As per BQ and agreement with contractor

		hard stone for building should be obtained from bona fide commercial quarries;		
Removal/clearing of vegetation	<ul style="list-style-type: none"> ▪ Exposing ground to agents of soil erosion ▪ Lose of vegetation ▪ Loss of terrestrial habitat & biodiversity 	<ul style="list-style-type: none"> ▪ Proper demarcation and delineation of the project site to be affected by construction work ▪ Specify location for trucks and equipment, and areas of the site which should be kept free from traffic, equipment and storage. ▪ Designate access route within the site ▪ Design and implement an appropriate landscaping program to help in re-vegetation of part of the project site after construction ▪ Protecting the existing vegetation as much as possible ▪ Set a replanting and landscaping programme that focuses on increasing “green area” 	Proponent and contractor KFS	10,000 for landscaping
Sewage and effluent	<ul style="list-style-type: none"> ▪ Pollution 	<ul style="list-style-type: none"> ▪ Provide adequate sanitary facilities for workers, ▪ Provide solid waste receptacles and storage containers, particularly for the disposal of plastic bags boxes, so as not to block drainage system and to prevent littering of the site. 	Proponent and contractor	Already provided
Movement of vehicle at the site	<ul style="list-style-type: none"> • Compaction of soil • Interference with soil structure leading to low water infiltration 	<ul style="list-style-type: none"> • Apply soil erosion control measures such as leveling of the project site to reduce run-off velocity and Increase infiltration of storm water into the soil. • Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site, • Ensure that any compacted areas are ripped to reduce run-off. 	Proponent and contractor	15,000

		<ul style="list-style-type: none"> Storm water drainage lines be well constructed to reduce incidence of pounding and flooding 		
Utilization of construction materials	<ul style="list-style-type: none"> Generation of Construction waste leading to: <ul style="list-style-type: none"> ➤ Wastage of resources/ materials ➤ Health risk to the workers and environment ➤ Reduced aesthetic value of the site ➤ Production of leachate hence pollution of underground water and the soil ➤ blockage of drainage systems ➤ Chocking water bodies 	<ul style="list-style-type: none"> Through accurate estimation of quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials. Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed off. Ensure that damaged or wasted materials including cabinet, doors, plumbing, and lighting fixtures, marble and glasses will be recovered for refurbishing and use in other projects reducing the amount of construction waste generated over time Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste Dispose waste more responsibly by dumping at designated dumping sites or landfills only; the use of a NEMA registered waste disposal company is encouraged. 	constructor and his workers	Material schedule already developed

Dust emission from movement of transportation vehicles at the site and on the road,	<ul style="list-style-type: none"> • Air pollution • Causing breathing problems to the workers and the neighborhood • Blockage of fauna stomata 	<ul style="list-style-type: none"> • Sprinkle water on graded access routes each day to reduce dust generation by construction vehicles • controlling the speed of vehicles on the site • watering open soil or storage sites • selecting transportation routes • provide worker with dust masks 	Constructor and his workers	10,000
Utilization of fossil fuel by fuel consuming machineries.	<ul style="list-style-type: none"> • Emission of carbon gas into the atmosphere leading to global warming • Exhaustion of fossil fuel resource • Air pollution • Can Lead to breathing problems 	<ul style="list-style-type: none"> • Ensure proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done per vehicle or the number of vehicles on the road. • Sensitize truck drivers to avoid unnecessary racing of vehicle engines at adding/offloading points and parking areas, and to switch off or keep vehicle engines when not in use • Prompt servicing of vehicles engines • Use of unleaded and low sulphur fuel • Monitor energy use during construction and set target for reduction of energy use. 	Contractor and Drivers	As per need
Noise and vibration	Noise generation Hearing problem	<ul style="list-style-type: none"> • Sensitize construction drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, schools, residential areas and hospitals • Sensitize construction vehicle drivers and machinery operators to switch of 	Constructor and Workers	30,000

		<p>vehicle or machinery not being used.</p> <ul style="list-style-type: none"> • Ensure that all heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. • Measure to ensure that noise levels does not exceed 75dB(A) • Attenuation of any sound that may affect the inner ear by use of earplugs and earmuffs 		
Water consumption	<ul style="list-style-type: none"> • Excessive use / misuse of water • Generation of excess waste water • Water pollution 	<ul style="list-style-type: none"> • Prompt reuse and recycling of water as much as possible where necessary • Install a discharge meter at water outlet to monitor and determine total water usage. • Monitor water consumption and utilization; • Sensitize construction workers on the importance of proper water management; • All wastewater should be drained into approved drainage facilities. 	Contractor and his workers	150,000
Approval of building plan	Positive : the building being in alignment with the town/District Development Plan (DDP)	Ensure that plans are approved by the county Government, Physical Planner and the local Occupational Health and Safety Office	The proponent	Gazetted fee

Incident, accidents, and dangerous occurrences	To enable relevant authorities to monitor incidence occurrences and take necessary measure to minimize them.	Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Contractor and his workers	Gazetted fee
Safety, health and environment (SHE) policy	To give guidelines on how one is to protect himself within a given premises against any incident.	Develop, document and display prominently an appropriate SHE policy for construction works	Contractor	5,000
Personal protective gears	To protect against any infection or injuries while at work.	Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc should be made available and construction personnel must be trained on their use.	Contractor	80,000
Supply of clean water	Ensure good health as dirty/untreated water leads to water borne diseases.	Ensure that construction workers are provided with an adequate supply of wholesome drinking water which should be maintained at suitable and accessible points.	Contractor	available
Storage of materials	Can cause accident, material wastage and spoilage, and reduced aesthetic value.	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Contractor	5000

First aid	To ensure that when any injury occur it can be taken care of before main treatment at a hospital or a dispensary.	<ul style="list-style-type: none"> • Well stocked first aid box which is easily available and Accessible should be provided within the premises • Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body. 	Contractor	40,000
Safety and security	Destruction and stealing of materials on site.	<ul style="list-style-type: none"> • Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site. • The Contractor should ensure strict safety management through close attention to design, work procedures, materials and equipment; • Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls; • All workmen should be provided with personal protective equipment (e.g. nose masks, ear muffs, helmets, overalls, industrial boots, etc); • There should be regular site reporting on health, safety and environment (HSE) issues by an appointed HSE representative, daily site inspections should be done to ensure safe work practices are adhered to; • All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate (Section 	Contractor	20,000

		<p>62 of the Factories and Other Places of Work Act);</p> <ul style="list-style-type: none"> • Statistical records on accidents and incidents should be collated and analysed on a monthly basis and forwarded to the contractor and / or displayed on the notice boards; • Site personnel should be encouraged to report “near-miss incidents” in order to avoid potential problems and increase safety awareness. 		
Fire Hazards	Destruction of property and lives	<ul style="list-style-type: none"> • Provide adequate number of appropriate firefighting equipment as well as fire exit options. • Ensure inspection and maintenance of fire equipment • A fire escape route and an emergency assembly point should be clearly indicated 	Contractor and proponent	200,000
Construction traffic:	Disruption of local traffic; Potential for accidents.	<ul style="list-style-type: none"> • The Contractor should plan itineraries for site traffic. • Issue notices/advisories of pending traffic inconveniences and solicit tolerance by commuters before the commencement of construction works. • Assign traffic regulators to places during periods of chronic or potential traffic congestions. • Prepare & provide appropriate signage & trained flag persons where the movement of heavy machinery and construction equipment may cross the main roads. 	Contractor	5,000

Influx of construction workers into the area:	Proliferation of informal kiosks in the area; Increase in transport demand. Road side vending	<ul style="list-style-type: none"> • Develop a catering program on site for construction staff; • Provide transportation for the workforce to and from the site. • The contractor should identify, demarcate and fence a specific area within which specific number vendors will be allowed to operate. • The vendors should be instructed to maintain the area in a tidy fashion and litter bins should be provided with arrangements in place to have the contents of these emptied on a regular basis and disposed of appropriately. 	Contractor	10,000
Energy utilization:	Energy consumption.	<ul style="list-style-type: none"> • Develop an energy management plan; • Construction machinery and vehicles should be maintained and used in accordance with manufacturer's specifications, to maximize efficiency and lower use of energy, e.g. drivers of construction vehicles should be instructed not to leave them idling for extended periods; • Construction workers should be sensitized on the importance of energy management. 	Contractor	5,000
Ergonomic	Bad posture may lead to body structural disorder.	<ul style="list-style-type: none"> • Provision for repairing and maintaining of hand tools must be in place • Hand tools must be of appropriate size and shape for easy and safe use • Height of equipment, controls or work surfaces should be positioned to reduce bending posture for standing workers 	Contractor	20,000

Operational Phase

Solid waste generation	Generation of general Solid wastes leading to pollution of water bodies, air impairment when decomposing hence odours, and reduction in aesthetic value of the compound.	<ul style="list-style-type: none"> • Provision of dirt bins/skips at strategic points of the compound • Disposal at the designated site, • Awareness creation among workers • Practice reuse and recycling methods as much as possible where applicable. • Display portraits like “Don’t Litter”, “Keep Environment Clean” 	Proponent	Waste collection as per rates
	Bagasse, filter cake and boiler ash	<ul style="list-style-type: none"> • Clearly designate and construct an appropriate waste collection facility or provide covered refuse skips; • Maintain a proper waste tracking document • Bagasse is used as a source of fuel in the boilers. However, the bagasse holding shades appear not to be adequate to hold additional bagasse. A larger shade may be needed. • Co-generation can be considered • Ensure adequate fire warning, response and management systems are installed. • Provide well-structured engineering solutions to leachate and surface runoff. 		
Hazardous waste generation	Pollution of surface or ground water due to oil	<ul style="list-style-type: none"> • Hazardous wastes, such as waste oils and grease to be collected in secure storage facilities on-site to prevent accidental release that may result in 	Proponent	Waste collection as

	spillage	<p>contaminated run-off and leaching.</p> <ul style="list-style-type: none"> • storage areas for hazardous material to be cemented to provide an impervious surface and to prevent uncontrolled discharges to groundwater 		per rates
Air pollution	Unmonitored stack emissions	<ul style="list-style-type: none"> • Monitor stack emissions regularly • Ensure the emissions are within permissible limits • Install wet scrubbers • Use appropriate fuels in the boilers 	Proponent	100,000
Accidents and injuries	machine safety (improper use and maintenance of machines)	<ul style="list-style-type: none"> • All plant, machinery and equipment should only be used for work which they are designed for and be operated by a competent person. • Insist on regular servicing of electrical fittings and appliances by qualified personnel. • Every machine intended to be driven by mechanical or any other type of power should be provided with an efficient starting and stopping appliance, the control of which should be in such a position as to be readily and conveniently operated by the person operating the machine 	Proponent	-
Occupational health and Safety	Accidents and injuries	<ul style="list-style-type: none"> • The premise must be kept clean, daily removal of accumulated dust from floors, free from effluvia arising from any drain, sanitary convenience or nuisance • The premise must not be overcrowded, there must be in each room 10 metres of space for each employee, not counting space 14 feet from the floor and a 9 feet floor-roof height. 	Proponent	100,000

		<ul style="list-style-type: none">• The circulation of fresh air must secure adequate ventilation of workrooms.• There must be sufficient and suitable lighting in every part of the premise in which persons are working or passing.• There should also be sufficient and suitable sanitary conveniences separate for each sex,• Management should ensure provision of suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, and maintained for the use of workers in any process involving expose to wet or to any injurious or offensive substances• Management should ensure training and supervision of inexperienced workers• An adequate supply of both quantity and quality of• Wholesome drinking water must be provided.• Maintenance of suitable washing facilities, accommodation for clothing not worn during working hours must be provided.• Provision of well-equipped First Aid kits and /or ready transport facilities to hospital.		
--	--	--	--	--

Use of sanitary room (toilets and urinal)	<p>Generation of sewage (liquid waste),</p> <ul style="list-style-type: none"> • Water pollution, • Air pollution (odour) • Reduced aesthetic value 	<ul style="list-style-type: none"> • Incorporate grease traps • Conduct regular inspections for sewerage pipe blockages or damages and fix appropriately • Ensure regular monitoring of the sewage discharged • Reuse, recycle waste water where necessary • Ensure adequate water supply for flushing and to ensure the waste is carried to the sewerage system without causing blockage. • Ensure flashing toilet after use though Avoid unnecessary flushing • Apply for effluent discharge license 	Proponent NEMA	150,000
Water Consumption	<ul style="list-style-type: none"> • Overutilization of water 	<ul style="list-style-type: none"> • Monitor water consumption • Apply for water abstraction permits from WRMA • Install internal water meters. • Incorporate rainwater harvesting measures. • Installing plumbing fittings, appliances and devices to optimize water use efficiency; • Recycling of wastewater to reduce water consumption. 	Proponent/Contractor WRMA	As per BQ
Waste management	<ul style="list-style-type: none"> • Drain blockages 	<ul style="list-style-type: none"> • The proponent should ensure that there is adequate means of handling large quantities of sewage blockages as well as related emergency situations. • Proper monitoring at waste generation points should be established. 	Proponent/ Contractor	As per BQ

use of energy	<ul style="list-style-type: none"> • Overutilization of hydropower • Overloading hydropower grid 	<ul style="list-style-type: none"> • Switch off electrical equipment, appliances and lights when not being used • Install energy saving fluorescent tubes at all lighting points within the facility instead of bulbs which consume higher electric energy • Sensitize occupants of the facility to use energy efficiently • Use of alternative sources of energy like solar for lighting • Plant trees within the compound and along the fence. 	Proponent	-
Electricity use	Explosions/Fire outbreaks causing injuries and destruction of properties	<ul style="list-style-type: none"> • Regular maintenance of fire extinguishers • Proper electric connections. • Circuit must not be overloaded • Distribution boards switches must be clearly marked to indicate respective circuits • No live exposure connection • Electrical fittings near all potential sources of ignition should be flame proof 	Proponent /Contractor	As per BQ and need
Ventilation	Suffocation and lack of clean air may lead to discomfort of the occupants of the building.	<ul style="list-style-type: none"> • Enough space must be provided within the premises to allow for adequate natural ventilation through circulation of fresh air 	Proponent Contractor	As per BQ

Vector/rodents breeding grounds	Diseases and infections	<ul style="list-style-type: none"> • Ensure that there is no space for unplanned stagnant water retained in the fields. • Recommended measures should be applied when dealing with rodents and food storage. • A monitoring programme should be put in place for controlling relative cases observed. 	Proponent	As per need
Lighting	Lack of enough light in the room may lead to eye straining hence eye problems	There must be adequate provision for artificial and natural lighting in the building.	Proponent	As per BQ
Decommissioning Phase				
Demolition activity	<ul style="list-style-type: none"> • Lead to accident from falling, and flying objects. • Generation of construction waste • Reduced aesthetic value of that place • Destruction of soil structure • Lead to soil erosion hence water pollution 	<ul style="list-style-type: none"> • Develop a decommissioning EIA 	Proponent and the contractor	Develop BQ and project budget

CHAPTER EIGHT: CONCLUSIONS

This Project Report has been prepared to provide sufficient and relevant information on the proposed project to enable NEMA to establish whether activities of the project are likely to have significant adverse environmental impacts. Mitigation measures have been proposed for identified impacts in this report and an Environmental Management Plan (EMP) for the implementation of the proposed measures has been presented. The EMP presented in this report is a tool to be used by the Project Team during the construction, hand-over and operation periods.

To ensure implementation, mitigation measures should be reflected in the Conditions of Contract and Bills of Quantities. It is the responsibility of the Proponent to ensure these measures are incorporated into these two documents.

It is recommended that the available waste management systems must be monitored and upgraded (where necessary) to ensure that they adequately handle the anticipated increase in waste and by-products.

In this respect the project can proceed on condition that the concerns are addressed the proposed mitigation measures are implemented and an EIA license issued with the above conditions taken fully into account amongst any others.

References

1. Republic of Kenya (2015). The Environmental Management and Co-ordination Act, No. 5 of 2015. Government Printer, Nairobi.
2. Republic of Kenya (2016). Laws of Kenya: The Water Act, Cap 372. Government Printer, Nairobi.
3. Agriculture, Fisheries and Food Authority Act, 2013
4. Kenya Sugar Act, 2001 (rev.2012)
5. Republic of Kenya (1998). Laws of Kenya: The Science and technology Act, Cap 250. Government Printer, Nairobi.
6. Republic of Kenya (2003). Legislative Supplement No. 31, Legal Notice No. 101: The Environmental (Impact Assessment and Audit) Regulations, 2003. Government Printer, Nairobi
7. Regulations, 2006. Government Printer, Nairobi. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. Government Printer, Nairobi
8. Kenya Gazette Supplement Acts Physical Planning Act, 1999. Government Printer, Nairobi.
9. Kenya Gazette Supplement Acts Public Health Act (Cap. 242). Government Printer, Nairobi.
10. Kenya Gazette Supplement Acts Water Act, 2016. Government Printer, Nairobi.
11. Kenya Gazette Supplement Acts. Environmental Management and Coordination (Water Quality) Regulations, 2006. Government Printer, Nairobi.
12. Kenya gazette supplement number 56. Environmental (Impact Assessment and Audit) Regulations, 2003. Government Printer, Nairobi.

13. Kenya Gazette Supplement Number 69. Environmental Management and Coordination (Waste Management) Regulations, 2006. Government Printer, Nairobi.
14. Kenya Gazette Supplement Number 74. Environmental Management and Coordination (Fossil Fuel Emissions Control) Regulations, 2006. Government Printer, Nairobi.
15. Occupational Safety and Health Act, 2007
16. Sessional Paper No. 1 of 1999. Government Printer, Nairobi.

Annexure

1. Proof of land ownership
2. Proof of Public Participation
3. Proposed plans/designs
4. Summary of bill of quantities
5. Existing licenses



REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

Title Number WEST NYOKAL/KANYIKELA/1510

Approximate Area (0.94) HECTARE

Registry Map Sheet No. 24

This is to certify that SUKARI INDUSTRIES LIMITED

OF P.O. BOX 358, KAKAMEGA

is ~~(XXX)~~ now registered as the absolute proprietor^(S) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.



GIVEN under my hand and the seal of the
HOMABAY District Land Registry

this 5th day of NOVEMBER 20 09

[Signature]
Land Registrar Office 239



REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

Title Number WEST NYOKAL/KANYIKELA/1511

Approximate Area 19.59 (NINETEEN DECIMAL FIVE NINE) HA.

Registry Map Sheet No. 22

This is to certify that SUXARI INDUSTRIES LIMITED.
P.O. BOX 358 KAKAMEGA.

is (are) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.



GIVEN under my hand and the seal of the
HOMA-BAY District Land Registry

this 6th day of NOVEMBER 2009

[Signature]
Land Reg. *[Signature]* Land 239



REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

Title Number WEST NYOKAL/KANYIKELA/340

Approximate Area 4.35 (FOUR DECIMAL THREE FIVE) HA.

Registry Map Sheet No. 22

This is to certify that SUKARI INDUSTRIES LIMITED.

P.O. BOX 358 KAKAMEGA.

is (are) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.



GIVEN under my hand and the seal of the
HOMA-BAY District Land Registry

this 4th day of NOVEMBER 20 09


Land Registrar



REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

Title Number WEST NYOKAL/KANYIKELA/1512

Approximate Area 6.7 SIX DECIMAL SEVEN) HA

Registry Map Sheet No. 22

This is to certify that SUKARI INDUSTRIES LIMITED.

P.O. BOX 358 KAKAMBA.

is (are) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the
HOMA-BAY District Land Registry
this 6th day of NOVEMBER 20 09



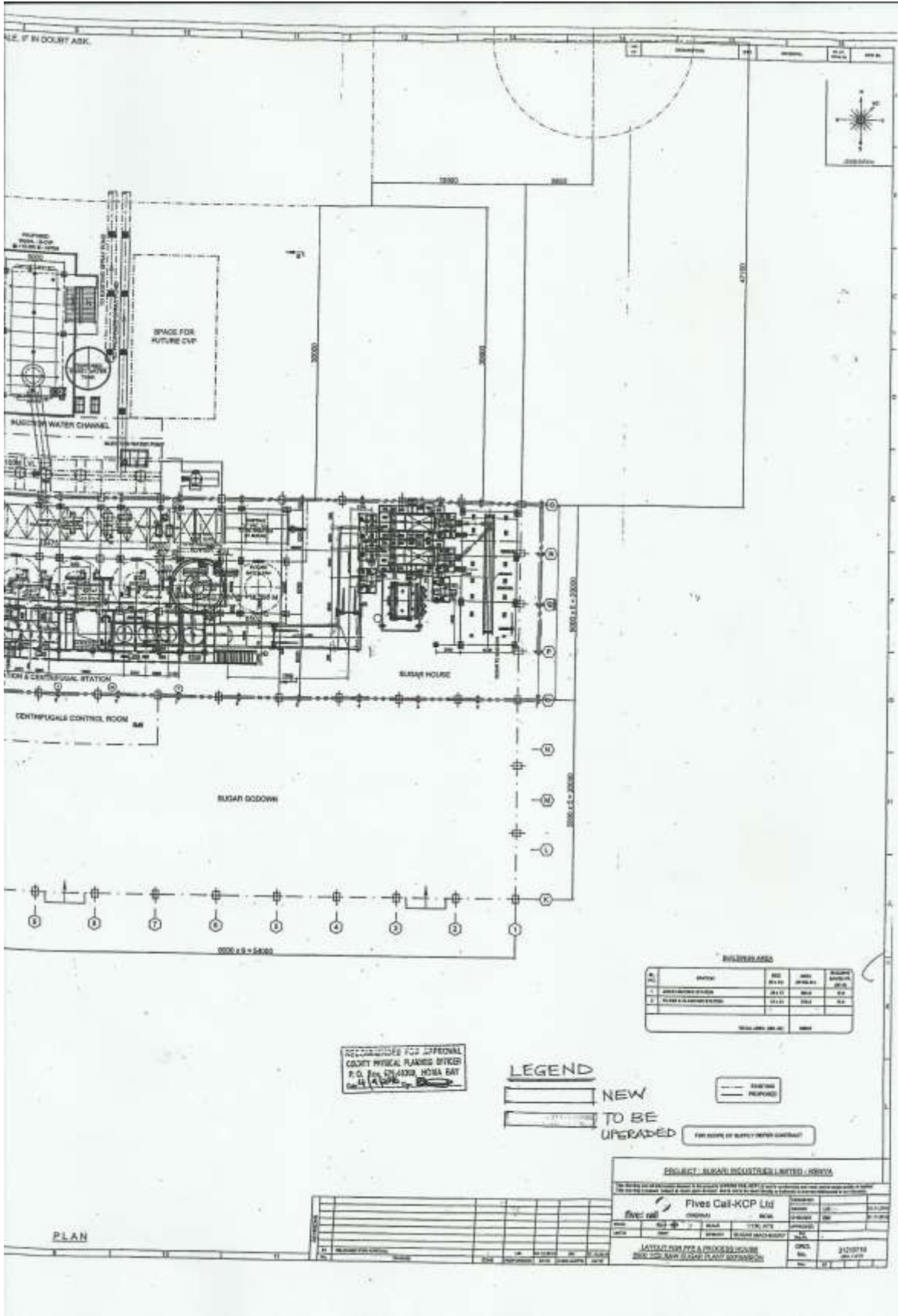
U. Z. Luma 239
Land Registrar

LIST OF PLANT & MACHINERY FOR EXPANSION
FROM PLANT 1500 TCD TO 5000 TCD

PRICE BREAKUP FOR F.F.E. HOUSE EQUIPMENTS			
Sr. No.	Description	Quantity	Price (Kshs.)
1	Falling Film Evaporators and its Accessories	7 Nos.	47,400,000
2	Juice Re-Circulation Pumps and Motors for F.F.E.	14 Nos.	12,020,000
3	Caustic Lye Tank	1 No.	260,000
4	Caustic Recirculation Tank	1 No.	210,000
5	Chemical Recirculation Tank - 1	1 No.	260,000
6	Chemical Recirculation Tank - 2	1 No.	200,000
7	Neutralization Tank	1 No.	260,000
8	Pump & Motor for Lye Tank	1 No.	310,000
9	Pump & Motor for Re-Circulation Tank	1 No.	310,000
10	Pump & Motor for CIP System	1 No.	260,000
11	Pump & Motor for Chemical Tank - 1	1 No.	310,000
12	Pump & Motor for Chemical Tank - 2	1 No.	310,000
13	Pump & Motor for Neutralization Tank	1 No.	310,000
14	Electrocal Hoist	1 No.	400,000
15	Automation & Instrumentation	1 Unit	3,400,000
16	Structural Staging	1 Unit	4,010,000
17	Piping	1 Unit	3,000,000
18	Insulation	1 Unit	2,000,000

75,230,000

PRICE BREAKUP FOR F.F.E. HOUSE EQUIPMENTS			
Sr. No.	Description	Quantity	Price (Kshs.)
1	Rotory Screen	1 No.	2,070,000
2	Raw Juice Tank & Pumps	1 Unit	420,000
3	Juice Heaters	12 Nos.	6,410,000
4	Clarifier	1 No.	2,110,000
5	Mud Juice Pump & Motor	1 Unit	130,000
6	Clarified Juice Buffer Tank & Pumps	1 Unit	1,280,000
7	Rotory Screen for Clear Juice	1 No.	2,100,000
8	Polymer Mixing Tanks with Eductor	1 No.	800,000
9	Vaccum Filter with Pumps, Condensers & Bagachillo Blower	2 Unit	3,260,000
10	Mud Bin	1 No.	580,000
11	Exhaust Condensate Tank and Pumps with Motors	1 Unit	1,250,000
12	Condensate Flash Vessel	1 No.	1,620,000
13	Overhead Condensate Storage Tank	1 No.	1,750,000
14	Batch Pan - A & Accessories	1 Unit	2,860,000
15	Continuous Pan for B Massecuite with Receiving Tank	1 Unit	3,080,000
16	Receiving Crystallizer	1 No.	1,360,000
17	Cooling Crystallizer - C Massecuite	1 No.	6,510,000
18	Liquidating Pump with Motor of Cooling Crystallizer	1 Unit	520,000
19	Centrifugal Machine for A Massecuite	1 No.	3,260,000
20	Centrifugal Machine for B Massecuite	1 No.	2,490,000
21	Centrifugal Machine for C Massecuite	1 No.	3,460,000
22	Run off Tank with Pumps & Motors for BH-Molasses	1 Unit	130,000
23	Bucket Elevator - 1 (Big)	1 Unit	1,080,000
24	Grader	1 Unit	2,050,000
25	Bucket Elevator - 2 (Small)	1 Unit	680,000
26	Magnetic Separator	1 No.	110,000
27	Molasses Storage Tank	1 No.	10,460,000
28	Molasses Loading Pump with Motor	1 Unit	270,000
29	Spray Pond Complete with Nozzels	1 Unit	1,410,000
30	Electrical Items	1 Unit	10,810,000
31	Piping	1 Unit	4,920,000
32	Steel Structure, Railing and Chequered Plates	1 Unit	7,200,000
33	Insulation	1 Unit	3,330,000
			89,770,000



REVISIONS

No.	DATE	BY	CHKD BY	REVISION
1	10/11/03
2	11/11/03
3	11/11/03

RECOMMENDED FOR APPROVAL
 COUNTY PHYSICAL PLANNING DIVISION
 P.O. Box 214308, HOUMA, LA 70321
 Call (504) 833-3333

LEGEND

- [Solid line] NEW
- [Dashed line] TO BE UPGRADED
- [Dotted line] EXISTING
- [Double line] IMPROVED
- [Box with diagonal lines] FOR WORK BY SUPPLY/INSTALL CONTRACT

PROJECT: SUGAR INDUSTRIES LIMITED / KROVA

The drawings herein are prepared by the design engineer for the purpose of showing the general character and location of the work proposed and are not intended to be used for construction without the approval of the design engineer. The design engineer shall be responsible for the accuracy of the information furnished to him by others.

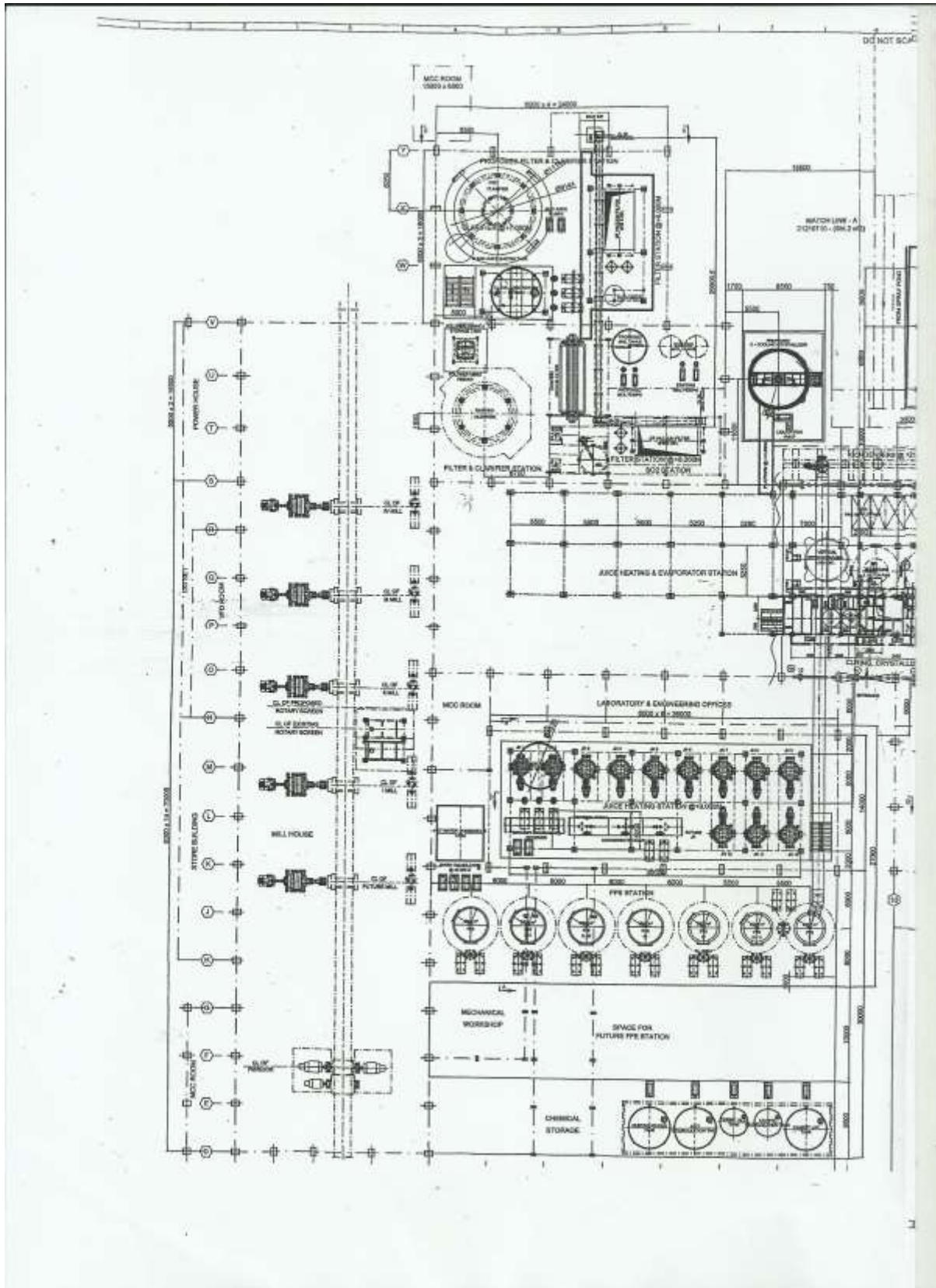
Fives Call-KCP Ltd

DATE	10/11/03	BY	...	CHKD BY	...
DATE	11/11/03	BY	...	CHKD BY	...
DATE	11/11/03	BY	...	CHKD BY	...

LAYOUT FOR PIPE & PROCESS HOUSE
 2000 THE NEW BLAKE PLANT ROAD

SCALE: 1/4" = 1'-0"

PLAN



**MINUTES OF PUBLIC PARTICIPATION MEETING HELD FOR THE PROPOSED
EXPANSION OF SUGAR PLANT CRUSHING CAPACITY FROM 1500TCD TO
5000TCD FOR SUKARI INDUSTRIES, ON 3RD MARCH, 2017 AT KENYA
FORESTS RESEARCH INSTITUTE(KEFRI) RIAT GROUNDS**

AGENDA

1. Prayers
2. Introductions and opening Remarks
3. Overview of the proposed project
4. Concerns and responses on the proposed project
5. Closing remarks
6. AOB

MEMBERS PRESENT

No.	NAME	DESIGNATION
1.	Moses Ooko	Chief
2.	Javan Abuto	Assistant Chief
3.	Meshack Owiti	Retired Senior Chief South Kanyikela
4.	Steve Ogolla	KEFRI
5.	Jacob Onoka	Personal Assistant to the area MCA
6.	Shadrak Ochieng	Ward Admin
7.	Nyambero Onyango	Former Councillor
8.	Charles Ogambo	Village Elder
9.	Michael Awino	Village Elder
10.	Fred Oyosi	Church Elder
11.	Martin Odongo	Village Elder
12.	Richard Odir	Village Elder
13.	Enos Orana	Village Elder
14.	Betto Jeremiah	Village elder
15.	John Odero	Village Elder
16.	Meshack Muga	Village Elder
17.	Andrew Oyath	Village Elder
18.	Hannah Agolla	Elder
19.	Fred Ochieng	Elder
20.	Teresa Akeyo	Elder

21.	Rose Atanga	Elder
22.	Miltone Obote	KUSEDA ass.
23.	S. Rajendran	Chief process manager, Sukari
24.	M. Sathian	Regional manager, Sukari
25.	Meshack Owiti	PLO Sukari
26.	Ronald Ajowi	Chemist, Sukari
27.	Odidi Mitchel	EIA Expert
28.	Irene Were	Expert assistant
29.	John Moi Odongo	
30.	Johnson Agulo	Farmer
31.	David Omollo	Farmer
32.	Shadrack Orwe	Farmer
33.	Martin Odhiambo	Farmer
34.	Rasto Nyambero	Teacher
35.	Kennedy Goche	Farmer
36.	Meshack Muga	Farmer
37.	Hezekiah Agola	Farmer
38.	John Odero Otieno	Federation
39.	Lucas Kumba	federation
40.	Jack Adongo	Driver
41.	Peter Orimba	Farmer
42.	Gordon Otieno	Farmer
43.	Loice A. Joseph	Farmer
44.	Richard Odhiambo	farmer
45.	Mercy Onyango	Farmer
46.	Lucky Akinyi	farmer
47.	Isaack Otieno	Farmer
48.	Hanna Ogola	farmer
49.	Johanna Apiyo	ODM
50.	J. Ogom	ODM
51.	Joshua Okumu	Farmer
52.	Elly Onyango	Farmer
53.	Elphas Okolla	member
54.	Belo Jeremiah	Welder

55.	Jeremiah Osoo	farmer
56.	Okise Awino	Farmer
57.	Julias Awino	ODM
58.	Duncan Odhiambo	member
59.	Josia Ndiga	Farmer
60.	Maureen maende	Farmer
61.	Nickanor Ojwang	Farmer

MIN 01: PRAYERS

The meeting was called to order at 14.35pm by the area chief followed by a word prayer.

MIN 02: OPENING REMARKS

The area chief of the location Mr. Moses Ooko began by welcoming and thanking everyone for attending the meeting. In the interest of time and considering the large number of attendants, the area chief made a decision to introduce some of the people who had attended the meeting. He introduced members of the ‘Nyumba Kumi’, village elders’ present, church leaders, opinion leaders, political leaders and representative from KEFRI. He later proceeded to invite Mr. Ogolla from KEFRI, personal assistant to the area MCA, Ward Administrator and retired senior chief South Kanyikela for his there opening remarks.

Mr. Ogolla welcomed everybody to the KEFRI compound. The MCAs personal assistant, ward administrator and retired senior chief all greeted the attendant and welcomed them to the meeting.

The area chief then proceeded to introduce the representatives from the Sukari sugar factory. He introduced; Mr. Sathian (cane development area regional coordinator), Mr. Rajendran (Chief process manager) and Mr. Ronald Ajowi from the process department.

Finally, the Chief introduced the Lead environmental expert present, Mr. Odidi.

The introductory session was followed by the information of the agenda of the meeting. Mr. Moses the area chief explained that the meeting had been called as a requirement to the environmental law which requires E.I.A. license from NEMA before certain development projects are implemented. Further, he stated that public participation is an important part of

this process and hence the purpose for the meeting. He said that the factory had intentions of expanding the cane crushing capacity of their factory by installation of additional equipment to the already existing milling plant.

The Chief then invited Mr. Rajendran and the Lead Expert to give more information on the proposed project and its anticipated impacts.

MIN 03: OVERVIEW OF THE PROPOSED PROJECT

Mr. Rajendran began by saying that this is the only major agro based industry in the county supporting livelihoods of more than 2000 families, directly or indirectly. He said that about 10,000 cane growing farmers in the surrounding area are prosperous due to this institution that it has helped them to grow a commercial crop that is socially and environmentally friendly.

He added that in today's competitive market, efficiency in every front is crucial for survival. The prosperity of local citizens is directly linked to the prosperity of this unique rural industry. The economic scale of operation i.e .sizing of the factory and implementation of advance and modern technology is a must. Mr. Rajendran explained that, the whole process of expansion is capital intensive and will be implemented in phases. This shall be synchronized with producing more cane in field. He said, presently the management is focusing on implementation of stand by equipment with up graded technology .This will help the factory to run with reduced stoppage, that shall help the farmers to supply his/her product with regularity.

He stated therefore that the agenda for the day was to get public opinion on the proposal and as part of application from license from NEMA. He then invited the EIA expert to explain further on the foreseen potential adverse impacts, positive impacts and proposed mitigation measures of the proposed project.

Mr. Odidi, the EIA expert explained to the community, the entire process of factory upgrade was not going to bring about any new impacts as the factory was not bring in any new process. He stated that the factories main objective is the production of sugar from sugarcane and this was still the objective of the proposed developed. However, with improved technology and more efficient equipment, it was envisaged that there will be an increase in the amount of cane crushed per day hence the expansion of its capacity.

He said that the proposed development had the potential to create more employment opportunities especially during the construction stage and generate revenue to the county and national governments from taxes and statutory fees charged for various processes. He added that the greatest positive impacts would be felt by the company, the farmer and the environment, stating that efficient processes meant low pollution foot prints, increased production and reduced time wastage to farmers as more cane can be crushed within a day.

However, he added that negative impacts are also to be expected from the generation of effluent, bagasse, dust, noise, accidental fires accidents and injuries among others. Although, the factory had already put in place measures to mitigate these impacts by attaining various licenses and implemented their requirements. He added that the effluent treatment plant was fully functional and could handle the effluent to be discharged from the process. The factory had also applied for a license from NEMA to operate a more modern bagasse holding site which will take care of accidental fires, bagasse dust and bagasse leachates. The factory already operates a NEMA licensed filter mud and boiler ash holding sites. He said that no new environmental impacts were envisaged as the sugar making process was not changed and the already existing impacts could be mitigated or were already in the process of being mitigated.

Mr. Odidi also explained that the process of public participation was an integral part of the EIA as the public concerns should be incorporated in the final report and in the implementation of the project and encouraged the community to voice their views and concerns with fear.

MIN 04: COMMUNITY CONCERNS AND RESPONSES ON THE PROPOSED PROJECT

04-01: Councilor James Ouma wanted to know why a meeting was needed for a development to be undertaken within the factory. He was suspicious of the attendance lists going round and wanted to know for what purpose they had to sign on it. He also wanted to know how the proposed project will benefit the community and requested for more support to the community from the sugar factory.

Response:

The area chief explained that an attendance list is the proof of a meeting being held and it was not to be used for any other purpose.

Mr. Odidi also explained that despite the project being implemented within the factory compound, its impacts will be felt both inside and outside the confines of the factory, hence the need for those expected to be affected to be aware of the proposed project, its impacts and give their comments, suggestions for consideration at various stages of the project implementation.

Mr. Rajendran reiterated that the improved efficiency will prevent the delay of cane within the fields as more cane will be crushed per day. He also stated that other CSR matters will be discussed with the senior management of the factory and that the factory and community will have another meeting to discuss these.

04-02: Mr. Milton Orwe, said that the expansion of the capacity of the factory was not a problem, however he cited that this was a scientific issue and wanted to know how generation of filter mud, increment in fleet capacity and dust from roads shall be dealt with.

He requested the company to do more in terms of assisting farmers in cane production. He cited a lot of fallow land around the factory.

He also wanted the company to alleviate poverty in the area through CSR projects that directly benefit the community.

Response:

Mr. Odidi informed Mr. Milton that a number of mitigative measures had been discussed in the report in detail and some of the impacts were currently being mitigated by the company. He explained that the company had applied for and received a license from NEMA to operate a filter cake holding site which is about 10 acres. The license conditions were also being met, as the company now operated licensed waste transport vehicles which were well covered to avoid littering while in transit. The filter cake was then composted and applied in field as manure. He however added that the licenses had to be renewed annually and that the conditions of licensing needed continued monitoring. He said that calming the roads with water during dusty days was a practical way of reducing dust on the road; however a more permanent solution would be to have tarmac roads within the area which sukari can coordinate with the county government and the Kenya Rural roads authority. Transport officers and flagmen were also to be stationed on the roads to manage transport during heavy traffic and Sukari had also opened roads connecting its main

factory compound to its other compounds e.g. bagasse holding site, automotive workshop to avoid congesting the main road.

Mr. Rajendran said that he would take up all suggested SCR actions suggested by the community members with the company top management and shall let the community now of the response soon enough. He also stated that other requests had been implemented citing the placement of boreholes for the community at some strategic points.

04-03: Mr. Jorum Kola wanted to know which measures the company had put in place to ensure the availability of cane to be crushed with the increased capacity. He said that cane was a problem even with the current capacity.

Response:

Mr. Rajendran responded by saying that the company had a vision of planting 8000Ha of sugarcane and had already planted 2000Ha. He said that this had been done on diverse out grower farms.

04-04: Mr. Odhiambo Ochieng wanted to know what plans the company had for out grower expansion or establishment of a nucleus

Response:

Mr. rajendran said that they were planning for a nucleus in the future, however, at the moment the company was developing its existing farmers and were investing in 4 regions.

04-05: The ward administrator cited that the issues cited were technical issues and he made a suggestion that the community needs to come up with a technical committee to follow up on the issues agreed upon in the meeting.

He also suggested that the company needs to have an out growers company to handle the cane out growers.

Response:

It was agreed that copies of the EIA report will be submitted to the area chief for future reference and follow-up.

MIN 05: CLOSING REMARKS

On his closing remarks, Mr. Rajendran thanked the community for showing up for the meeting. As most of the issues discussed revolved around SCR of the company, he said that he will personally handle matters within his powers and those that he could not, he promised to take up with the general manager and company director.

The area assistant chief thanked everyone for coming to the meeting and for airing their opinions.

The area chief thanked the community members for attending the meeting. He said that it was good to attend meetings that involve company operations so as to air out community views. He said that the communities are the first recipients of all benefits and negative impacts of company activities. He said that the company should consider employing as many locals as possible before importing staff. He also added that provided the company complies with the proposed mitigation measures, he had no objection to the project.

MIN 07: AOB

There being no other business, the business was brought to a conclusion at 6.03pm by a word of prayer.

MIN 07: AOB

There being no other business, the business was brought to a conclusion at 6.03pm by a word of prayer.

Checked by: Mr. Rajendran

Chief Process Manager

SUKARI INDUSTRIES LIMITED
P.O. BOX 237-40382/14
NDHIVA KENYA

Sign and stamp

Confirmed by: Mr. Moses Ooko



Some pictures taken at the public meeting







HOMABAY COUNTY GOVERNMENT

No.B 29057

**GRANTS THIS
SINGLE BUSINESS PERMIT**

to

SUKARI INDUSTRY (LTD)

TO ENGAGE IN THE BUSINESS OF

MILLINSH COMPANY

**Having Paid a Single Business Permit Fee
of**

Kshs.	<u>99,600</u>
Amount in words	<u>TWENTY NINE THOUSAND SIX HUNDRED ONLY</u>
For the Year <u>2017</u>	

Business under this Permit shall exclusively be conducted at the address as indicated below.

Town RIFT Plot No. ISOLATED
 business Address: Box 23210302 ADHWA
 as from: 1st JANUARY 2017
 and until: 31st DECEMBER 2017


 County Executive
 For the County of the County



11/1/2017
 Date issued



AGRICULTURE AND FOOD AUTHORITY

SUGAR DIRECTORATE

Sukari Plaza, Off Waiyaki Way,
P.O. BOX 51501-00200, Nairobi

REF: AFFA/SD/SCO/4/46

13 July 2016

Managing Director
Sukari Industries Ltd
P O Box 237-40302
NDHIWA

Dear Sir

MILL LICENSE FOR YEAR 2016/17

Reference is made to your 2016/17 annual mill license application. Kindly find enclosed mill operating license **No. AFA-SD-MLIC-008/2016** for your retention.

Note that this license is issued subject to the following conditions:

1. Adherence to relevant statutory requirements and industry standards.
2. Availability of contracted cane supply to match crushing capacity of miller.
3. Conformance to Cane Payment Formula.
4. Disclosure of factory operational data in the format required by the Authority.
5. The Authority reserves the right to vary the terms of this License including its withdrawal at any time.

Kindly also note that non-compliance to any of these terms shall result to withdrawal of this license.

Yours faithfully

ANDREW OSODO
INTERIM HEAD SUGAR DIRECTORATE

Encl.

Copy to: Interim Director General

Tel: (254-20) 8018750/1/2/3; (254-20) 2022336/7/8/9 | Mobile: +254-722-200127/8, +254-753-335178/9
Fax: (254-20) 2021206/77 | Email: info@kenyasugar.co.ke | Website: www.kenyasugar.co.ke



AFA-SD-MUC-008/2016



Sugar Directorate

THE SUGAR INDUSTRY (LICENSING OF MILLERS) REGULATIONS SUGAR MILL LICENSE

County : HOMABAY
Name of Licensee : SUKARI INDUSTRIES LIMITED
Sugar Mill at : LR. NO. WEST NYOKAL/KANYIKELA/1511 & 1512

License is hereby issued to the above mentioned to manufacture sugar and other products at the Mill specified in this license.

This license shall, unless earlier revoked, expire on the 30th June next following the date of issue.

Fee Paid: Ksh 1,000,000

Date of Issue: 1st July, 2016

Head of Directorate

This license is issued subject to the conditions shown overleaf.

Serial No: 2730

Form B

(r17(1))



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
EFFLUENT DISCHARGE LICENSE

License No: NEMA/WQ/EDL/2593

Application Reference No: NEMA/WQ/EDA/1561

OFFICIAL USE:

This is to certify that the application for discharge to aquatic environment received from (name of applicant)

Sukari Industries Limited of **P.O. Box 237 - 40302, Ndhiwa**

(address) to the National Environmental Authority in accordance with the Environmental Management and Co-ordination (Water Quality) Regulations, 2006 for **waste water Treatment system**

(facility) located at **West Nyokal/Kanyikela, Ndhiwa, Homabay County** (locality and district) to

discharge effluent to **River Kuja** has been evaluated and a license is hereby issued for discharge, subject to attached conditions.

This license is valid for a period of **Twelve (12) Months**.

Renewal: **27th February, 2016**

Expiry date: **2/26/2017**

Dated: **3/17/2016**

Signature

(Seal)
Director-General

The National Environment Management Authority.

P. I. O.



FORM II



FORM NEMA /WM/2

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
LICENCE TO TRANSPORT WASTE
(r.7)

Licence No. TR/HW 005284

Name SUKARI INDUSTRIES LIMITED

Address P.O. BOX 237-40300 NDHIWA

Address RIAT, NDHIWA

You are hereby licenced to transport waste to:
I.R.NO, WEST NYOKAL/KANYIKELA/290&1550 RIAT AREA NDHIWA

from SUKARI INDUSTRIES LIMITED
(Location/district)

Type and registration number of vehicle licenced KBV 402X FAW TRUCK, 15 TONS
(Location/district)

This licence is valid from 15TH DECEMBER 20 16

to 14TH DECEMBER 20 17

This licence is granted subject to the following conditions:

SEE OVERLEAF

Date: 15TH DEC 2016

Signature: 



for Director General
National Environment Management Authority



FORM II



FORM NEMA /WM/2

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
LICENCE TO TRANSPORT WASTE
(r.7)

Licence No. TR/HW 006286
Name SUKARI INDUSTRIES LIMITED
Address P.O. BOX 237-40300 NDHIWA
RIAT, NDHIWA


You are hereby licenced to transport waste to:
LR.NO. WEST NYOKAL/KANYIKELA/796&1559 RIAT AREA NDHIWA

from SUKARI INDUSTRIES LIMITED
(Location/district)

Type and registration number of vehicle licenced KUN 750V, TATA 15 TONNES
(Location/district)

This licence is valid from 15TH DECEMBER 2016
to 14TH DECEMBER 2017

This licence is granted subject to the following conditions:
SEE OVERLEAF

Date: 15TH DEC 2016 Signature 



Dr Director General
National Environment Management Authority



FORM II



FORM NEMA /WM/2

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
 THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
 LICENCE TO TRANSPORT WASTE
 (r.7)

Licence No. TR/HW 006285
 Name SUKARI INDUSTRIES LIMITED
 Address P.O. BOX 237-40300 NDHIWA
RIAT, NDHIWA

You are hereby licenced to transport waste to:
L.R.NO. WEST NYOKAL/KANYIKELA/290&1557 RIAT AREA NDHIWA

from SUKARI INDUSTRIES LIMITED
 (Location/district)

Type and registration number of vehicle licenced KTCB 812E MAHINDRA TRACTOR
 (Location/district)

This licence is valid from 15TH DECEMBER 2016
 to 14TH DECEMBER 2017

This licence is granted subject to the following conditions:
SEE OVERLEAF

Date: 15TH DEC 2016 Signature 



Director General
 National Environment Management Authority



FORM II



FORM NEMA /WM/2

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
LICENCE TO TRANSPORT WASTE
(r.7)

Licence No. TR/HW SUKARI INDUSTRIES LIMITED
Name P.O. BOX 237-40300 NDHIWA
Address RIAT, NDHIWA

You are hereby licenced to transport waste to ROMA BAY EFFLUENT TREATMENT PLANT (ETP)

from SUKARI INDUSTRIES LIMITED
(Location/district)
Type and registration number of vehicle licenced KTCB 917J MAHINDRA TRACTOR
(Location/district)

This licence is valid from 15TH DECEMBER 20 16
to 14TH DECEMBER 20 17

This licence is granted subject to the following conditions:

SEE OVERLEAF

Date: 15TH DEC 2016

Signature

Director General
National Environment Management Authority





LAKE VICTORIA SOUTH WATER SERVICES BOARD

TITLE: Waste Water Sample Analytical Certificate for waste water analysis- Results	REF NO:285-287/2016
	ISSUE NO:1
DEPARTMENT: Technical	REV.NO:0
ISSUED BY: CHEMIST	DATE OF ISSUE:11/07/2016
AUTHORISED BY: CHEMIST	Page: 1

Serial No. 285-287
 Name of Customer: Sukari sugar industry
 Purpose of Sampling : Waste water Quality Assessment
 Date Sampled: 06/07/2016.
 Source: upstream, downstream and effluent.
 Date Compiled: 11/07/2016

Sample No: 285-287
 Address:
 County: Homabay county
 Date Received: 06/07/2016

Parameters	UNITS	NEMA STANDARDS FOR DISCHARGE TO SURFACE WATER	upstream	downstream	effluent	REMARKS
PH	PH SCALE	6.0-8.5	7.6	7.6	8.2	Complied
CONDUCTIVITY	µs/cm	Max 2000	101	116	504	complied
TDS	Mg/L	Max 1200	51	57	252	complied
COD	MgO ₂ /L	Max 50	32.0	46.0	49.0	complied
BOD	MgO ₂ /L	Max 30	12	15	13	complied
TEMPERATURE	°C	20-29	21.7	22.0	21.8	complied
TSS	Mg/L	Max 30	18.3	21.0	1.14	complied
Oil and grease	Mg/L	Max NIL	Nil	Nil	Nil	complied
NH ₄ ⁺	Mg/L	Max 4	1.04	2.00	0.98	complied

Name of Analyst: ALEX CHALE

Signature

COMMENTS BY HEAD OF LABORATORY:

The water samples are safe to be discharged to the environment.

GEORGE AGENG'O
 CHEMIST LVSWB

Signature

11/07/2016

LAKE VICTORIA SOUTH WATER SERVICES BOARD
 P. O. Box 3325, KISUMU.

DATE:

The Chief Executive Officer,
Water Resources Management Authority,
P.O.Box 45250-00100,
Nairobi.



Form: WRMA 010
Catchment: Lake Victoria South (LVS)
WRMA ID: WRMA\12\00305
File: WRMA\12\KSI\1HG\18\5

Water Resources Management Authority WATER PERMIT

(Rule 38)

By virtue of the authority vested in us by the Water Act 2002, we, the Water Resources Management Authority, do hereby grant unto (name) SUKARI INDUSTRIES LIMITED, hereinafter called the permit holder, or his/her/their executors, Administrators and assigns permission to use water in accordance with them details contained herein, subject to the provisions of the Water Act 2002, and the Rules thereunder, and the conditions following hereafter and endorsed hereon and attached hereto: -

Permit No. P	WRMA/12/KSI/1HG/18/5				Permit Expiry Date	13-November-2017		
Type Of Water use	Surface water				Ground Water		Effluent discharge	Swamp Drainage
	Diversion	Abstraction	In-stream Works	Storage	Shallow Well	BoreHole		
Tick Box		X						

PARTICULARS OF PERMIT HOLDER		DETAILS	
1. Full name of applicant(s) (In Block letters)		SUKARI INDUSTRIES LIMITED	
2. Category of Applicant - Individual, Group (Association, Society), Company, Institution		Company	
4. (i) Number of Applicant (Individual) or Certificate of Incorporation or Registration for Groups or Companies		CPR/2009/6818	
5. PIN Number (where available)		P061305483M	
Physical Address where water is to be used			
6. L/R Number(s)	1511	7. Box Number	P.o box 237
8. Villages/Ward(s)	KANYIKELA	9. Town	Nchiwa
10. Sub-location(s)	KAMENYA	11. Post Code	40302
12. Location(s)	KOCHIA/EAST	13. Telephone Contact (Landline)	0727924440
14. Division(s)	RANGWE	15. Telephone Contact (Mobile)	0727924440
16. District(s)	HOWA BAY	17. Email Contact	-

WATER RESOURCE DETAILS	
17. Name of Body of Water or Aquifer where water is to be diverted, abstracted or stored	GUCHA RIVER
18. Is the point of abstraction or storage in a Protected Area or a Groundwater Conservation Area? (yes/no)	NO
19. Sub-catchment Number	1HG
20. Class of Water Resource	
21. Name of Body of Water or Aquifer where effluent is to be discharged	
22. Sub-catchment Number (Effluent)	
23. Class of Water Resource (Effluent)	
24. Category of Application (Class of Permit)	C