

ENVIRONMENTAL IMPACT ASSESSMENT

FULL STUDY REPORT

FOR THE PROPOSED

CENTUM'S TUMAINI AGRI BUSINESS FARM PROJECT



**On LR. NO: NYANDARUA / MATINDIRI SETTLEMENT SCHEME / 1398 &
123.**

PROPONENT:

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P.O. Box 10518-00100,

Nairobi.

NEMA / PR/ 5/2/ 15438

September '2016

DOCUMENT AUTHENTICATION

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LIST OF ABBREVIATIONS

$^{\circ}\text{C}$ - Degrees Celsius

CO^2 - Carbon dioxide

EA - Environmental Audit

EIA - Environmental Impact Assessment

EMCA- Environmental Management and Coordination Act

EMP - Environmental Management and Monitoring Plan

KFS - Kenya Forest Service

Km^2 - Square kilometers

L. R. No. Land Registration Number

NEAP - National Environment Action Plan

NEC- National Environmental Council

NEMA- National Environment Management Authority

NMK- National Museums of Kenya

OSHA - Occupational Health and Safety Act

PPE- Personal Protective Equipment

SOX - Sulphur Oxides

TOR - Terms of Reference

TSP-Total Suspended Particulates

WHO- World Health Organization

LIST OF TERMS

Environment	Includes surroundings of human beings e.g. Land, water, atmosphere, climate, air, people, animals etc.
Environmental Impact Assessment	A systematic examination conducted to determine a project's impacts on the environment – whether positive or negative.
Proponent	A person proposing or executing a project, programme or undertakings specified in the Second schedule of EMCA-In this case he is the owner of the project.
Lead expert	A person licensed by the authority to conduct EIA.

EXECUTIVE SUMMARY

The acquisition of an Environmental Impact Assessment (EIA) license is a requisite under section 58 of the Environmental Management and Coordination Act (EMCA), 1999 which stipulates that a proponent must seek an Environmental Impact Assessment (EIA) license “notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya” This requirement applies to all projects listed in the Second Schedule of the Act.

An Environmental Impact Assessment (EIA) project report was prepared following a study by NEMA registered EIA/EA experts at the request of the proponent in accordance with the Environmental Management and Coordination Act (EMCA), 1999 which specifies projects or activities that must be subjected to Environmental Impact Assessments (EIAs) and also in compliance with Environmental (Impact Assessment and Audit) Regulations 2003.

The report reference no. **NEMA / PR / 5 / 2 / 15438** was submitted in March 2016 and NEMA Proposed that a full study EIA be conducted so as to allow for a wider public participation. The terms of reference for the study report were done and approved in July 2016.

The purpose of Environmental Impact Assessment (EIA) is to identify potential positive and negative environmental impacts associated with a proposed project and its activities and thus provide recommendations on how to take advantage of the positive impacts on one hand and how to mitigate the negative environmental impacts on the other hand. This Environmental Impact Assessment (EIA) was done for the proposed farm on Land Registration No. NYANDARUA / MATINDIRI SETTLEMENT SCHEME / 1398 & 123 at the Tumaini area of Olkalou in Nyandarua County.

The proposed project has the objective of developing a modern farm for agribusiness, comprising of the following; green houses for horticultural farming, pack house, offices, an EPZ section for export processing, some earth dams, a septic tank to handle liquid waste, a garage with an oil interceptor, a composting area to handle organic waste, earth roads among others. The buildings in the farm will be constructed to accredited standards with approved building designs, quality materials and best practices. The proposed project is expected to cost approximately Ksh 100 000 000 (one hundred million). The study was done within the study limitations and resources available.

The EIA team carried out the assessment using a combination of methods including site inspection and interviews with the neighbors, project proponent and contracted Engineers. Existing literature on statutory and other requirements was also reviewed. Reference was made from documents relating to the proposed project including land ownership documents, structural and architectural plans for the proposed project.

The main project activities include the following:

a) Clearing and preparation of the project site; b) Construction of proposed buildings and other structures; c) Construction of local access roads, parking, walkways and drive ways; d) Installation of utilities (water, drainage among others); e) construction of septic tank, a garage for servicing machinery, f) electrical wiring & plumbing works g) cultivation of the farm and construction of the green houses and earth dams, h) Furnishing of the finished buildings with necessary equipment; i) laying of drip lines for drip irrigation, j) Export processing, j) Recruitment of staff; and h) Site landscaping and building finishing.

The Environmental Impact Assessment (EIA) identified specific areas of concern that could be affected by the implementation of the proposed project in all the three phases; construction, operation and decommissioning and proposed mitigation measures for these impacts. During the assessment, alternatives to the proposed site and project were identified. An Environmental Management and Monitoring Plan (EMP) have been provided in this report.

Below is a summary of potential environmental impacts associated with the proposed project and a brief description of their mitigation measures:

Table 1: Summary of potential negative environmental impacts

Potential Negative Environmental	Mitigation Measures
1. Disruption of existing natural environment and modification of micro-climate – <ul style="list-style-type: none"> • Increased development density • Increased glare/solar reflection • Reduced natural ground cover 	-Development to be restricted to approved density, building line, land coverage and land ratio -Careful layout and orientation of structures to respect wind and sun direction -Adequate provision of green and open space planted with grass, shrub and tree cover -Minimum use of reflective building material and finishes for roof, walls and pavements

<ul style="list-style-type: none"> • Obstruction of ventilating wind • Increased surface run-off 	<p>-The flow of underground water to be harmonized and directed to well-designed drainage channels.</p>
<p>2. Pollution and Health hazards</p> <ul style="list-style-type: none"> • Dust and other waste • Noise generation from construction and transportation activities 	<p>-Dumping down of site e.g. sprinkling water to dusty areas during site preparation & construction and operation</p> <p>-Containment of noisy operations, including locating noise operations away from sensitive neighborhoods</p> <p>-Limit construction work to day time only</p> <p>-Construction work to take shortest time possible</p> <p>-Ensure adequate height so as to prevent concentration of emissions at the ground</p> <p>-Regular management of waste</p>
<p>3. Increased loading on infrastructure services</p> <ul style="list-style-type: none"> • Increased vehicular and/or pedestrian traffic • Increased demand on utilities and services • Increased surface run-off 	<p>-Have paved local access road and walkway system</p> <p>-Encourage rainwater harvesting</p> <p>-Provide adequate storm water drainage system</p> <p>-Frequent checks and proper maintenance of existing infrastructure</p>
<p>4. Worker accidents and health Effects</p>	<p>-Employ skilled and trained workers</p> <p>-Provide personal protective equipment</p> <p>-Prepare clear work schedule and the organization plan</p> <p>-Ensure adequate worker insurance cover</p> <p>-Enforce occupational health and safety standards</p>
<p>5. Increased population and social conflicts</p>	<p>-Encourage formation of community policing and neighborhood associations</p> <p>-Increase economic activities which will also increase employment opportunities, income earnings and market capital stock formation</p>
<p>6. Impacts on vegetation (felling of trees and removal of grass)</p>	<p>-clear trees only on areas to be occupied by the farm, leave 15% of the land under tree cover and encourage planting of indigenous trees where possible.</p> <p>-replant grass on the lawns around the offices and pack house to</p>

	improve the aesthetic appeal of the farm upon operation
7. Impacts on culture and traditions from influx of new people coming to work on the farm	<ul style="list-style-type: none"> -sensitize the local community to maintain their culture and -sensitize the immigrants to respect the culture of the local people
8. impact on Soil pollution and erosion	<ul style="list-style-type: none"> -put in place soil conservation measures and best farming practices. -reduce to the bare minimum any incidences of soil contamination -regulate the use of artificial fertilizers and where applicable use organic manure -ensure controlled and efficient use of agricultural chemicals
9. Impact on water resources (increased demand for water)	<ul style="list-style-type: none"> -sensitize all workers on the need for water conservation, -install water meters to monitor the use of water, -put in place measures for water recycling where applicable. -harvest rainwater to supplement the proposed water supply -get authorization from WRMA and stick to the authorized water use per day.

We have provided the proponent of the proposed project with adequate guidelines to enable him follow the laid down regulations, standards, laws and structural drawings as designed and approved by the relevant authorities and professionals respectively. Other laws governing the operations of the farm are to be adhered to the letter.

Our conclusion is that the project is important for economic development of the proposed area as it will provide employment to people living in the vicinity of the proposed farm.

We have given adequate measures to mitigate the negative impacts and proposed an environmental monitoring and management plan for the proponent to adhere to.

We therefore recommended that the proposed project be approved subject to the adherence of recommendations given in this report.

CHAPTER ONE: INTRODUCTION

1.1 Background

The proponent, Green blade growers limited a subsidiary of **Centum Investment Company Limited** is a locally incorporated company. They propose to establish a modern farm for the production of horticultural produce to be sold locally and also for export. The project will be located in the Tumaini area of Olkalou Sub County of Nyandarua County on Land Registration No. NYANDARUA / MATINDIRI SETTLEMENT SCHEME / 1398 & 123.

With the devolution taking place in Kenya, most counties are highlighting their outstanding features that can attract investors. Nyandarua County government has identified irrigation farming as a potential alternative to rain fed agriculture that could generate income for the county and the central government. The farm is strategically located and on fertile land, with fairly good access road so as to ensure the produce reaches the market in time.

The farm will among others have the following; green houses, an export processing zone, pack house, offices, car park, garage, earth dams and a weir to store water, pump houses, perimeter electric fence, toilets, septic tank, composting pits and *a borehole for water supply*.

EIA is a systematic analysis of projects, policies, plans or programmes to determine their potential environmental impacts, the significance of such impacts and to propose measures to mitigate the negative ones. The underlying key principles of EIA are that every person is entitled to a clean and healthy environment and that every person has a duty to enhance and safeguard the environment as provided for by the Environmental Management and Coordination Act, 1999 and our constitution.

EIA is both a planning and decision-making tool. As a planning tool, EIA presents methodologies and techniques for identifying, predicting and evaluating potential environmental impacts of projects, policies, plans and programmes in the project cycle (planning, implementation, operation and decommissioning phases).

The EIA process presents decision-makers with the information necessary to determine whether or not a project should be implemented.

1.2 Objectives of the EIA

The overall objective of EIA is to ensure that environmental concerns are integrated in all development activities in order to contribute to sustainable development. The specific objectives of conducting Environment Impact Assessment study with respect to the proposed project were to:

- Examine in detail likely adverse environmental aspects and associated impacts
- Propose appropriate mitigation measures for the significant negative impacts and
- Develop an Environmental Management Plan with mechanisms for monitoring and evaluating compliance and environmental performance.

1.3 Scope of the project

This full EIA project report was prepared as per the guidelines provided under the Environmental (Impact Assessment and Audit) regulations, 2003. The guidelines provide that the EIA study report has to capture the following salient features:

- a) Name of the proponent, address and contact person
- b) Title of the project
- c) Objectives and scope of the project
- (d) Nature of the project;
- (e) Location of the proposed project, including the physical area that may be affected by the project's activities;
- (f) Types of activities that will be undertaken during the project implementation, operation and decommissioning phases;
- (g) Design(s) of the project;
- (h) Materials to be used, products and by-products, including waste to be generated by the project and the method(s) of disposal;
- i) Potential environmental impacts of the project;

- (j) Mitigation measures to be taken during and after implementation of the project;
- (k) An action plan for the prevention & management of foreseeable accidents during the project cycle;
- (l) A plan to ensure the health and safety of the workers, and neighboring communities;
- (m) Economic and social benefits to the local community and the nation in general;
- (n) Project budget;
- (o) Views of the public about the project, indicating representativeness of the potentially affected people; and
- (p) An environmental management plan (EMP) for the entire project cycle.

1.4 EIA study Methodology

The EIA study process entailed the following steps: *A meeting with the proponents and the project Consultant, Site visit and meeting with the local community and Pinning of a notice at the site. Desk top study of literature materials pertinent to the proposed project and its location. Field visits to collect baseline information through direct observations and interviews with the relevant stakeholders & Preparation of the EIA study report as per the guidelines issued by NEMA.*

1.5 Terms of References

The terms of reference were, but not limited to:

- *A critical look into the proposed project objectives,*
- *Assessment of the proposed location of the project,*
- *A description of the baseline information,*
- *National environmental legislative & regulatory framework and any other relevant legislation related to the project,*
- *Evaluation of the technology, procedures and processes to be used by the project,*
- *Evaluation of the materials to be used in the implementation and operation of the project,*

- Description, evaluation and analysis of the foreseeable potential environmental effects of the project classified as physical, ecological / biological social and economic aspects (direct, indirect, cumulative, irreversible, short and long term effects anticipated,*
- Evaluation of wastes to be generated by the project both during implementation and operation phase of the project,*
- To propose / recommend a specific environmentally sound and affordable waste management system,*
- Evaluation and analysis of alternatives including the proposed project, no project alternative, project site, design and technologies,*
- An environmental management plan (EMP), proposing the measures for eliminating/ minimizing or mitigating adverse impacts on the environment,*
- Propose measures to prevent health & safety hazards & to ensure security in the working environment for the employees & the management in the case of emergencies. This entails prevention & management of foreseeable accidents & hazards during the implementation & operation phases of the project and*
- such other matters as NEMA may require.*

CHAPTER TWO: PROJECT DESCRIPTION

2.1 Project Location

The project is located about 8km from Tumaini Shopping center, branching off to the left from the Nakuru-Olkalou Road right at Tumaini shopping center. The proposed farm is on Land registration Nyandarua / Matindiri Settlement Scheme / 1398 & 123 in Nyandarua County. The site is located on GPS coordinates UTM S 00. 19931°, E 036.26511° at an altitude of 2757 masl.

2.2 Components of the Proposed Project

The project will comprise different components at various stages viz:

Before the main project commences the following will have to be put up;

- i. A site office: to be constructed within the site for use by the contractors and the resident manager. The office will have the drawings, approvals of structures, staff register, procedures, records etc. There will be portable water for the operatives.
- ii. A store-This will be used for storing equipment, lubricants, construction materials such as cement and the PPEs.
- iii. Sanitary facilities-These will be for use by the operatives. This will include latrines and a bathroom.
- iv. Access road.
- v. An electric fence -To keep off potential intruders.

Other components of the project will include;

- Green houses on the whole farm
- Earth dams for storing water
- Laying of drip irrigation pipes on the farm
- An EPZ section for processing farm produce for export from the farm
- A septic tank and a constructed wetland to hold and treat waste water and sewage.

-A composting section to handle biodegradable /organic waste

-Water pumps and pump houses

-a flow tank

-Offices, stores, pack house, car park, garage among others

2.3 Project Designs:

2.3.1. General Considerations:

The design considerations incorporate aspects of modern architecture, the current local government building policy guidelines and the latest standards developed by Kenya Bureau of Standards including:

1. Ventilation: The design caters for natural ventilation with features that encourage natural air circulation (including use of permanent air vents above all doors and windows). The windows will be used to aid air circulation.

2. Lighting: The design caters for various types of energy efficient luminaries including energy saving fluorescent lamps and natural lighting through glass windows and doors as appropriate for both security and lighting.

3. Sanitary facilities: The number of toilets and hand wash basins has been selected according to guidelines in BS 6465.

4. Liquid waste management; Sewage will be drained into a septic tank.

5 Water supply: there is abundant safe drinking water in the proposed area.

Sustainable resource use: The design of the development incorporates landscaped gardens which will be planted with suitable species of trees / shrubs and grass to prevent ecological deterioration and improve aesthetic value of the site.

6. Solid waste management: The management will contract a waste handler for proper disposal of sensitive non-biodegradable waste e.g. plastics and metallic containers, sanitary towels etc. However most of the biodegradable solid waste shall be composted and used on the farm.

7. Fire protections: The design of the proposed developments incorporates firefighting equipment to be installed in each building and other likely sources of ignition.

Upon completion the farm will have green houses, offices, pack house, an EPZ zone for exportation of produce from the farm, roads, earth dams to store water, pumps and pump houses, car park, garage, septic tank, electricity from the main grid and a standby generator, there will be a borehole to supply water, staff houses, sanitary facilities, waste treatment plant among others.

2.3.2 Project Output

The output of the proposed developments will be a modern irrigated farm as described in chapter one above.

2.4 Project Activities

The project as proposed will have various activities being carried out, these include but not limited to:

- Clearing of the vegetation on the site (these include the planted cypress trees currently on site and grasses) and uprooting of all the tree stumps and transportation of the same to a central place to be used later as wood fuel.



Some of the uprooted stumps to be used as fire wood.

Some of the cypress trees cleared by the project.



- Drilling of a borehole and test pumping (already done)
- Ground leveling and earth moving and excavations for the construction works of the site office and the proposed offices and pack house.



Some excavations and the site office at the background.

- Transportation of construction materials
- Landscaping, paving and fittings of finishes and other utilities in the facilities of the farm
- Construction of a septic tank



The proposed septic tank

parts of the farm already cultivated with electric fence in place

- Cultivation and harrowing of the farm
- Export processing
- Electric perimeter fencing
- Laying of drip pipes for the drip irrigation
- Construction of green houses
- Planting of the proposed produce

2.5 Project Justification

The land is currently underutilized and it is suitable for agriculture. The proposed project would make the land profitable to the owner and also help create employment to the youth and earn the government income through various taxes. The need to enhance our ability to be food secure.

2.6 Project Cost

The project is estimated to cost about 100, 000, 000 (one hundred million) Kenya Shillings thus the NEMA fee at 0.1 % of the project cost is Ksh 100 000 (one hundred thousand).

CHAPTER THREE: BASELINE INFORMATION

3.1 Introduction

Nyandarua County is a County in the former Central Province of Kenya. Its capital and largest town is Ol Kalou. Formerly the capital was Nyahururu, which is now part of the Laikipia County. Nyandarua County has population of 596,268 and an area of 3,304 km². The county is located on the northwestern part of the old Central Province, and contains the Aberdare Ranges. The county was split into two in 2007: Nyandarua North District and Nyandarua South District. However with the promulgation in 2010 of new constitution, these have been re-organised as sub counties of Nyandarua County.

3.2 Rainfall and temperature

Rainfall in Nyandarua decreases from east to west. Areas close to the aberdare ranges receive high rainfall ranging between 1,000mm to 1,400mm and decreases on plateaus. The amount received in the plateau is too minimal to support meaningful agriculture i.e. maximum of 400mm. The rainfall pattern is varied and falls in two peak seasons. Long rains start in March to May while short rains are received between September and December. The rainfall intensify varies according to the location. Areas near Aberdare slopes receive sufficient rainfall with the plateau receiving scanty erratic rainfall. Kinangop plateau has two rain seasons with sufficient rainfall that can least be compared with the Ol Kalou and Ol Joro Orok plateau.

The County has moderate temperatures. The highest temperatures are recorded in the month of December, when the mean average is 21oC and the lowest temperature is recorded in the month of July, with a mean average of 7.1oC. The area also experiences temperatures with adverse effects. The cold air that is generated during clear nights on the moorlands of Nyandarua Ranges flows down the Kinangop Plateau and Ol kalou Salient causing night frost nearly every month making cultivation of maize too hazardous. The valleys west of the plateau occasionally provide outlet of the stream of cold air. The temperatures range between 1.2oC to 10oC. The low temperatures last some few hours before sunrise.

3.3 Vegetation & soils

The proposed site is vegetated with kikuyu grass and stands of planted cypress trees which will be cleared for the implementation of the project. The area has red volcanic soil ideal for

agriculture and it is also slightly sloppy so drainage of storm water will be efficient.

3.4 Economic Environment

In Nyandarua, about 75% of household income comes from agriculture, 5% of household income from rural self-employment, and 10% of the household income from urban-self employment. The average farm size for small-scale farmers in the County is 3.05 ha. Large-scale farmers have an average farm size of 100ha. The main food crops produced are maize, wheat, beans, peas, potatoes, cabbages, carrots, kale's, onion and tomatoes. The main cash crops produced are wheat, pyrethrum, and cut flowers. The total acreage under food crops is 45,000ha. The population working in the agricultural sector is more than 380,000 (72%). The County generally has 1 ranch, with a size of 300ha. The main livestock bred are cattle, goats, sheep and chicken. The land carrying capacity of the County is 2 livestock units/ha. The population working in the livestock sector is about 304,000.

3.5 Infrastructure

Transport infrastructure in the area is fair. The County has bitumen road of 141km, gravel road of 192km and earth road of 671km. This clearly indicates that a large percentage of the roads in the County are earth roads. The County also has a railway line of 70km, with stations. There is only one airstrip. The status of road infrastructure in the County is not up to standard and this justifies the need for more improvement. There is need to tarmac the roads and build more airstrips to facilitate trade especially that of cut-flowers and other cash crops.

Power infrastructure in the area is still poor with only 10,000 households with electricity connection. This does not augur well especially for the production sensitive crops such as cut flowers.

3.5 Wetlands

The proposed project site borders a small permanent river known as river Kiriundu from where a weir will be constructed to provide some irrigation water to supplement the existing borehole.

CHAPTER FOUR: LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

The Environmental Impact Assessment is a useful tool for protection of the environment from the negative effects of development activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition of the Kenya Government for developers to conduct Environmental Impact Assessment on the development projects.

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations, 2003 (Legal Notice No. 101), construction of buildings require an Environmental Impact Assessment project report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual licensing before the development commences. This is necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

4.2 Policy Framework

Environmental Impact Assessment (EIA) is a tool used to identify the actual and probable impacts of the projects on the environment and to recommend alternatives and mitigation measures. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. The National EIA regulations were issued in accordance with the provisions of Environmental Management and Co-ordination Act (EMCA) of 1999.

The EIA Regulations must be administered, taking into cognizance provisions of EMC A 1999 and other relevant national laws. The intention is to approve and license only those projects that take into consideration all aspects of concern to the public as they impact on health and the quality of the environment.

4.2.1 National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in mid 1990s: It was a deliberate policy effort to integrate environmental considerations into the country's economic and social development. The integration

process was to be achieved through a multi-sectored approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of societal decision-making.

4.3 Environmental Legal Framework

4.3.1 Environmental Management and Co-ordination Act No. 8 of 1999

This project report has been undertaken in accordance with the Environment (Impact Assessment and Audit) regulations 2003, which operationalizes the Environment Management and Coordination Act, 1999. The report is prepared in accordance with the second schedule of the environmental management and Coordination Act no. 8 of 1999 and the Environmental Impact Assessment and Audit Regulations 2003 regulation 7(1). Part II of the said act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. In order to achieve the goal of a clean Environment for all, new projects listed under the second schedule of Section 58 of EMCA No. 8 of 1999 shall undergo an Environmental Impact Assessment. This includes development activities such as this study project report. In addition to the legal compliance above, the following legal aspects have also been undertaken into consideration.

4.3.2 Public Health Act (Cap 242)

Part IX section 115 of the Act states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that local Authorities take all lawful necessary and reasonable practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to injuries or dangerous to human health.

4.3.3 Physical Planning Act, 1996(Cap 286)

The said Act section 29 empowers the local Authorities to reserve and maintain all land planned for certain uses e.g. riparian land, cemetery, roads, electricity networks etc. The same section allows for prohibition or control of the use and development of an area reserved for such use. Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local Authority. This Act makes provision for

the preparation and implementation of physical development plans to be approved by the relevant council.

4.3.4 Land Administration Act

In Kenya, there are various Acts of Parliament that govern land administration for various land tenure system. These Acts include Land Adjudication Act, Land Registration Act and other Acts regulating different tenure systems.

4.3.5 Water Act, 2002

The Act provides for the management, conservation, use and control water resources and for the acquisition and regulations of rights to use water and for the regulation and management of water supply and sewage services among other things. The Act also provides for the establishment, powers and functions of water management resources authority. It further provides for the application of permits and licenses under the Act to be accompanied by an EIA report done under EMCA, 1999. It requires that no person shall discharge into the sewers or aquatic environment without a license or permit.

4.3.6 Penal Code Act (Cap.63)

Section 191 of the penal code states that if any person or institution voluntarily corrupts or foils water for public springs or reservoirs, rendering it less suitable for its ordinary use shall be guilty of an offence. Section 192 of the same Act says a person who vitiates the atmosphere in any place to make it noxious to health of person's institution, dwelling or business premises in the neighborhood or those passing along public way, commits an offence.

4.3.7 Local Government Act (cap265)

The Act commenced on 30th April 1963 and provides for the establishment of authorities of the local government and to define their functions among other things. These local authorities may manage and let land besides regulating and licensing trade activities including construction in their areas of jurisdiction besides provision and maintenance of roads, footways, street lighting and sewerage in their areas.

4.3.8 The Building Code 2000

Section 194 requires that where a sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and that all wastewater must be

4.3.9 Forest Act, 2005

The Forest Act, 2005 was enacted in November 2005 to repeal the Forest Act, Cap 385. The Act provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources so as to enhance their role in the stabilization of soils, ground water, protecting water catchments, moderating climate by absorbing greenhouse gases, provide the main locus of Kenya's biological diversity and a major habitat for wildlife. Its provisions apply to all forests and woodlands on state, local authority and private land of the country declared as provisional forest by the Minister. The administration of forests is headed by the established Kenya Forest Service managed by a board, regional forest conservation committees work under and community participation is integrated through forest community associations and forest user associations. The Act also establishes the forest management and conservation fund headed by a finance committee. The Act requires formulation of forest management plans for use in management of state, local and provisional forests, joint management of forests is allowed but governed by management agreement with the forest service. Indigenous forests and woodlands shall be managed on a sustainable basis and presidential decree for protection of trees can be issued. Variation of forest boundaries or revocation of state or local authority forests and state forest concession are subject to an independent EIA and public consultation. Director of Kenya Forest Service (KFS) is required to maintain register of all licenses issued under the Act. Provisions of part VI and part XII of EMCA'99 shall apply mutatis mutandis to and in respect of a license under this Act and any EIA as well as reference to the National Environment Tribunal required under this Act. The provisions of EMCA'99 regarding reference to the Tribunal established under that Act shall apply to the settlement of disputes arising under Forest Act, 2005. Offences under the Act are punishable under the law and citizens can petition High court for a declaration of contravention of the Act provisions. Thus the Act directs, regulates and harmonizes development and use of forests in the country. In addition, the Act provides a vital link with the Environment Management and Coordination Act.

4.3.10 The Malaria Prevention Act Cap 246

Section 5 – Drainage System-No operations shall obstruct flow of water into or out of any drainage. The management shall be required to maintain the drainage system within the area of the project for removal of water from any land around the project to prevent larvae breeding.

4.3.11 Occupational Health and Safety Act

This legislation provides for protection of workers during construction and operation phases. It is tailored at implementation of the EHS plan in compliance with the relevant sections of this Act.

Subsection 17 - Drainage of floors-Where any process is carried on which renders the floor liable to be wet to such an extent that the wet is capable of being removed by drainage; effective means shall be provided and maintained for draining off the wet.

Subsection 18 - Sanitary conveniences-Sufficient and suitable sanitary conveniences for persons employed in the factory/ work places shall be provided, maintained and kept clean, and effective provision shall be made for lighting the conveniences and where persons of both sexes are, such conveniences shall afford proper separate accommodation for persons of each sex.

4.3.12 Land Control Act, Cap. 302

The proposed project will be carried out on private land. It is worth noting that the Government can compulsorily acquire private land for public interest.

4.3.13 National Construction Authority Act 2011.

The national construction act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contactors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they satisfy they are in Kenya for that specific time. The foreign contractors must also produce a certificate of compliance. Furthermore they must lodge an affidavit with the NCA that once the project they have been licensed is over, they shall wind up their business. This prevents them from engaging in any other construction in the country.

4.3.14 The Agriculture Act CAP 318

This is the principle law governing agricultural production in Kenya and the proponent must adhere to all the provisions of this Act in his day to day operations.

4. 3. 15 Employment Act (Cap. 226);

The proponent needs to comply with the provisions of this Act, it is the principle law governing the relationship between employer and employees in the country.

4.3.16 Wildlife Conservation & Management Act Cap 376 (Amended, 2010)

The Act and its related amendments regulate wildlife conservation within the country. The Act also created the Kenya Wildlife Service in 1997 and gives the agency the power to oversee the establishment and management of the Parks and reserves in Kenya and undertake to protect the fauna and flora within the National parks including entering into agreements with organizations of person to ensure that wildlife corridors continue to be provided for migration of wild- life. Alienation of any park can only be undertaken by a resolution from parliament. The Act gives KWS the powers to maintain an armed wing and pro-vides the sweeping powers for the organization to enter into premise search and arrest anybody handling live or dead animal or part of animal and prosecute in a court of law.

4.3.17. The Lakes and Rivers Act (Cap 409)

The proponent will adhere to the provisions of the above Act which guides the use of river water and other water bodies.

4.4.1 County and Sub county Environment Committees

According to EMC A, 1999, the Minister by notice in the gazette appoints County and sub county Environment Committees of the Authority in respect of every county and sub county respectively.

4.4.2 County Environment Committee

County Environment Committees are responsible for the proper management of the environment within the county in respect of which they are appointed. They are also to perform such additional functions as are prescribed by the Act or as may, from time to time be assigned by the Minister by notice in the gazette. The decisions of these committees are legal and it is an offence not to implement them.

4.4.3 Public Complaints Committee

The Committee performs the following functions:

Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of

environmental degradation and to make a report of its findings together with its recommendations thereon to the Council.

Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) • To perform such other functions and exercise such powers as may be assigned to it by the Council.

4.4.4 National Environment Action Plan Committee

This Committee is responsible for the development of a 5-year Environment Action plan among other things. The National Environment Action Plan shall:

Contain an analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.

Contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity among other duties as the EMC A specifies.

4.4.5 Standards and Enforcement Review Committee

This is a technical Committee responsible for environmental standards formulation, methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures. Standards and Enforcement Review Committee consists of the members set out in the third schedule to the Environmental Management and Co-ordination Act. The Permanent Secretary under the Minister is the Chairman of the Standard and Enforcement Review Committee. The Director General appoints a Director of the Authority to be a member of the Standards and Enforcement Review Committee who is the Secretary to the committee and who provides secretarial services to the Committee. The Committee also regulates its own procedure.

The Standard and Enforcement Review Committee may co-opt any person to attend its meetings and a person so co-opted shall participate at the deliberations of the committee but shall have no vote.

4.4.6 National Environmental Tribunal

This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. The Tribunal hears appeals against the decisions of the Authority. Any aggrieved persons may proceed to the High Court.

4.4.7 National Environmental Council (NEC)

EMCA act of 1999 Part iii Section 4 outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for purposes of EMCA; set national goals and objectives and determines policies and priorities for the protection of the environment and promote co-operation among public departments, local authorities, private sector, nongovernmental organizations and such other organizations engaged in environmental protection programmes. It also performs such other functions as are assigned under EMCA.

CHAPTER FIVE: PROJECT ALTERNATIVES

The alternatives to the project are different ways to achieve the same purpose and need that the proposed project will achieve. EIAs require looking into alternatives to the proposed project in order to make prudent decisions. The following alternatives were carefully considered;

5.1 Alternative Site

Under this alternative, the proponent could consider purchasing or leasing land at a different site. An alternative site would also require; the identification of a suitable area, several million shillings for its purchase, preliminary site reports, professional consultation etc. All these have already been done for the current site. Adopting this alternative will delay the implementation of the proposed development or it might not even be attainable in the long term. In summary there is no reason yet identified of choosing an alternative site.

5.2 Alternative Use of Land

The proponent could also use the same land for another project e.g. residential housing, but considering the fact that the area is rural and not highly populated, the demand for commercial building will not enough to justify such an alternative. Besides the area is good for agriculture and has good soils thus the proposed project will make the land productive.

5.3 Alternative Designs and technologies

The proponent has already got his designs and plans approved with the necessary variations hence no need to adopt alternative designs as the ones proposed suffice for the project as it were. The proponent can opt to change the farming technology from irrigation to rain fed production, however, the erratic rainfall patterns make this alternative an unsuitable one, thus the proposed alternative of irrigated greenhouse agricultural production remains the best option.

5.4 No Action Alternative

This alternative describes a situation where the proposed development fails to be implemented. In case, positive impacts associated with the proposed developments will not accrue to the proponent and other people e.g. the development consultants, contractors and suppliers of materials and thus the economy of the nation will be retarded. However, from an environmental management perspective, this alternative will be beneficial in the sense that any potential negative impacts

associated with the project will be avoided. The “No Action Alternative” should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis.

CHAPTER SIX: CONSULTATION AND PUBLIC PARTICIPATION

6.1 Introduction

Section 58 of EMCA, 1999 and subsequent EIA/EA Regulations of 2003 requires any project to carry out environmental impact assessments for development proposals. According to EIA /EA Regulations, 2003 such studies have to incorporate consultation and public participation (CPP) process.

EIA process is largely determined by effective consultation and public participation (CPP) which basically provides a cornerstone for project planning and successful implementation. Consultation and Public participation helps to:

- i) Facilitate involvement and participation of affected persons throughout the project cycle.
- ii) Ensures a sense of responsibility and commitment towards implementing the proposed EMP.

CPP should be undertaken mainly during project planning, in implementation and decommissioning phases. It should involve the affected persons, lead agencies, private sector, among others. The methodology for CPP may include; *Meetings and technical workshops with affected communities, Questionnaires, Interviews, Notices*

It is the responsibility of the project proponent to adequately ensure effective distribution of the information to the affected persons to mitigate against unnecessary delays in decision making and project implementation.

6.2 Public Participation Process

The study team visited the site and pinned a notice at the site alerting the residents and neighbors about the proposed project. They were given fourteen days to respond. The team also visited the area community and held consultative meetings with them about the proposed project. The minutes of the meeting are annexed at the end of the previous report earlier submitted.

Further consultation was done through the use of questionnaires and annexed in the EIA report. Further public participation was held as required and photos and attendance list are annexed at the end of this report.

6.3 Public Consultation approach

6.3.1 Consultation with Interested and Affected Parties

The consultation process included to a large extent public consultation through barazas with the local people and interested and affected parties.

Questionnaires were administered and filled as annexed at the end of the EIA report.

6.3.2 The Content of the Questionnaire.

(a) Awareness about the proposed farm development project.

(b) Whether the proposed project development project will cause negative impacts on the following.

- Local residents
- Natural ecology of the area
- The human environment
- Public health and safety
- Effect on water resources and quality
- The soil Quality in the local area
- The areas of scenic beauty
- Road transport and related infrastructure
- Drainage of the area
- Any other comment.

6.3.3 The results of the consultation

The result of the consultation is that most of the respondents were aware of the proposed development and welcomed this development.

The overall conclusion from the interviews and analysis of the questionnaire led to determination of the following:

- The proposed development project is accepted by the interested and the affected parties (i.e. almost all of the respondents)
- The proposed project will benefit the general population of by providing the much-needed jobs and in the long run reduce dependency and poverty.
- Other industries in the area hope to enjoy joint development activities like maintenance of the roads, security etc.

Public participation process

Meeting with local residents-This meeting was held for five days as from Tuesday 1st March to 5th March' 2016 at the site.

Further meetings were held in August 22nd to 30th 2016 as required by NEMA for the full study and a list of attendees and photos are provided at the end of this project report.

Residents raised the following issues; *the proponent should consider the locals during employment. The proponent and the county government should facilitate the construction and staffing of a police post to curb potential increase in insecurity and the proponent should use his influence to have the access roads upgraded.*



Some members of the public involved in public participation for the project



Participants attending one of the barazas

The respondents however, did not object the project and were in agreement that it should be implemented but the proponent should consider employing people from the local area for jobs that do not need specialized skills before he brings other people in. put in place measures to curb insecurity.

Members of the public who participated in this public participation were so passionate about insecurity and how it needs to be addressed.

Below members of the Public attending another baraza



CHAPTER SEVEN: ENVIRONMENTAL IMPACTS IDENTIFICATION

7.1 Definition & Classification of Environmental Impacts

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be positive (beneficial) or negative (adverse). They may also be direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect. It is desirable that all the negative impacts be mitigated completely to eradicate or reduce their effects.

7.2 Impact Significance

The purpose of an EIA is, to identify the significant impacts related to the project or activity under consideration and then to determine the appropriate means to avoid or mitigate those which are negative, and if possible, enhance any positive effects resulting from the project.

Significant impacts are defined, not necessarily in order of importance, as being those that;

1. Are subject to legislative control;
2. Relate to protected areas or to historically and culturally important areas;
3. Are of public concern and importance;
4. Are determined as such by technically competent specialists;
5. Trigger subsequent secondary impacts;
6. Elevate the risk to life threatening circumstances; and
7. Affect sensitive environmental factors and parameters.

7.3 Anticipated Impacts

The development of the proposed farm in the proposed area will change both the biophysical and the socio-economic salient environmental features of the area. During the implementation, potential positive and negative environmental impacts are expected to arise from the implementation, operation and decommissioning phases.

7.3.1 Predicted positive impacts during implementation phase

Environmental impacts that might possibly emanate from implementation phase of the proposed Project are as shown below.

Creation of employment opportunities-Some people in the Project area and the neighboring areas will be employed to render both manual and skilled labor during the implementation of the proposed farm Project. As a result many will benefit from improved livelihood and increased income from employment in the farm.

Provision of market for construction materials-The project will require supply of materials for the construction of some of the facilities required in the farm such as the offices, park house, stores pump houses among others. Some of these construction materials will be sourced locally and from the surrounding areas. These include sand, stones, cement, hardcore, etc. This will provide a ready market for such construction material suppliers including hardware shops.

Increased revenue to the county and national government-the implementation of the project will lead to improved government revenue from the acquisition of statutory licenses.

7.3.2 Predicted negative impacts during implementation phase

The following negative impacts are associated with the implementation of the proposed Project.

Vegetation disturbance and destruction at the Proposed Project site-In the implementation phase, vegetation mainly grass and trees will be cleared to pave way for the proposed farm. The disturbance and destruction of vegetation in the site will negatively affect the biophysical environment. This impact is major as the farm will require removal of much of the trees, however the proponent is committed to replanting more grass in the unused areas of the farm and planting of more indigenous trees and also living 15% of the farm under tree cover..

Increased water demand-During the implementation phase water will be used for dust suppression, drinking by the workers, washing of machinery and the construction works. This will increase demand for water in addition to the existing demand. Water will be mostly used in the preparation of concrete for construction works.

Workers accidents and hazards during construction-Construction workers are likely to have injuries and be exposed to hazards as a result of the construction of some of the proposed Project components. The construction works unavoidably expose workers to occupational health and

safety risks. Use of manual labor is expected to take place resulting in increased occupational safety risks.

Extraction sites and use of construction materials-Construction materials that will be used in the construction such as; hard core, stones, cement and sand will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as rivers and quarries. Since substantial quantities of these materials will be required for the construction of the facilities, the availability and sustainability of such resources at the extraction sites will be negatively affected as some are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, clearance of vegetation and opening of depressions on the surface leading to human and animal health impacts.

Noise, dust and exhaust emissions- noise pollution is likely to occur due to offloading of construction materials at the proposed site, site preparation by use of tractors and earth moving machines. Potential impacts on the air quality during implementation phase will be due to exhaust emissions, noise and dust on site caused by the earth moving machines and offloading trucks. These will cause a potentially significant air quality impact by emitting pollutants through exhaust emissions and dust since most of the access roads are marrum roads. Dust emission is also likely to occur during site clearance and spreading of top soil during implementation of the proposed Project. The workers involved in the site preparation and construction will be required to wear personal protective equipment such as nose masks and ear plugs to reduce the impacts of dust and air emissions on their health.

Waste management-Construction activities create solid wastes that need to be disposed. Such wastes include: *plastic containers, cement bags and other packaging materials; and Metal, glass, plastic containers and other unwanted materials.*

These wastes may have a direct impact on the neighboring areas, residents and domestic animals. Disposal of the same solid wastes off-site could also be a social inconvenience if done in wrong places. The off-site effects could be un-aesthetics view, pest breeding, unhygienic conditions and pollution of physical environment. Proper waste management will however be taken into consideration and proper dumping done according to the Environmental Management and Coordination (Waste Management) Regulations, 2006.

Increased Motor traffic-during implementation phase of the project, there will be increased traffic on the existing roads and this may lead to damage to the road, it imperative for the proponent to take this into consideration and repair any road that gets damaged by the implementation vehicles to avoid conflict with the people neighboring the project site.

7.3.3 Expected positive impacts during operation phase

The following positive impacts are associated with the proposed Project during the operation phase:

The proposed farm will act as a catalyst to improve livelihoods among the community members thereby alleviating poverty through provision of employment.

Increased income to the central and county governments through payment of various taxes.

Improved horticultural production and contribution to food security.

Increased market for goods and services around the area

It will also improve the value of the land around the site.

7.3.4 Probable negative impacts during operation phase

Generation of solid waste and disposal-The project will generate and dispose solid wastes during operation phase of the proposed Project. The environmental consequences for generating and disposing the waste will be: *Trash and litter pollution*; *Smoke and fumes from burning*; *Degraded water quality*; and *Degraded air quality*.

In terms of the human health and welfare impacts, the generated solid waste disposal will lead to: *Public health risk*; *Economic losses*; *Aesthetic losses*; and *Cleanup costs*.

There is need therefore for the Proponent to come up with proper waste management programme that will mitigate the solid waste disposal impacts generated by the project.

Most of the waste generated during operation of the farm will be organic waste, this will be composted to make manure which will be used again the farm, non-biodegradable solid waste such as plastic containers, plastic sheets, wastes drip pipes, waste metals among others will be disposed of by licensed waste handlers and according to the law.

Sewage disposal-The sewage and wastewater treatment method for the proposed project is the use of a septic tank. The effluent in the septic tank will be treated and be used for irrigation where possible. However the treatment plant may be overloaded and sometimes may malfunction leading to overflows. This may eventually lead to: *Cleanup costs; Public health risks; Aesthetic degradation; Recreational losses; and degraded water quality.*

Increased water usage-horticultural production is a water intensive venture, thus with the operation of the proposed Project there will be increased water use. The following activities among others will lead to increased water usage: *irrigation of the farm, Cleaning and drinking; watering of lawns and □ cleaning of vehicles.*

Increased energy use-The proposed Project will require energy for lighting, and even pumping water. These could be in the form of using generators, electricity or solar energy. Energy from manual labor will also be needed. In addition, transportation will also require use of fuel. This will eventually have an effect on the amount of money spent on energy.

Increased use of herbicides and other chemicals-agricultural production requires the use of chemicals, the operation of the farm will use herbicides and other chemicals. These if not handled well could lead to health hazards both to the environment, humans as well as animals.

Increased use of chemical fertilizers- the operation of the farm will lead to increased application of artificial fertilizers. These need to be applied sparingly to avoid nitrification and eutrophication of water bodies. This may lead to growth of aquatic and or invasive weeds and salination of the soil.

Increased siltation of the river- cultivation of the soils may lead to siltation of the rivers, this can be mitigated thorough observation of the buffer zone and planting of trees near the river banks.

Oil spills-the machinery used in the farming and operation of the project may lead to accidental oil spills and contamination of the environment.

Increased soil Erosion and pollution- intensive agriculture and tillage reduces the soil organic matter, making soils less able to absorb and retain water and thus more prone to erosion and run off.

Degradation of downstream ecosystems- this is likely to happen due to water abstraction for irrigation purposes, leading to reduced river flow rate and or accidental or deliberate discharge of untreated effluent into the water bodies. This will affect downstream ecosystems hence loss of biodiversity. Impact on biodiversity may also result due to the monoculture nature of agricultural production hence reducing the variety of microhabitats needed for a thriving biodiversity.

Occupational health and safety-the operation of the farm may lead to increased occupational accidents to the workers and also lead to health and safety problems.

7.4 Expected positive impacts during decommissioning phase

Employment opportunities-For demolition to take place properly, several people will be involved. As a result, employment opportunities will be created for the demolition staff during the decommissioning phase of the proposed Project. However, it should be pointed out that with the decommissioning of the proposed project, jobs will also be lost especially to farm staff.

7.5 Expected negative impacts during decommissioning phase

Noise pollution-The demolition works will lead to insignificant deterioration of the environment within the Project site and the surrounding areas. This will be as a result of the noise that is likely to be caused by the demolition workers of the proposed farm installations.

Solid waste generation-Demolition of the proposed Project and related infrastructure will result in large quantities of solid waste. The waste will include the materials used in construction such as concrete, polythene from the green house, timber etc. However, most of the demolished materials can be recycled and used for other developments.

Dust and exhaust emission-Large quantities of dust will be generated during demolition works of proposed facility especially if done during dry season. This will affect especially the demolition staff. Minimal exhaust emission is also likely to be emitted by the trucks transporting the demolished wastes from the sites to the disposal areas.

Health and safety risks-During decommissioning phase, health and safety risks are likely to be experienced. The risks could be as a result of injuries inflicted on the demolition staff.

SUMMARY OF PREDICTED IMPACTS

Anticipated Impacts	Very High Impact	High Impact	Moderate Impact	LOW Impact	Very Low Impact	No Impact	Remarks
Planning stage	X						If the proponent fails to plan well he could be Prosecuted, or inconvenienced by the authorities. He can also leave the project halfway done if he Doesn't plan properly.
IMPLEMENTATION STAGE							
Land & Soil contamination and degradation		X					There will be high impact on the land and soil during vegetation clearing, cultivation, excavation and construction. Artificial fertilizer can contaminate the rivers with nutrients leading to eutrophication. The place can be littered with tin cans, metal pieces, papers etc.
Solid waste			X				As mentioned above there will be production of metal, paper and wood waste.
Air quality				X			Since the area is not highly populated this impact is low
Noise				X			Again because the area is not populated this is low
Health and safety of workers		X					There is danger to employees working at the site e.g. falling objects, sharp objects, corrosion by cement slurry etc.
Socio-economic welfare		X (P)					Temporary and permanent jobs will be created.
Impact on wildlife				x			This is low as the area does not have significant wildlife
Traffic congestion				X			This is low as the access road is not busy.

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IMPACTS UPON OPERATION

Health & safety					X		This is low impact since measures will be put in place e.g. construction of septic tanks, safety signage, Guards and guard rails etc
Water demand			X				There will be increased water demand for the irrigation of the farm. This will impact both on surface and ground water as water will be abstracted from the borehole and also from the river
Increased use of herbicides and other chemicals	X						This is high impact
Use of artificial fertilizers	X						High impact
Energy demand		X					Electricity will be installed and a backup generator
Liquid waste	X				X		This is a major impact since there is no sewer line
Solid waste	X						This is a major impact
Economic impact	X(P)						The proponent will be earning money from the project. His employees will also benefit from the same.
Conflict with the Neighborhood						X	The land is owned by the proponent and it is not expected that there will be any conflict with anyone.
Insecurity	X						Security is nowadays a serious issue in all Establishments.

X (P) Positive impact

Health and safety concerns	Proper housekeeping shall be put in place. The farm shall undergo an environmental and safety audit every year. The workers shall be trained in health and safety issues.
Conflict with the neighborhood	The proponent shall ensure that she doesn't interfere with other neighbors and their property. The proponent shall consider the neighbors when employing.

CHAPTER EIGHT: MONITORING AND MITIGATION MEASURES

8.1 Mitigation of implementation / Construction Related Impacts

Vegetation disturbance-Clearance of vegetation (mainly grass and planted cypress trees) at parts of the proposed Project site will be inevitable. However, the Proponent will ensure proper demarcation of the Project area to be affected by the site preparation works. This will be aimed at ensuring that any disturbance to flora is restricted to the actual project area and avoid spillover effects on the neighboring areas. In the same vein, there will be strict control of implementation vehicles to ensure that they operate only within the area to be disturbed by access routes and other works. In the eventuality that some vegetation is destroyed, these shall be replaced by planting trees or grass in order to maintain the aesthetics of the Project area.

Increased water demand-Potable water supply shall be ensured for all persons engaged in the implementation / construction of the Project by the Contractor. In this regard, the Contractor shall adhere to the requirements of the Occupational Safety and Health Act, 2007 and the Environmental Management and Coordination (Water Quality) Regulations, 2006.

Workers accidents and hazards during implementation / construction-To reduce workers accidents and hazards during the implementation / construction phase of the proposed Project, the Proponent is committed to adherence to the site occupational health and safety rules and regulations stipulated in the Occupational Safety and Health Act, 2007. In this regard, the Proponent is committed to provision of appropriate personal protective equipment, as well as ensuring a safe and healthy environment for the workers. Workers accidents in trenching operations shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response. Safety education and training shall also be emphasized.

There is also need for having contingency plans for handling accidents and emergencies which may threaten the environment and conservation and sustainable use of biodiversity.

Extraction of construction materials-The Contractors of the proposed Project will source construction materials such as sand and hard core from registered quarry and sand mining firms whose processes have undergone satisfactory environmental impact assessment/audit and received NEMA approval. Since such firms are expected to apply acceptable

environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated.

To reduce the negative impacts on availability and sustainability of the materials, the Contractor will only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the Contractor will ensure that wastage of materials at construction site is kept minimal, as this would lead to additional demand for extraction or purchase of materials.

Noise, dust and exhaust emission-Though insignificant noise pollution will take place during the implementation of the proposed Project, there is still need to mitigate the noise impacts. The Proponent, through the Contractor, shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimize the impact of noise at the Project site during construction.

- Construct during the day;
- Encourage drivers for the trucks transporting materials workers to switch off vehicle engines whenever possible; and Limit vehicles idling time.

To mitigate the impact of dust emission, the following measures are recommended for implementation:

- Applying water to at least 80% of all inactive accessible disturbed surface areas on a daily basis when there is evidence of wind driven dust; especially on the access road which is close to the nearby school.
- Down wash of trucks (especially tyres) prior to departure from site; and
- Cover trucks hauling dirt and debris to reduce spillage on to roads surface or have adequate free board to prevent spillage.

Waste management-It is recommended that construction waste be recycled or reused as much as possible to ensure that materials that would otherwise be disposed of as waste are

diverted for productive uses. In this regard, the Contractor will ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of. The Proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted for and to ensure that the amount of construction materials left on site after construction is kept minimal. Additional recommendation for minimization of solid waste during construction of the proposed Project is use of durable, long-lasting materials that will not need to be replaced often, thereby reducing the amount of construction waste generated over time.

8.2 Mitigation of operation phase impacts

Management of solid waste and sewage disposal-During operational phase of the proposed Project farm and its workers will generate and dispose solid waste and sewage. NEMA has come up with the environmental Management and Coordination (Waste Management) Regulations, 2006 on how various wastes should be regulated.

The Proponent of the proposed Project together with the facility management will be responsible for efficient management of solid waste generated by the farm. In this regard, the Proponent will install waste bins strategically at various places to be used for disposal of solid wastes. In addition, the Proponent will ensure that such wastes are transferred by NEMA registered waste transporters and disposed of regularly and appropriately at a NEMA licensed disposal site. An integrated solid waste management system is recommendable. First, the Proponent will give priority to reduction at source of the materials. Secondly, recycling, reuse and composting of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. The recyclables will be sold to waste buyers. The third priority in the hierarchy of options is to incinerate wastes that are not recyclable. Finally, sanitary landfilling will be the last option for the Proponent to consider. In order to achieve the above recommendations the following will be done:

Collection bins

- Regular collection of waste from the proposed Project site; and
- Daily sweeping of the associated facilities and compound.

Waste disposal

- Solid waste generated would be collected and disposed by a firm registered and licensed by NEMA to transport solid waste that will be contracted by the Proponent.
- The proponent proposes the construction of a septic tank and shall install grey/black water treatment facility on site

Minimization of energy use-The following measures should be taken into consideration to minimize the energy use:

- Usage of alternative energy sources, including solar and biomass;
- Reporting on fuel usage costs and possible greenhouse gases (CO₂) emissions;
- Use of renewable energy sources;
- Using energy saving bulbs and appliances; and
- Minimizing use of energy intensive practices.

Safety and security-It is recommended that the Proponent contract the services of private security company to ensure the security and safety of staff and everyone visiting the farm.

Increased water usage-A combination of water saving appliances and water management measures will be planned and implemented at the farm. Specific measures that will be implemented include the following:

- Reduce toilet cistern in single flush models;
- Promote awareness on water conservation and reducing water wastage;
- Quick fixing of leaking pipes and toilet cistern; and
- Sweep with a broom where possible, rather than hose down external areas.

The following water saving investments should be taken into consideration:

- Reduce water delivery in taps, through the installation of low flow devices or aerators on taps;

- A manually pressed button flush valve which stops on release of button;
- Water efficient plumbing fixtures can be used in the proposed project to save water & energy.

Rain water can also be harvested to supplement the existing water sources Rain water harvesting comprises of two components:

- Storing rainwater in ground reservoirs for beneficial use in future; and
- Rain water harvesting for artificial recharge of ground water.

Efficiency of rainwater harvesting and recharging ground water can be increased by the following methods: Reduce and filter surface run off; and Catch drainage all along the periphery of land to prevent surface run off.

8.3 Mitigation of decommissioning phase impacts

Noise pollution-The impacts of noise pollution during decommissioning phase will be mitigated as already described in the implementation / construction phase above.

Waste management-Solid waste resulting from demolition or dismantling works associated with the proposed Project during decommissioning phase will be managed as described below:

- All that will not be used for other purposes will be removed;
- Where recycling/reuse of equipment and other demolition waste is not possible, the materials will be taken to a licensed waste disposal site; and
- Donate reusable demolition waste to charitable organizations, individuals and institutions.

Dust and exhaust emission-High levels of dust and exhaust emission concentration resulting from demolition or dismantling works will be minimized as follows:

- Avoiding dusty activities e.g. loading and dumping on windy days;
- Rehabilitating or stabilizing all disturbed areas.

Occupational health and safety-Health and safety risks likely to arise as a result of the decommissioning phase of the proposed Project will be minimized by ensuring that appropriate health and safety measures are applied in all activities. Other measures will include:

- Fencing all unsafe and dangerous areas and placing warning signs;
- Enforcing maximum traffic speeds through villages during closure operations; and
- Continuing to monitor environmental health aspects.

SUMMARY OF NEGATIVE IMPACTS AND PROPOSED MITIGATION MEASURES

PRE-IMPLEMENTATION STAGE	
Approvals and licences	<p>These will be acquired before materials are operations commence.</p> <p>A file will be opened at the site with all the approvals.</p>
IMPLEMENTATION STAGE	
IMPACT	MITIGATION
Vegetation destruction	<p>The unoccupied areas shall be grassed and planted with indigenous trees after implementation of the project.</p> <p>Flower beds shall be established and well maintained.</p> <p>There will be no unnecessary excavation.</p>
Air quality	<p>Workers shall wear nose masks</p> <p>Water will be sprinkled on the dusty area.</p>
Noise pollution	<p>Workers shall wear ear muffs</p> <p>Any machine used at the site including delivery vehicles shall be serviced appropriately.</p>
Health and safety	<p>workers shall be given personal protective equipment</p> <p>The site foreman shall ensure that such PPEs are worn at all times.</p> <p>The foreman shall take all new workers through safety tips.</p> <p>Metal, wood and other sharp objects shall be collected and put in safe areas.</p> <p>Scaffolding shall be strong to prevent collapse</p>

Solid waste	<p>The foreman shall install bins for waste segregation and disposal The bins shall be emptied at least twice a week. Wood and paper waste shall be sold to be used as fuel. Metal waste shall be sold to recyclers.</p>
OPERATION STAGE	
Liquid waste	<p>A septic tank shall be constructed. The sewage will be & treated & monitored to ensure no overflowing or foul smell.</p>
Solid waste	<p>The proponent shall ensure a licensed garbage handler is engaged. Some of the waste shall be sold to neighbors to be used as animal feed.</p>
<p>Fire hazards Increased water demand</p>	<p>Fire extinguishers and reels shall be installed on strategic places of the farm . The staff shall undergo firefighting training. The proponent shall harvest rain water. The proponent shall sensitize staff on wise use of water. The proponent will explore possibilities of water recycling and use them</p>
Energy demand	<p>Buildings will incorporate designs that allow maximum natural lighting during the day The proponent shall use power saving devices.</p>
Insecurity	<p>The proponent shall engage a reputable security company. Everyone entering the facility shall undergo security check.</p>

CHAPTER NINE: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1 Significance of an Emp

This EIA Study report complies with the requirements of the Environmental Management and Co-ordination Act (EMCA) of 1999 and takes into consideration the applicable local and international standards and best practices. As a requirement in EMCA, 1999, the report should provide for a detailed EMP.

There is no universally accepted standard format for EMPs. The format needs to fit the circumstances in which the EMP is being developed and the requirements which it is designed to meet. EMPs should contain the following which are in line with the NEMA requirements:

- Summary of Impacts: The predicted negative environmental impacts for which mitigation is required should be summarized;
- Description of mitigation measures: The EMP identifies feasible and cost effective mitigation measures to reduce significant negative environmental impacts to acceptable and legal levels;
- Description of a monitoring programme: Environmental performance monitoring should be designed to ensure that mitigation measures are implemented. The monitoring programme should clearly indicate the linkages between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions;
- Institutional arrangements: Responsibilities for mitigation and monitoring actions should be clearly defined;
- Legal enforceability: The key legal considerations with respect to EMPs are: *Legal framework for environmental protection; and Legal basis for mitigation.*
- Implementation schedule and reporting procedures: The timing, frequency, and duration of mitigation measures should be specified; and
- Cost estimates: Costs should be calculated for both the initial investment and recurring expenses for implementing the mitigation measures.

The benefits of including the EMP as part of the EIA are:

- Encouraging applicants to be more systematic and explicit in the design and development of mitigation measures and the intended means of implementation;
- Encouraging authorities to check the practicality and likelihood of implementation of mitigation and monitoring measures;
- Ensuring that the mitigation measures are properly incorporated into the project design and contract documentation after authorization is granted;
- Encouraging the project proponent to meet the requirements of the EMP which now form the basis for the conditions attached to authorization of the project; and
- Forcing the project proponent to internalize environmental impacts that would otherwise become a social cost.

The EMPs presented in this Chapter therefore summarizes the key impact elements identified and the remedial measures, and the responsibilities of various parties.

The implementation of the EMP should be done within the provisions of the law and for the ultimate benefit of the stakeholders in the Project area. The effectiveness of the EMP shall be monitored and assessed during spot checks, formal inspections and at the end of the Project when an overall audit of the works shall be carried out.

9.1.1 Environmental Management Plan – Implementation / Construction Phase for the project.

Impact	Proposed mitigation measures	Time frame	Responsible person	Estimated Cost (Kshs)
Structural stability of project Buildings & roads	<ul style="list-style-type: none"> -Ensure the farm building & structural plans are approved. - Ensure the right construction and quantity of materials are used -Ensure the construction is supervised by qualified personnel -Ensure the inspection and structural design are done by a registered engineer -Ensure that lorries heavier than what the existing roads can take are directed to use alternative routes to avoid destruction of the roads. 	During implementation / Construction	Proponent/engineer	Implementation budget
Impact on Biodiversity and soil erosion	<ul style="list-style-type: none"> -Design a landscape plan that enhances landscape aesthetic value using local and native vegetation. - Ensure proper demarcation of the project area to be affected by the project works in order to restrict any disturbance of flora and fauna only on the actual project area and to avoid spillover effects on the neighboring areas. - Have strict control of vehicles to ensure that they operate only within the area to be disturbed by access routes and other works. - Minimize soil erosion and associated sediment release from the project site. -Excavated materials should be controlled and properly disposed to avoid blocking of storm water drainage system and subsequent soil erosion. 	During construction	Proponent/engineer	Implementation budget
Minimization of accidents & hazards	<ul style="list-style-type: none"> -All excavations, shafts, pits or openings more than two meters deep should be covered or barred by suitable means when access is not needed. - No materials should be stored near such excavations. - All excavation wall over 1.2 meters deep should be reinforced with timber to prevent collapse to persons working inside. - Supervision of such works should include collaboration with safety supervisors. 	During construction	Contractor	Implementation budget
Noise pollution & excessive vibrations	<ul style="list-style-type: none"> - Minimize noise and vibration in the project site and surrounding areas through sensitization of drivers to switch off vehicle engines while offloading materials. - Instruct the drivers to avoid unnecessary gunning of vehicle engines or hooting especially when passing through sensitive areas such as residential areas, wildlife areas and hospitals. - Insulate all generators & heavy duty equipment or place them in enclosures to minimize high noise levels 	During construction	Contractor/proponent	Implementation budget
Management of waste & use of raw materials	<ul style="list-style-type: none"> -Segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal - Provide adequate and suitable solid waste collection containers - Containers for storing hazardous waste including used oil should be securely banded, labeled and disposed as required by Waste Management Regulations, 2006 	During construction	Contractor/proponent	Implementation budget

	<ul style="list-style-type: none"> - Contract a NEMA licensed waste collection company to collect solid waste from the site for appropriate disposal at approved sites. -Accumulate scrap metals in a scrapping yard and contract a scrap metal dealer with a valid license for appropriate disposal/recycling - Minimize waste generated by adopting cleaner operation methods such as conserving materials, enabling recovery and re-use of the waste product where possible -Use durable, long- lasting materials which will not need to be replaced as often, thereby reducing the amount of construction waste generated over time. -Provide facilities for proper handling and storage of materials to reduce the amount of waste caused by damage or exposure to the elements of nature i.e. sunshine, wind, rain etc. -Use materials that have minimal packaging to avoid generation of packaging waste - Source materials from suppliers who have undergone satisfactory EIA/EA and received NEMA approval. These companies are expected to apply acceptable environmental performance standards so that the negative impacts of their activities at the extraction sites are considerably well mitigated. -Have an accurate budget & estimation of actual material requirements in order to ensure that materials are not extracted or purchased in excessive quantities. -Consider reusing materials and use of recycled ones in order to reduce the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites 			
Dust generation & exhaust emissions	<ul style="list-style-type: none"> -Dust emissions from piles of soil or from any other material during earthwork, excavation, & transportation should be controlled by wetting. -Piles and heaps of soil should not be left over after site preparation is completed. -Excavated sites should be covered with suitable solid material and vegetation planted around the compound. - Minimize dust through strict enforcement of onsite speed controls as well as limiting unnecessary traffic within the project site. - Ensure that traffic routes on site are sprinkled with water regularly to reduce amount of dust generated by the vehicles. - Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading areas, & to switch off or keep vehicle engines at these points 	During site preparation	Contractor/ proponent	Implementation budget
Oil spills	<ul style="list-style-type: none"> - Ensure that all equipment is in good serviceable condition. - Ensure that no fuels or oils are stored on site but procure them when needed. 	During site preparation and operation	Contractor/ proponent	Implementation budget
Storm-water drainage	<ul style="list-style-type: none"> -Construct storm water drains 	During operation	proponent	Implementation budget
Occupational Health and Safety	<ul style="list-style-type: none"> -Ensure that the contractor adheres to the occupational health and safety rules and regulations stipulated in the Occupational Safety and Health Act 2007 and the Factories (Building Operations and Works of Engineering Construction) Rules of 1984. - Provide workers with insurance cover such as workmen’s compensation. -First aid facilities should be availed at the site office. These include properly stocked first aid 	During operations	proponent	Implementation budget

	<ul style="list-style-type: none"> boxes & trained personnel to handle first aid. - Provide proper scaffolds for construction at high level - Document and display on-site emergency procedures - Use appropriate signage to direct and control flow of traffic -The construction site should be registered as per OSHA 2007 and the DOHSS should be notified of the construction works before commencement. - A general accidents register should be kept on- site. -Provide and enforce use of PPEs including overalls, helmets, safety boots & gloves among others where necessary. -Ensure proper storage of materials and equipment to avoid accidents occurring from falling. -Provide temporarily sanitary facilities during construction. - Water surfaces before and during excavation and construction to reduce dust generation. - Restrict un-necessary movement of public to the site in order to avoid accidents. All access to the hazardous areas should be secured with a fence and warning notices. - Ensure portable fire extinguishers are provided and in working condition near probable ignition sources -Adequate and clean water supply for drinking. - Maintain environmental management records on site. 			
Energy consumption	<ul style="list-style-type: none"> -Staff should be sensitized to switch off equipment and lights when not being used - Consider the possibility of using alternative sources of energy especially renewable ones such as solar -Have proper planning of transportation of materials in order to save fossil fuels (diesel, petrol) 	During operations	proponent	Implementation budget
Water use	<ul style="list-style-type: none"> -Any water leaks through damaged pipes should be fixed promptly. - Sensitize the staff to use water efficiently/sparingly. - Enhance rain water harvesting by use of tanks and other containers. 	During operation	proponent	Implementation budget
Traffic impacts	<ul style="list-style-type: none"> -The contractor shall take all possible precaution to safe guard the safety of wheeled traffic and pedestrian. - Ensure strict enforcement of on and off -site speed limits as well as limiting unnecessary traffic within the project site - Provide parking areas for the trucks. - Provide entry and exit points into the site. -Erect proper warning signs at a safe distance on the access roads to warn motorist of heavy vehicles turning. -Ensure trucks do not damage the road structures and drainage systems. - Ensure only serviceable trucks are used during transportation hence less break downs. -Ensure that transportation of the materials take the shortest period possible. -Transport most of the materials during off peak hours when the traffic is low. 	During operation	proponent	Implementation budget

9.1.2 Environmental Management Plan - Operation Phase of the project.

Activity	Mitigation measures	Time frame	Responsible persons	Cost
Sewerage disposal	<ul style="list-style-type: none"> - Construct an adequate septic tank and a wetland. - Ensure that sewage pipes are not blocked or damaged since such vices can lead to release of the effluent, resulting in land (soil) and water pollution -use licensed exhausters to periodically empty the septic tank 	Continuous	proponent	-
Energy consumption	<ul style="list-style-type: none"> -Switch off equipment and lights when not being used. - Consider the possibility of using alternative sources of energy especially renewable ones such as solar -Install energy-efficient lighting systems within the farm. - Sensitize farm workers on energy conservation through efficiency use of energy. 	Continuous	proponent	-
Efficient waste Management	<ul style="list-style-type: none"> -Provide proper waste handling facilities such as waste storage chamber /receptacles for temporarily holding solid waste generated. - Contract a NEMA licensed waste company for proper waste disposal -Raise awareness among workers about waste management - Dispose waste more responsibly by dumping at designated sites only 	Continuous	proponent	-
Efficient water use	<ul style="list-style-type: none"> -Put in place measures for quick detection and repair of pipe and tank leaks -Sensitize staff and visitors to use water more efficiently -Ensure taps are not running when not in use 	Continuous	proponent	-
Occupational Health and Safety	<ul style="list-style-type: none"> -Educate the staff on the occupational health & safety rules and regulations stipulated in the Occupational Safety and Health Act 2007 and the Factories Rules of 1984. - Provide workers with insurance cover for such as workmen’s compensation. -First aid facilities should be availed at the site office and strategic places in the farm. These include properly stocked first aid boxes & properly trained personnel to handle first aid. - Provide ear muff, dust masks and other PPEs to staff working in dusty and noisy areas. - Document and display emergency procedures - Use appropriate signage to direct and control flow of traffic - A general accidents register should be maintained and all incidences and accidents recorded and reported as appropriate. -Provide and enforce use of personal protective equipment -Ensure proper storage of materials, products and equipment to avoid accidents. -Provide adequate sanitary facilities to the staff and visitors - Ensure portable fire extinguishers are provided and in working condition near probable 	During operation	proponent	implementation budget

	<p>ignition sources</p> <ul style="list-style-type: none"> -Adequate and clean water supply for drinking. - Maintain environmental management records during operation phases of the project. 			
Emergency/ hazard response/ preparedness plan	<ul style="list-style-type: none"> -There must be a well-designed and documented emergency preparedness plans including fire emergency procedures. -signage around the farm warning the staff of possible danger and educate them on how to respond to emergencies. 	Continuous	proponent	-
Fire protection	<ul style="list-style-type: none"> - installation and regular inspection and servicing of fire extinguishers should be undertaken by a reputable service provider and records of such inspections maintained - Fire safety signs should be prominently displayed within the buildings -have a designated fire assembly point. 	Continuous	proponent	-
Electrical Safety	<ul style="list-style-type: none"> -Circuits must not be overloaded -Distribution board switches must be clearly marked to indicate respective circuits -There should be no live exposed connections - Electrical fittings near all potential sources of ignition should be flame proof - All electrical equipment should be earthed 	Continuous	proponent	-
Chemical fertilizers	<ul style="list-style-type: none"> -these need to be applied in the required quantities and at the appropriate time to reduce the amounts that seep into the soil and potentially to nearby water bodies 			
Oil and grease spills	<ul style="list-style-type: none"> -All servicing and maintenance of farm machinery must be done at the designated garage and oil interceptors provided to minimize the occurrence of such accidental spills 			
Poisoning protection	<ul style="list-style-type: none"> -All poisonous chemicals to be properly stored and issued only to the people authorized to use them and only in the required quantities. -Label all poisonous chemicals to reduce the chances of ingestion. -All people manning the chemical stores must wear personal protective equipment - All chemical stores must be always under key and lock. 	During implementation and operation	proponent	Project budget
Housekeeping	<ul style="list-style-type: none"> - Floor areas should be free of debris, spillage and tripping hazards 	Continuous	proponent	

9.1.3 Environmental Management Plan - Decommissioning Phase

In addition to the mitigation measures provided above, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the proposed project have ceased. The necessary mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the proposed project are outlined in the table below

Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Demolition waste management			
1. All farm buildings and installations, foundations, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible	Contractor	One off	-
2. Dispose reusable demolished facilities as prescribed by public procurement & disposal Act 2005, Cap 412C.	Contractor	One off	-
3. Where recycling/reuse of the equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be transported off site to a licensed waste disposal site	Contractor	One off	-
	Proponent	During decommissioning	Project budget

CHAPTER TEN: CONCLUSION AND RECOMMENDATIONS

10.1 Recommendations

In ensuring proper mitigation measures are instituted the proponent and contractor will need to ensure the following:

- They are involved in every stage of the project implementation and particularly on the management of the anticipated wastes & emissions into the environment as well as other concerns that may touch on the neighbors especially control of noise & waste management.
- That the project is implemented as described and the management plan implemented to the letter.
- That the project implementation will not cause any unnecessary disruption to public utilities, storm water/surface runoff drainage systems, ecological systems & human settlement.
- Conservation measures are implemented that ensure sustainable use of energy and natural resources
- Annual Environmental Audits are conducted every year by NEMA registered experts so as to confirm the status of the compliance with the relevant legislation and implementation of the Environmental management plan.

10.2 Conclusion

In conclusion the proposed project will have several positive economic benefits during its different phases and it will also have negative impacts. However, these impacts are synonymous with development project and can adequately be mitigated through the implementation of the EMP prepared. Our conclusion is that the project is important for economic development and its benefits outweigh its shortcomings. We therefore recommend that the project be licensed.

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