AUGUST 2012

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT REPORT

For the Proposed Service Station on L.R. No. 841/III/MN, off Voi-Mombasa Highway, at Mazeras, Kokotoni Area of Kilifi County.

NATURECOM GROUP

linking Environment, People & Development

CERTIFICATION

Certification by Expert:

I hereby certify that the environmental impact assessment report has been done under my supervision and that the criteria, methodology and content reporting conform to the requirements of the Environmental Management and Coordination Act, 1999.

Lead Expert: Felicia Muriuki

Signature:_____Date _____

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Associate Expert: Edwin Murithi Nyaga.

Signature:_____**Date**: _____

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Certificate of Registration No: 1974

Certification by Proponent

I hereby confirm that the contents of this report are true and will implement practicable mitigation measures proposed in the report.

Name: Mr. Meshack Mwangi Mbayu

Signature_____**Date**_____

ACKNOWLEDGEMENTS

We the experts would wish to extend our sincere appreciation to all individuals and institutions that offered their cooperation and support in ensuring that we gathered the information required to compile this report. We are grateful for the support we got from the town council of Kilifi, the Department of Physical Planning and the Coast Development Authority, for providing the baseline information for the project area.

We acknowledge the facilitation by the proponent **Mr. Meshack Mwangi Mbayu** who provided the necessary information and supportive materials required throughout the assessment process.

We are further indebted to the project site's neighboring facilities and residents for accepting to participate in the public consultations which would not have been possible without their support. Their opinions, contributions and suggestions that are included in this EIA report went a long way in ensuring successful and timely completion of this environmental impact assessment report. We are grateful to them for their spirit of cooperation and support.

EXECUTIVE SUMMARY

Kenya has seen a surge in improvements on its infrastructure in the last decade. The Proponent for this Development seeks to construct a Service Station with the following amenities:

- 4 Twin pumps service bay
- 4 Underground petroleum storage tanks (UPSTs)
- Car wash
- Oil Interceptor
- Air and water point
- Office and Store
- Changing and Wash Rooms
- Mini market
- Restaurant
- A septic tank
- A soak pit
- Associated piping work

This would be a welcome convenience for both local residents and those on transit on the busy Mombasa-Nairobi Highway.

In line with the requirements of the Environmental Management and Coordination Act, an Environmental Impact Assessment (EIA) Study for the proposed Petrol Station on Plot No.841/III/MN, Kokotoni area off Voi - Mombasa highway, Kilifi County was commissioned by the proponent, Meshack Mwangi Mbayu. The aim of this Environmental Impact Assessment (EIA) is to examine both the positive and negative effects that this proposed undertaking is likely to have on both the physical and socio economic environment. The EIA process is an important planning tool for the project proponent as it will inform on significant project effects and clearly define mitigation measures to avoid or curb adverse impacts. Early identification of possible impacts promotes environmental sustainability as anthropogenic factors are balanced with natural environmental needs.

The Study sought to identify possible impacts that would arise as a result of the projects' activities. It also sought to recommend workable mitigation measures and formulate an Environmental Management and Monitoring Plan to curb the negative impacts.

It was noted that there are positive impacts of the proposed petrol station mainly related to economic benefits both to the proponent, employees and those who will enjoy the services. However the project raises environmental, social, health and safety concerns which are manageable through implementation of the environmental management plan and organization scheduled monitoring and review of the same. Continuous environmental monitoring of the project shall be implemented during the entire project cycle in liaison with NEMA and the project proponent to ensure that environmental, health and safety considerations are incorporated at all stages of project implementation.

It is therefore the recommendation of this study that the project be allowed to proceed on condition that the environmental management plan is implemented and follow-up is made to ensure compliance as may be directed by NEMA.

Table of Contents

CERTIFICATION i
ACKNOWLEDGEMENTS ii
EXECUTIVE SUMMARY iii
Table of Contents v
LIST OF ACRONYMS ix
1. PROJECT BACKGROUND AND CONTEXT 10
1.1. Introduction 10
Project Proponent and Estimated Projected Cost 11
1.2 Scope and EIA Criteria of the Project 11
1.3. Project objectives 11
1.4. EIA Objectives 12
1.5. Terms of Reference (TORs) for the EIA process 12
1.6. Assessment methodologies and materials 13
1.7. Environmental screening criteria 13
1.9. Reporting and Documentation 14
2. DESCRIPTION OF THE PROPOSED PROJECT 14
2.1. Project Site Description. 14
2.2. Planning and design 14
2.3. Project design 15
2.4. Key Environmental Issues 16
2.5. Construction process 16
2.6. Construction technology to be used 16
2.6.1.Dust control technology 17
2.6.2. Noise pollution control technology 17
2.7. Construction material 17
2.8. Proposed Use of Facility 17
2.9. Health and safety considerations 18
2.10. Aesthetic value considerations 18
2.11 .Alternatives to the project 18

2.11.1. The "No Project" Alternative 18
2.11.2. The "Yes Project" Alternative 19
3. BASELINE INFORMATION ON THE PROJECT AREA 19
3.1. Introduction 19
3.2. Administrative location and size 19
3.3. Climate 19
3.4. Topography, geology and soils 20
3.5. Land use 20
3.6. Demographic characteristics 21
3.6.1. Introduction 21
3.6.2 Settlement patterns 21
3.6.3 Poverty index 22
3.7. Environmental quality 23
3.7.1 Water Availability 23
3.7.2 Solid waste and sewerage issues 23
3.7.3 Protected areas 24
3.7.4 Flora and Fauna 25
3.8. Infrastructure 25
3.8.1 Roads 25
3.8.2 Telecommunications. 25
3.9. Energy supply. 25
4. INSTITUTIONAL AND LEGAL FRAMEWORK 26
4.1 Introduction 26
4.2 Environmental Policy 26
4.3.Institutional Arrangements 27
4.2. Institutional arrangements relevant to the project 27
4.3. Legal Framework 28
4.3.1 The Constitution of Kenya, 2010 28
4.3.2. The Environmental Management and Co-ordination Act, 1999 29
4.3.3 The National Environmental Council (NEC) 29
4.3.4. The National Environmental Management Authority (NEMA) 30
4.3.5 Legal Notice No. 101: Environmental Impact (assessment and audit) Regulations, 2003 30

4.3.6 Legal Notice No.120: Kenya Gazette Supplement No. 68 - Environmental Management and Coordination (Water quality) Regulations, 2006 30
4.3.7 Legal Notice No.121: Kenya Gazette Supplement No. 69-Environmental Management and Coordination Act (Waste Management) Regulations, 2006 31
4.3.8 The Water Act No. 8 of 2002 (Effective implementation of provisions in 2003) 32
4.3.9 Occupational Health and Safety Act (OSHA) No. 15 of 2007 32
4.3.10. The Public Health Act- Laws of Kenya, Chapter 242 33
4.3.11. The Physical Planning Act, (Cap. 286) 33
4.3.12. Building Code 2000 34
4.3.13. Petroleum Act Cap 116 34
4.3.14. The Energy Act No. 12 of 2006 35
4.3.15. The Energy Regulatory Commission (2007) 35
4.3.16. Kilifi Town Council By-laws 36
5. PUBLIC CONSULTATIVE PROCESS (PCP) 36
5.1 Introduction 36
5.2. The Key Informants, Government Departments and Lead Agencies 37
6. PROJECT IMPACT IDENTIFICATION AND ANALYSIS 37
6.1. Introduction 37
6.2. Project construction phase 38
6.2.1. Positive impacts 38
6.2.2. Negative Impacts 38
6.3. Operational phase 40
6.3.1. Positive Impacts 40
6.3.2. Negative impacts 41
6.4. Possible decommissioning phase 43
6.4.1. Positive impacts 43
6.4.2. Negative impacts 43
7. IMPACT MITIGATION AND ENVIRONMENTAL MANAGEMENT PLAN 44
7.1. Introduction 44
7.1.1. Construction Phase 44
7.1.2. Operational phase 48
7.1.3. Decommissioning phase 51
7.2. Environmental Management Plan 52

8. ENVIRONMENTAL MONITORING PROGRAMME 53
8.1. Introduction 65
8.2. Environmental Management System 65
8.3. Environmental Management Organization (EMO) 65
9. CONCLUSION AND RECOMMENDATIONS 67
10. REFERENCES 68
APPENDICES 69

LIST OF ACRONYMS

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
CWSB	Coast Water Services Board
EA	Environmental Audit
EHS	Environmental Health and safety
EIA	Environmental Impact Assessment
EMAP	Environmental Management and Action Plan
EMCA	Environmental Management and Coordination Act
EMO	Environmental Management Organization
EMS	Environmental Management System
GoK	Government of Kenya
Ha	Hectares
HCVs	Heavy Commercial Vehicles
ILO	International Labour Organization
KRA	Kenya Revenue Authority
LN	Legal Notice
LPG	Liquefied Petroleum Gas
NEC	National Environmental Council
NEMA	National Environment Management Authority
NGOs	Non –Governmental Organization
OSHA	Occupational Health and Safety Act
PCPB	Pest Control Products Board
PPC	Participatory Poverty Assessment
PPE	Personal Protective Equipment
PRA	Participatory Rural Appraisal
TORs	Terms of Reference
UNEP	United Nations Environment Programme
UST	Underground Storage Tanks

1. PROJECT BACKGROUND AND CONTEXT

1.1. Introduction

Kenya has seen a surge in improvements on its infrastructure in the last decade. Road transport on the main Mombasa-Nairobi Highway has remained an important national and regional linkage plied by numerous vehicles throughout the year. The addition of a convenient Service Station for refueling, vehicle service, refreshments, toilet facilities and other amenities is a welcome convenience for both the local residents and those on transit.

The aim of this Environmental Impact Assessment (EIA) is to examine both the positive and negative effects that this proposed undertaking is likely to have on both the physical and socio economic environment. The EIA process is an important planning tool for the project proponent as it will inform on significant project effects and clearly define mitigation measures to avoid or curb adverse impacts. Early identification of possible impacts promotes environmental sustainability as anthropogenic factors are balanced with natural environmental needs.

In keeping with the requirements of the Environmental Management and Coordination Act (EMCA), 1999 an Environmental Impact Assessment (EIA) study for the proposed development of a petrol station was commissioned. The proponent, Meshack Mwangi Mbayu proposes to develop a Petrol Service Station with associated amenities on Plot No.841/III/MN in Kokotoni area off the Voi-Mombasa highway, Kilifi County. Some of these amenities include:

- 4 Twin pumps service bay
- 4 Underground petroleum storage tanks (UPSTs)
- Car wash
- Oil Interceptor
- Air and water point
- Office and Store
- Changing and Wash Rooms
- Mini market
- Restaurant
- A septic tank
- A soak pit
- Associated piping work

Project Proponent and Estimated Projected Cost

The proponent, Meshack Mwangi Mbayu intends to construct a Petrol Service Station in Kokotoni along the Mombasa-Nairobi Highway on Plot No.841/III/MN.

The project's estimated cost is Kshs. ***17,135,102*** (Seventeen million, one hundred and thirty five thousand, hundred and two Shillings Only)

1.2 Scope and EIA Criteria of the Project

With the enactment of appropriate environmental management instruments for Kenya in 1999 under EMCA, it became mandatory for environmental concerns to be mainstreamed into development projects during project design, construction, operation and decommissioning of such projects, programmes or activities. The scope of this EIA study covered the following aspects as stipulated in EMCA;

- Activities and processes undertaken by the proponent,
- The baseline environmental and physical conditions of the proposed project area,
- Detailed description of the proposed project,
- Provisions of the relevant environmental, health and safety laws,
- Identification and analysis of any adverse impacts to the environment and neighboring communities likely to emanate from the project,
- Facilitation of public (Stakeholder) consultations,
- Development of proposals for implementation and monitoring of mitigation measures, and
- Provision of an outline of a detailed environmental management plan.

1.3. Project objectives

The proposed development aims at meeting the following objectives:

- Provision of quality fuel station services to motor vehicle owners and other fuel customers,
- Generation of skilled and unskilled job opportunities,
- Income generation for the company,
- Generating revenue for the government

1.4. EIA Objectives

The following were the objectives of the EIA study;

1. To review location, project activities and baseline information of the area proposed for the establishment of the petrol station,
2. To review and document legislative and institutional framework relevant and applicable to the proposed petrol station,
3. To assess the potential environmental, social, health and safety impacts of the proposed petrol station,
4. To propose appropriate mitigation measures for the identified impacts of the proposed petrol station,
5. To make appropriate recommendations for environmental management organization for the facility,
6. To conduct a public consultative exercise and ensure that issues raised by stakeholders are mainstreamed into the environmental management plan that is developed for the facility,
7. To prepare and submit an EIA study report to NEMA for the issuance of an EIA license to the proponent.

1.5. Terms of Reference (TORs) for the EIA process

The following Terms of Reference stipulated in the Environmental (Impact and Audit) regulations 2003 and in particular part II S 7[1] have been adopted. The report examines the following:

(i) Nature of project
(ii) The location of the project including the physical environment that may be affected by the project's activities
(iii) The activities that shall be undertaken during the design of the project, construction and operation
(iv) The potential environmental impacts of the project and mitigation measures to be taken during and after the implementation of the project
(v) An action plan for prevention and management of possible accidents during the project cycle

(vi) A plan to ensure the health and safety of the workers and the neighboring communities
(vii) The economic and social cultural impacts to local community and the nation in general
(viii) Examination of the project alternatives
(ix) The project budget
(x) Any other information that the proponent may be requested to provide by NEMA

1.6. Assessment methodologies and materials

Various tools and instruments were utilized during the initial survey to collect and collate data.

- A semi-structured interview approach was used to gather primary data and information from neighbors. A checklist provided suitable guidelines addressing various aspects of the proposed project and the environmental impacts and observable details recorded.
- The information gathered during the above exercise was evaluated and data analyzed to determine the required level of environmental performance and make recommended action plans with a view to ensuring compliance with the National Environmental Management Authority requirements and/or guidelines relating to issues listed in Environmental Management and Coordination Act, including the Regulations on EIA/Audits under the Kenya Gazette Supplement No.56 of 13th June 2003 (Legal Notice No. 101 of 2003).
- Baseline information gathering involved review of literature and information available from government departments (mainly physical planning), and the Town Council of Kilifi. Desktop reviews were conducted using the internet and other EIA report of similar nature in the area by the consultants.
- A semi-structured interview strategy as well as informal consultations to obtain comments from neighbors were used.

1.7. Environmental screening criteria

In line with the Second Schedule of Legal Notice No. 101 of 2003, the following considerations were taken into account in determining the environmental screening criteria.

- Ecological considerations (Biological diversity, sustainability, ecosystem maintenance)
- Social considerations (economic impacts, social cohesion and disruption, effect on

human health, communication, effects on culture and objects of cultural value)

- Landscape impacts (views opened up or closed, visual impacts, compatibility with surrounding area)
- Land uses (effect of proposal on current land uses and land use potentials in the project area, possibility of multiple use, effects of proposal on surrounding protected area)
- Water (impact of proposal on water resources and drainage patterns or systems)

1.9. Reporting and Documentation

The reporting and documentation follows on the format provided by NEMA (through both EMCA, 1999 and the Environmental Impact Assessment and Audit regulations-legal notice no.101 of 2003). The proponent was continually informed throughout the period of report preparation to ensure that he was aware of the issues raised and the recommendations that were likely to be made regarding the best practices to mitigate the possible environmental impacts.

2. DESCRIPTION OF THE PROPOSED PROJECT

2.1. Project Site Description.

The proposed petrol station will be established on Plot No. 841/III/MN situated off Voi -Mombasa highway, Mazeras, Kokotoni area in Kilifi County. The project site lies between latitudes 3° 57'31.49 S' and longitudes 39° 32'48.73 E at an elevation of 569 feet above sea level.

2.2. Planning and design

This is the current phase that also includes preparation of this report and subsequent submission to NEMA for licensing purposes. Activities expected to be performed at this stage include;

- Proposal development and seeking internal approval to undertake the project
- Site layout designs which have already been prepared and approved by the Town council of Kilifi
- Design work for the site engineering aspects including earth works, building and structures, electrical equipment installation and other related activities
- Confirmation of acquisition of all permits including EIA license from NEMA

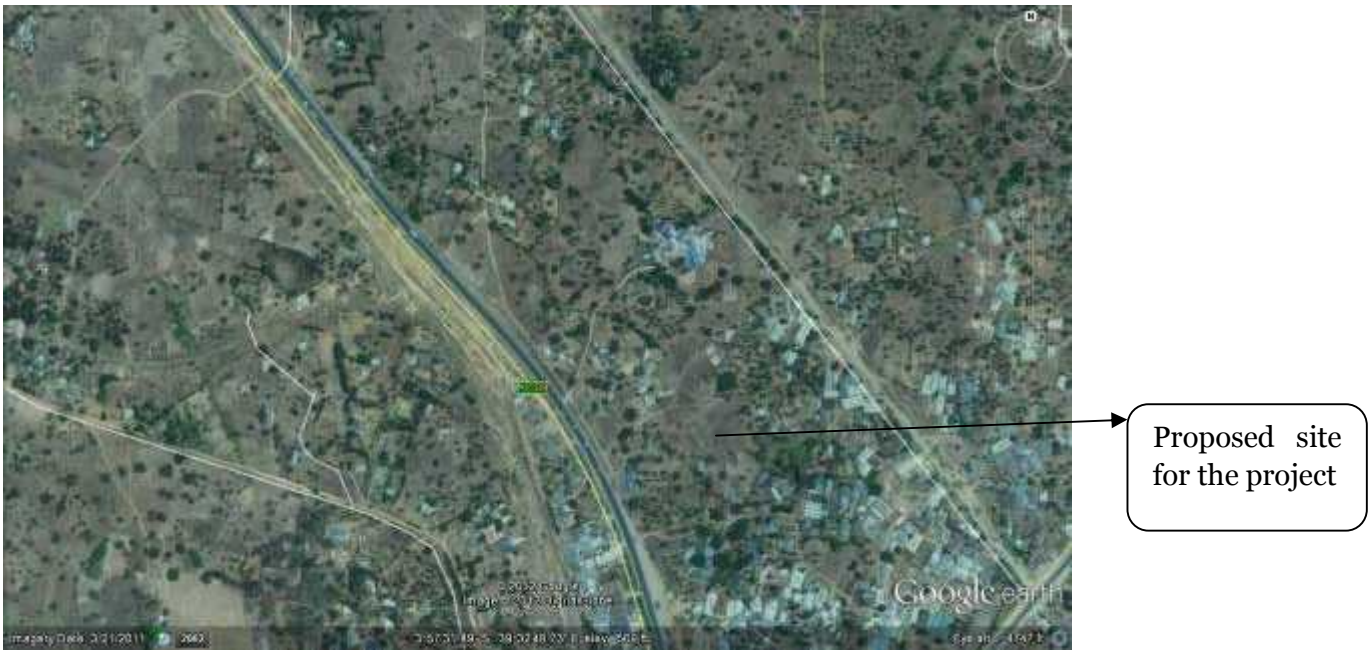

Plate 1 Location of Proposed Project Site

2.3. Project design

The proposed project comprises of putting up of a petrol station to address a growing need for quality services spurred by economic development within the region. The facility will constitute the following;

- 4 Twin pumps service bay
- 4 Underground petroleum storage tanks (UPSTs)
- Car wash
- Oil Interceptor
- Air and water point
- Office and Store
- Changing and Wash Rooms
- Mini market
- Restaurant
- A septic tank
- A soak pit
- Associated piping work

The site will be landscaped before commencement of operations using plant species available locally. Landscaping will include establishment of flower gardens, to improve the visual quality of the site. Appropriate signage within the facility will also be provided. Sections through the pavements on site shall comprise of paving slabs on sand bed set on well compacted hardcore with pointed joints at the bottom. Separate entry and exit routes will be also provided.

2.4. Key Environmental Issues

The major environmental concerns relating to the proposed development include the following:

- Sourcing of raw materials for construction from the environment,
- Impacts of the actual construction process, noise, dust, occupational hazards, construction waste, aesthetic value impact among others,
- Waste management especially oil and grease from garage, organic waste from cafeterias, during operation
- Use of environmental resources such as water and electricity.
- Possible fire outbreaks
- Increase vehicular traffic in the area.

2.5. Construction process

The preparatory activities to be undertaken at the site will be site clearance. This will be followed by the excavation of the site to create trenches for use in laying footings for the development and for installing the underground fuel storage tank. Foundations will then be laid, and eventually the buildings. There will be use of machinery mainly for concrete mixing and lifting installations during the construction.

2.6. Construction technology to be used

The technology used in the design and construction of the buildings will be based on international standards, which have been customized by various petrol stations in Kenya. Buildings will be constructed stipulated in respective architectural structural details provided in the site plans. Basically, the building structure will consist of concrete appropriately reinforced with metal (steel and iron).

Concrete mixing and mobile elevator equipment will be installed during the construction. Others will include dump trucks and an assortment of hand tools. As such, dust and noise are likely to be issues of concern. This means that the contractor will undertake to use appropriate technology that will reduce the impact of both noise and dust at the construction site.

2.6.1. Dust control technology

The contractor will deploy dust control screens to mitigate the impact of dust during construction activities. The effectiveness of the screens will mainly depend on their sizes since fine screens are more effective compared to course ones. Their effectiveness will also be a function of how well the site is covered. Worn out screens will need to be replaced on a regular basis and the contractor will ensure that the site is secured with screens throughout.

2.6.2. Noise pollution control technology

Use of machinery at the site will be a source of noise for the neighbors. The contractor will therefore have an obligation to use suitable noise reduction strategies. For example the contractor could fit silencers to machines that produce noise. Another strategy will be for the contractor to locate noise producing machines as far away as practical from the residential area and to ensure that the machines are well maintained and lubricated to minimize collision, wear and tear noise.

2.7. Construction material

Structural construction of the site will largely apply ordinary materials that are not expected to have significant impact on the environment.

Among the material to be used include:

- Mined sand and building blocks
- Wood requirements for farm works will rely on sourcing from planted woodlots
- Cement - manufactured locally, to be obtained mainly from suppliers in within Mombasa
- Water fittings (pipes, valves and joineries) and other secondary materials such as, papers, polythene materials, fabrics etc.), will also be obtained from Mombasa.
- Paints and decorating materials will be sourced from local outlets in Mombasa.
- Electrical cables, lifts and other machinery will be sourced from Mombasa.

2.8. Proposed Use of Facility

The facility is intended for use of the following activities.

- Sale of fuel (petrol, diesel, and paraffin) and vehicle accessory parts,

- Servicing and washing of motor vehicles.
- Facility administrative functions
- The shops and restaurant will also provide their respective services to the clientele who include motorists and area residents.

2.9. Health and safety considerations

This is the most crucial part of the project. The following will be noted during all the various phases of the project.

- Care must be taken during delivery of raw materials so that trucks do not pose a danger to road users
- Due diligence will be observed to contain all the waste (solid and effluent) during all the phases of the development.
- The depth of the soakage pit will be undertaken to a level that does not contaminate ground water sources.
- All workers will be provided with safety gear and PPE during construction phase.
- With regard to the fire safety, fire fighting extinguishers will be installed in strategic areas of the facility.

2.10. Aesthetic value considerations

Though the proposed development scale is in keeping with other developments in the area, the proponent will appreciate the need to have minimal impact on the aesthetic value of the area especially in terms of maintaining the integrity of the surrounding properties.

2.11 .Alternatives to the project

2.11.1. The "No Project" Alternative

Though this alternative presents no additional environmental impacts, it does not add value to the status of the plot. This alternative will in addition to denying the Proponent, contractors, and other workers a reliable income, deny the potential clients

goods and services to be supplied by the facility. The government will also lose out on the revenue from the tax on materials and licenses related to construction of the building and operation of the facility.

2.11.2. The "Yes Project" Alternative

This option was considered as the most viable because of the following reasons;

- There will be employment creation
- It will contribute to addressing the high demand for petrol station related services
- The proposal is consistent with the existing land use character of the area
- Income to the government and other business ventures inform of taxes and levies.
- It will improve the development ranking of the area

3. BASELINE INFORMATION ON THE PROJECT AREA

3.1. Introduction

The following baseline information details on environmental, socio-economic and bio-physical characteristics of the site. It is expected that it will provide for a benchmark for continued monitoring and assessment of the impact of the proposed service station on the environment.

3.2. Administrative location and size

The project site lies in Kokotoni area, Kilifi county of Coast Province. The county borders Voi county to the north and the Indian Ocean to the east, Mombasa county to the south, Kwale county to the southwest and Taita-Taveta county to the west. The County covers an area of 12,464 sq km inclusive of about 109 sq km of water

3.3. Climate

The project site is located along the inland coastal belt of Kenya. The area is characterized by a tropical and monsoon climate with temperatures high throughout

the year. The rainfall pattern is bimodal with rainfall averaging at between 900-1000mm annually. The long rains come between March and July with a peak in May while the short rains are experienced between October and December.

Apart from the monsoon rains, the other dominant feature of the weather at the site is the heat and humidity. Maximum and minimum temperatures range between 26.5-34 and 22.5-24.5 respectively. The coastline experiences more than 6 hours of sunshine daily exceeding 8 hours between October and March. The relative humidity (RH) varies from a minimum of 74% in October to 81% in January and May.

3.4. Topography, geology and soils

Kilifi County has four major topographical features. These are;

- The Coastal plain,
- The Foot Plateau,
- The Coastal Range and
- The Nyika Plateau.

The proposed project site is located on the coastal range. The range varies in width between 3 km and 20 km. It lies below 100m above sea level except for occasional prominent peaks on the western boundary.

The soils on much of the project site area were observed to be mainly composed of clay - brown loamy soil. In general, however, the lithology of Kilifi County is composed of sedimentary rocks of the Mesozoic and Cenozoic eras. The sedimentary rocks consist of a variety of sandstones, siltstones, shales and limestone.

3.5. Land use

Agriculture, mostly of subsistence nature, is the main land use in the County. Tourism is also conspicuously present with tourism supporting facilities concentrated in the creeks, (Mida Kilifi and Mtwapa). The main commercial centres in the Kilifi County are Kilifi, Mtwapa and Mariakani towns. Mariakani is the nearest commercial center to the project site. The site is classified for mixed land use comprising of commercial, residential and industrial uses. However at the moment the land uses at the site include agricultural use as well.

A major challenge to the management of land use patterns in Kilifi is the lack of a master plan to guide development activities and dictate land use activities. Development and land use activities have largely been uncontrolled leading to the proliferation of informal settlements.

3.6. Demographic characteristics

3.6.1. Introduction

The population of Kilifi especially in its urban centers has been on the rise mainly due to rural urban migration, tourism and the influx of foreigners. In the Kenyan Coast as a whole, population distribution in the hinterlands is mainly affected by rainfall distribution, altitude, agro-ecological zones and administrative policy through which a number of settlement schemes have been created. The 2009 population census figures show that the County has a population of over 700,000 persons and a density of 144 persons per km² with a population growth rate of 3.05% against the national population growth rate of 2.49% (CBS 2009 estimate).

The local population is culturally heterogeneous. The largest indigenous ethnic group being the Mijikenda which is comprised of nine sub-tribes namely: Giriama, Digo, Rabai, Duruma, Kauma, Chonyi, Kambe, Ribe, and Jibana. Other indigenous Coastal ethnic groups are: Taita, Pokomo, Bajuni, Orma, Sagala, and Swahili. Due to its socio-economic dynamics which offer great opportunities for livelihoods and leisure, the Kenyan Coast and the project site in particular has over the years attracted a multiplicity of ethnic and racial groups.

3.6.2 Settlement patterns

Settlement patterns in Kilifi County are influenced by infrastructure network (roads, water, and electricity) and high agricultural potential zones. High population densities are found in Bahari, Kikambala and Kaloleni divisions along the tarmac road of Mombasa-Malindi and Mombasa-Nairobi up to Mariakani urban town. These areas are also well supplied with piped water and electricity. High population clusters are also found in Chonyi division and some parts of Kaloleni division where there are high potentials for agricultural production. Sparsely populated divisions in the County

are Ganze, Vitengeni, Bamba and some parts of Kaloleni division. These areas are rangelands and are less productive agriculturally. The three larger towns in the County (Kilifi, Mariakani & Mtwapa) have a total population of 100,000 (2009), which represents approximately 13% of the total County population.

3.6.3 Poverty index

Poverty in Kilifi County manifests itself, in the inability by the majority of the population to access basic needs due to geographical, economical and social-cultural barriers. The poverty index on the area is estimated at 50% and is slightly above the national average. Out of the 719,000 people in Kilifi County (2009), 35-65% are food poor and 43.02% hardcore poor meaning that they cannot meet the minimum food requirements even after spending all their income on food alone.

Within the adult population, 66.8% people cannot meet the minimum cost of food and non- food items essential for human life and hence are absolutely poor. In terms of gender, 45% of the poor are male and 55% percent are female.

Factors that contribute to the poverty incidence in Kilifi include climatic conditions, low levels of education and land ownership. Effects of the high poverty levels in Kilifi include high rate of school drop outs, deteriorating health conditions, worsening literacy levels etc. The immediate cause of poverty within the proposed project area has been attributed to landlessness, high and increasing cost of living, inaccessibility to credit facilities, lack of entrepreneurial skills, unemployment, low incomes and HIV/AIDS and discrimination at places of work.

In general, poverty has led to over-use and destruction of natural resources where short-term development goals are pursued at the expense of long-term environmental sustainability. There is need to ensure that environmental concerns are integrated into development planning and that development plans lead to empowerment of local communities to engage in sustainable livelihood activities. Hence the development proposal will contribute significantly to reducing the poverty index at a local level and the County at large.

3.7. Environmental quality

3.7.1 Water Availability

Kilifi County is generally water scarce both in terms of surface and ground water thus largely depend on piped water from the Mzima springs and Baricho water. The only permanent river is the Sabaki River that feeds the Baricho water works and crosses the northern part of Kilifi County. The others are temporary due to few catchment areas, sandy soils which have high infiltration and evapo-transpiration rates. Ground water resources are exploited along the coastline through shallow wells and boreholes but diminish as one ventures inland. This is because inland boreholes have to be deep and in most cases the water quality is poor; hard, mineralized and saline.

3.7.2 Solid waste and sewerage issues

The main waste generation sources are domestic, commercial ventures, hotels, markets, industries and institutions including health facilities. The types of waste that are generated can be classified as follows:

- Mixed heavy plastics -Soft drink bottles, detergent bottles, cooking oil/fat bottles, household plastics etc;
- Mixed light plastics - Shopping bags, wrapping films, waste collection bags
- Rubber - Old tires, shoe soles etc;
- Mixed paper - Books, office paper, newspapers carton pieces etc;
- Metals -Pieces and sheets of aluminum, steel and other metals;
- Mixed glass - Coloured and non-coloured, broken or whole glass bottles, panes, household glass items etc;
- Organics - Food remnants, wooden debris, yard waste etc;
- Biomedical waste- waste from hospitals, dispensaries and medical clinics.

All types of waste are transported to disposal sites including hazardous types containing pesticides, heavy metals, oils, batteries, acids, domestic and hospital wastes. The private sector has initiated ways to address the problem of waste management through construction of compost pits in areas where collection is limited and providing waste disposal services to complement those provided by the County Council.

The entire Kilifi County Council has no sewerage infrastructure. Hence the common methods for disposal of human wastes is through pit latrines and septic tank and soak pit systems. The area proposed for the development is characterized by use of septic tanks and soak pits which are later emptied by private liquid waste handlers.

The problem is compounded by the fact that the local authority has not developed by-laws guiding generation and disposal of liquid waste. It relies on the Public Health Act Cap 242, which is inadequate in seeking lasting solutions to the problem of liquid waste. There is little evidence of adherence to the Water Act 2002 that stipulates the requirements for boreholes and pit latrines are located at far distances to protect ground water sources from contamination.

3.7.3 Protected areas

Gazetted forests, kayas and marine parks constitute the protected areas in Kilifi County. The gazetted forests include a section of the Arabuko Sokoke forest and mangrove forests mainly found at Takaungu, Kilifi creek, Mtwapa creek and part of the Mida creek in Uyombo, with an area of approximately 880Ha. The kayas (sacred forests) include Chonyi, Kambe, Ribe, Jibana, Kauma and Kaya fungo. The marine parks and reserves include, part of the Mombasa marine and National Reserve, Watamu-Voi Marine National park and Reserve (coral gardens) and part of the Voi Marine and National Reserve. The part of Arabuko Sokoke forest which falls in Kilifi County constitutes 19,000 Ha out of the 37,000 Ha .The forest is situated between Kilifi creek and The Sabaki River. The forest has a very high biological diversity. It is one of the important sites for bird conservation in Kenya (Kesley and Langton). Six of the bird species listed as rare in the ICBP/IUCN Bird red data book occur in this forest. Two of these bird species, the Sokoke Owl (Otus arena) and the clerk's weaver (Ploceus golandi) are found nowhere else in the world except in this forest. In addition to the endemic bird species, Arabuko Sokoke is also home to other terrestrial fauna. For instance it is the only known home for the endangered Cephalophus adersi, the frog Leptopelis flavomacculatus, and two butterfly species, the Charaxes protocles and the Charaxes lasti.

3.7.4 Flora and Fauna.

Human interference and particularly agriculture have greatly modified the original floral and faunal status of the County. Several vegetation types including coastal dunes, woodlands, bush lands and savannas are encountered from the shoreline inland.

3.8. Infrastructure

3.8.1 Roads

Most rural areas at the coast are served with a dilapidated and narrow road network contrary to most urban centers such as Mombasa, Kilifi and Kwale which are well served by both classified and non-classified roads. The road networks are greatly influenced by existence of important industrial, tourism and commercial centers. Except for the Mombasa-Voi highway most of the roads in Kilifi are murram. The proposed development area has a good road network and will rely on the Mombasa-Voi Highway for transportation.

3.8.2 Telecommunications.

The site being in a residential, commercial and agricultural area is served by all types of telecommunication facilities. Mobile networks are available and fixed landlines provided by Telkom Kenya. Accessibility to *scratch* cards will be improved with planned shops.

3.9. Energy supply.

The main source of energy supply in the area is electricity from the Kenya Power and Lighting Company. However, this is mostly supplemented with diesel powered generators in times of power blackouts. A number of facilities have also ventured into harnessing solar energy by use of solar panels and accumulators. Wind energy has also been sparsely used especially in pumping water from boreholes in the remote parts of the County. In the rural areas, main energy sources are fuel wood, charcoal and paraffin. The proposed development will rely on majorly on electricity.

4. INSTITUTIONAL AND LEGAL FRAMEWORK

4.1 Introduction

Development activities have the potential to damage the natural resources upon which the economies are based. A major national challenge today is how to maintain sustainable development without damaging the environment. Among environmental problems being experienced include land degradation, loss of biodiversity, environmental pollution, and water management. This situation is aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. In addition, there is limited involvement of the local communities in participatory planning and management of environment and natural resources. Recognizing the importance of natural resources and environment in general, the Kenya Government has put in place a wide range of policy, institutional and legislative measures to address the underlying causes of environmental degradation in the country.

4.2 Environmental Policy

The broad objectives of the national environmental policy include:

- Optimal use of natural land and water resources in improving the quality of human environment.
- Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of the future generations.
- Encourage concern and respect for the environment, emphasize on every Kenyan's responsibility in environmental performance and ensure appropriate operating practices and training of generations.
- Integrate environmental conservation and economic activities into the process of sustainable development.
- Meet national goals and international obligations by conserving biodiversity, arresting desertification, mitigating effects of disasters, protecting ozone layer and maintaining ecological balance on the earth.
- Communicate with the public on environmental matters to facilitate

improvements in environmental performance.

- Undertake appropriate reviews and evaluations of developmental plans and operations to measure their progress and to ensure compliance with this policy.

4.3.Institutional Arrangements

Some of the key institutions dealing with environmental issues in Kenya include the National Environment Management Authority (NEMA), the Forestry Department, the Kenya Wildlife Service (KWS), the Kenya Forestry Research Institute (KEFRI), the National Museums of Kenya (NMK), the Kenya Agricultural Research Institute (KARI), the Permanent Presidential Commission on Soil Conservation and Afforestation, the Kenya Marine Research Institute (KMFRI), Regional Development Authorities and Public Universities.

Other than these there are local and international NGOs involved in environmental issues in the country. The main international agencies involved in environmental issues in Kenya include Environmental Liaison Center International (ELCI), International Union for the Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund for Nature (WWF), United Nations Environment Programme (UNEP).The local NGOs include East African Wildlife Society (EAWLS), the Green Belt Movement, Forest Action Network (FAN), African Water Network (AWN), Wildlife Clubs of Kenya (WCK), Environmental Trust of Kenya (ETK) and Friends of Lake Victoria (OSIENALA) among other Non Governmental Organizations and Community Based Organizations. International and regional NGOs active in the coastal area include Coral Reef Degradation in the Indian Ocean (CORDIO) AND Coral Reef Conservation Programme (CRCP). Of these institutions, NEMA plays the regulatory role in the management of environment in the country.

4.2. Institutional arrangements relevant to the project

Although there are many institutions (over 20) relevant to environmental management in Kenya as envisioned under EMCA, 1999, the ones relevant to the above project and their functions are summarized in the table below.

Table 1 Summary of Institutional Arrangements Relevant To The Proposed

Project

Institution	Envisioned role in the proposed project	Project phase required
National Environment Management Authority	Issuance of EIA license and monitoring for compliance with conditions and environmental law	Implementation, operation and decommissioning
Town council of Kilifi	Approval of development plans and inspections. Issuance of single business permits for the operations of the facility.	Implementation, operation and decommissioning
Kilifi Water and Sewerage company	Supply of water for the business premises, Connections to sewerage system	Implementation, operation and decommissioning
Occupational Health and Safety Department	Ensure safety of workers, neighbors & construction site and during the operational phase of the establishment of the petrol station services business	Implementation, operation
Private sector	Collection of solid wastes	Implementation, operation, decommissioning

4.3. Legal Framework

The legal provisions on environmental protection have been discussed in several statutes, which touch on various aspects of the environment. In 1999, Kenya consolidated legislation for the protection and management of the environment. The following pieces of legislations and regulations are applicable to the environmental, health and safety aspects related to the proposed project.

4.3.1 The Constitution of Kenya, 2010

The Constitution of Kenya 2010 is the supreme law of the land. Any other law that is inconsistent with the Constitution is null and void to the extent of the inconsistency. Further any action by an individual or a State organ that contravenes the Constitution is null and void.

Relevance to the Project

- The proponent has a right to carry out the project within legal limits;
- The proponent must ensure that the development is carried out in an ecologically, economically and socially sustainable manner;
- The proponent is entitled to a fair administrative decision making process from NEMA and other State organs;
- The proponent must ensure that all the applicable provisions of the Constitution are observed at all times.

4.3.2. The Environmental Management and Co-ordination Act, 1999

The purpose of this Act is to improve the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment so as to enhance the national capacity for its effective management. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment in line with national objectives and the sustainable development goals enunciated in Agenda 21 of the Earth Summit held in Rio de Janeiro in 1992. The Act is important like for instance in the case of the current project, it will ensure the harmonization of the workings of the institutions indicated in the table above. In almost all instances, the NEMA EIA license is a precursor to the implementation of the other legal provisions especially at the project implementation stage.

To administer the Act, two major institutions have been established. They include the National Environmental Council (NEC) and the National Environmental Management Authority (NEMA).

4.3.3 The National Environmental Council (NEC)

NEC is chaired by the Minister for Environment and Natural Resources with membership from all relevant ministries as well as a broad range of other interests. It functions to formulate national policies, goals, and objectives and the determination of policies and priorities for environmental protection. The council also promotes co-operation among all the players engaged in environmental protection programmes.

4.3.4. The National Environmental Management Authority (NEMA)

NEMA is a corporate body responsible for the administration of the above legislation. The Director General appointed by the President heads NEMA. The NEMA functions include the co-ordination of various environmental management activities, initiation of legislative proposals and submission of such proposals to the Attorney General, research, investigations and surveys in the field of environment. They also undertake to enhance environmental education and awareness on the need of sound environmental management. In addition, NEMA will advise the Government on regional and international agreements to which Kenya should be a party and issue of an annual report on the state of environment in Kenya. NEMA is charged with the responsibility of the execution of Environmental Impact Assessment (EIA) as per the requirements of the proposed project.

Although the overall environmental law relevant to the development and occupation of the commercial building is the Environmental Management and Coordination Act (EMCA, 1999), there are other pieces of legislation and regulations that are applicable to the social, environmental, health and safety aspects.

4.3.5 Legal Notice No. 101: Environmental Impact (assessment and audit) Regulations, 2003

Legal Notice No. 101 stipulates the ways in which environmental experts should conduct the Environment Impact Assessment and Audits in conformity to the requirement stated. It is concise in its report content requirements, processes of public participation, licensing procedures, inspections and any possible offences and penalties under the Act.

Project relevance: Acquisition of EIA license to commence petrol station construction and operations as well as allow for approvals from other government departments and build neighborhood support for the entire project.

4.3.6 Legal Notice No.120: Kenya Gazette Supplement No. 68 - Environmental Management and Coordination (Water quality) Regulations, 2006

Water quality regulations were gazetted in 2006 as legislative supplement to mainly address the challenges of pollution of water sources and conservation. It consists of VI

parts and eleven schedules dealing with protection of sources of water for domestic use to miscellaneous provision. Effluent discharge and water for industrial use are dealt with under part III which sets out the following among others:

- Discharge into the environment;
- Discharge into public sewers;
- Discharge monitoring, and;
- Application for effluent discharge license.

Part II, 6, (a) specifies the need for a discharge license. It states in that part "No person shall discharge any effluent from sewage treatment works, industry or other point sources without a valid effluent discharge license issued in accordance with the provisions of the Act. Part III, 12 (1 & 2), 13 and 14 sets out the need for adherence to the discharge standards specified in the third, fifth and sixth schedules. The monitoring guides for discharge into the environment are provided under schedule IV.

Project relevance: Importance in protection of ground water sources and meeting standards for discharge of effluent to municipal sewer line. Also ensure water for use by workers at the station meets drinking standards.

4.3.7 Legal Notice No.121: Kenya Gazette Supplement No. 69-Environmental Management and Coordination Act (Waste Management) Regulations, 2006

In pursuit of the provisions of the Environmental Management and Coordination Act, 1999, NEMA, in 2006 gazetted the waste management regulations focusing on management of solid wastes, industrial wastes, hazardous wastes, pesticides and toxic substances and radioactive substances The regulations are aimed at addressing the following concerns;

- Reduction of waste through adoption of cleaner methods of operation;
- Responsibilities for waste generators and obligations for disposal;
- Proper transportation and disposal of wastes;
- Management of waste disposal sites;
- Waste treatment requirements;
- Application of existing regulations in relation to waste management;
- Licensing of waste handlers and disposal sites;

- Licensing fees and procedures for waste handlers and pollution penalties.

Project relevance: Fulfill the responsibilities of a waste generator by separating the waste at source before collection**.** Ensure there exists proper contractual agreements with NEMA licensed solid waste handlers and those solid wastes are disposed in the manner prescribed.

4.3.8 The Water Act No. 8 of 2002 (Effective implementation of provisions in 2003)

The Act provides for effective management of the water resources in Kenya.

Project relevance: Ensure conservation of water resources through recycling and minimizing wastage.

4.3.9 Occupational Health and Safety Act (OSHA) No. 15 of 2007

The OSHA No. 15 of 2007 repealed the Factories Act, Cap 514 Laws of Kenya which had been originally adopted in 1962 and revised in 1972, underwent further and extensive amendments in 1990. The provisions of OSHA have far reaching implications on safety and health at the work place. The OSHA sets out to make provisions that aim to eradicate or minimize accidents at the work place. Throughout the world, work related accidents are a major concern for Governments and industry, the hospitality industry included. The ILO estimates that there are over 250 million work related accidents per year; 160 million work related ill health every year and that 3000 people are killed at work per day. Many of the accidents could be avoided if appropriate safety practices and information were used. Work related accidents affect not only the injured employee, but others as well – employers, family, co-workers, clients, suppliers, community etc.

Of particular importance to the proposed project is the requirement that all work places must be registered with the Department of Occupational Safety and Health Services. Further, there is a requirement that a Safety and Health Committee must be put in place and employees and members of this committee must be inducted and trained on the provisions of the Act accordingly. The Act imposes various obligations on both employers and employees.

These are all necessary for the health and safety of persons accessing and using the premises of the proposed project. Strict provisions are made for in respect of

equipment containing self acting machines, hoists and lifts and the requirement for supervision and training of inexperienced workers. Further an abstract of the company's safety and health policy should be exhibited at a conspicuous location within the property.

Project relevance: Strict provisions are made for self acting machines, hoists and lifts and the requirement for supervision and training of inexperienced workers. This is applicable during the entire project cycle and will involve the prevention of accidents at the workplace and provision of personal protective equipment (PPE) to all workers and ensuring their use.

4.3.10. The Public Health Act- Laws of Kenya, Chapter 242

The Act prohibits activities that may be injurious to health. It then becomes the responsibility of the local authority to maintain clean and sanitary conditions. This affects the cleanliness of a premise, the quality of water supplied for drinking purposes, the types of wastes discharged and possible air emissions that may be injurious to health. Under this act the proposed facility must be kept clean, daily removal of accumulated dust from floors, free from effluvia arising from any drain, sanitary convenience or nuisance and without prejudice to the generality of the foregoing provisions.

Project relevance: Applicable during the entire project cycle in ensuring those proper and hygienic methods are used. Maintain the completed facility according to standards, ensure access to safe drinking water and put measures to prevent activities that would be a nuisance to the public. All workers at the cafeterias handling food should be immunized accordingly.

4.3.11. The Physical Planning Act, (Cap. 286)

The local authorities are mandated under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section therefore allows for the prohibition or control of the use and development of land and buildings in the interests of proper and orderly forms of development in the area. Section 36 of the Act allows local authorities to order for the project to comply with NEMA regulations i.e. EIA reports if the authority deems that the project has

injurious impacts on the environment.

EMCA, 1999 stipulates the procedures for conducting the EIA process and recommends annual audits to monitor progress of implementation and environmental performance. In general, this Act provides for the preparation and implementation of physical development plans. They formulate national, regional and local development policies, guidelines and strategies. The director also advises the Commissioner of Lands on appropriate uses of land and land management. The Act directly prohibits or controls the use and development of land and buildings in accordance to the projected development plans of the area.

Project relevance: Applicable during the entire project cycle. The proponent should obtain requisite operational licenses from the Town council of Kilifi.

4.3.12. Building Code 2000

Section 194 requires that where a building exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and all the waste water must be discharged into sewers. The code also prohibits construction of structures or buildings on sewer lines.

4.3.13. Petroleum Act Cap 116

Current legislation regulating installations of facilities using petroleum products is contained in the Petroleum Act, Cap. 116. It sets out numerous requirements relating to fire precautions and emergency preparedness. An effort to enact a new Petroleum Bill 2002, which had more stringent environmental, health and safety provisions, was not passed by parliament. The following Petroleum Rules are defined in the Petroleum Act.

- Storing petroleum products is prohibited within a municipality or a township in a building the sides or roof of which are wholly or mainly constructed of inflammable material;
- Petroleum in bulk must be stored in an installation, while petroleum not in bulk must be kept in a storage shed;
- An application for the grant of a license is required to be accompanied by specifications and plans indicating the following:
    -

he premises to be licensed

- The position of the premises in relation to adjoining property, and
- he position and capacity of all tanks, storage sheds and filling stations, the position of all buildings, structures or other works within the installation, and the manner in which the petroleum is to be stored,
- ll lighting arrangements.

- ontainment capable of holding not less than 5% of the total capacity of the tanks should be provided where petroleum storage is above ground;
- license issued by the Minister for Energy is required, but must be approved by the local authority if the petroleum is to be stored within a municipality or a township.

Additionally, the Rules and conditions of the license are known to, and observed by, all persons employed in or about the licensed premises, and that unauthorized persons do not have access to the licensed premises.

Project relevance: Applicable during the entire project cycle, where the proponent is required to adhere to all the Acts provisions.

4.3.14. The Energy Act No. 12 of 2006

The Act seeks to amend and consolidate the law relating to energy, to provide for the establishment, powers and functions of the Energy Regulatory Commission and the Rural Electrification Authority, and for connected purposes.

4.3.15. The Energy Regulatory Commission (2007)

Energy Regulatory Commission (ERC) was established as an Energy Sector Regulator under the Energy Act, 2006 in July 2007. ERC is a single sector regulatory agency, with responsibility for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review,

licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.

The Energy Act states in Section 5(a) (ii) that the objects and functions of ERC include regulating the importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products. Therefore one of the functions of the ERC is licensing of petroleum import, export, transport, storage, refining and sale. Construction Permits are also to be issued by ERC for all petroleum related facilities in order to check proliferation of substandard sites. All petroleum operators are required to comply with provisions for Environment Health and Safety. Petroleum products should also meet the relevant Kenya Standards.

Project relevance: Proponent should adhere to all provisions relating to supply of petroleum as per the act in the entire project cycle.

4.3.16. Kilifi Town Council By-laws

The council by-laws prescribe the necessary easements required for the establishment of any project. This includes approval of the development plans and issuance of inspection reports upon completion of the project.

Project relevance: Applicable during the entire project cycle.

5. PUBLIC CONSULTATIVE PROCESS (PCP)

5.1 Introduction

Projects, Facilities and activities particularly those having potential impacts on the environment, are required by EMCA, 1999 and its subsidiary regulations on Environmental Impact Assessment and Environmental Audit, to undertake a public participation exercise to allow the local Residents and various stakeholders to fully understand the objectives and implementation of the proposed project. It also helps in understanding the habits, preferences, needs of the affected persons, potential adverse and beneficial impacts, their associated mitigation measures and the anticipated results. In this regard a public consultation exercise was carried out within the project area where the relevant stake holders were interviewed orally and through questionnaires which were administered directly to them.

5.2. The Key Informants, Government Departments and Lead Agencies

Among the key informants were the nearby facilities and local residents within the project area who were interviewed and gave their consent to the construction of the petrol station. They approved the project to continue, as they do not have any objection to the exercise. *The questionnaires from various stakeholders are attached as appendices.*

Based on the issues of concern presented from the results of the questionnaire administration, the major neighborhood concerns that demand mitigation were identified as:

- Fire safety/ danger of explosions and possibility of loss of lives and property;
- Noise and dust during construction and operational phases;
- Increased traffic;
- Potential possibility of oil spills;
- Waste management, and;
- Fumes and gases emission.

Expected benefits of the project included:

- Provision of employment and subsequent income during construction and operational phases of the project;
- Security of the surrounding area will be enhanced especially due to lighting;
- Convenient supply of fuel especially kerosene to the local residents;
- Convenient supply of other household goods and foodstuff;
- The government will accrue revenue.

6. PROJECT IMPACT IDENTIFICATION AND ANALYSIS

6.1. Introduction

The impact identification brings together both the environmental baseline and project

characteristics in the previous sections. The development will change both the biophysical, environmental and socio-economic character of the proposed project area. Environmental impacts are expected to arise from the construction, operation and possible decommissioning phases. This assessment is done for all the phases.

6.2. Project construction phase

6.2.1. Positive impacts

6.2.1.1. Employment

During the project planning and design, the project Proponent has already employed consultants including Architects, Quantity Surveyors, Engineers and EIA consultants. At construction stage the contractor will deploy workers to help in the construction activities. This will include both skilled and unskilled personnel especially from the local population. Food vendors are likely to enjoy additional market from the demand created by those who will be working at the construction site.

6.2.1.2. Income to the local community

During construction, suppliers of raw materials will benefit by increased sales food vendors are likely to enjoy additional market from the demand created by those who will be working at the construction site. If the economic labor policy is focused on the local community, they will earn an income.

6.2.1.3. Income to the government in terms of taxes

The government intends to get income/revenue in terms of taxes generated during the acquisition of licenses. The construction material to be used during construction will also be taxable (16% VAT). There will be a 0.05% of the total cost of the project which will be paid to the government. Through the revenues generated, the government will be capable of financing its obligations to her citizens.

6.2.2. Negative Impacts

6.2.2.1. Impacts on physical environment

The land preparation activities during construction phase will cause some destruction to the physical environment. The impacts on soil will be localized and will be caused by:

Excavation

Excavation creates loose soil that is easily carried away by water or wind. This causes

soil erosion and disturbance in soil quality. However it should be noted that vegetation cover will be restored in areas not covered by buildings once the construction is completed.

Soil Compaction

Construction activities are normally accompanied by some form of compaction. Compaction seals the soil on the surface hence hindering the penetration of air or water beneath the surface. This limits the aerobic activities of the organisms underneath the soil, hence affecting soil productivity. Compaction also hinders the infiltration of water into the surface increasing the surface run-off and the possibility of flooding downstream of the site.

6.2.2.2 Occupational health and safety hazards

Workers and visitors at the construction site are primarily exposed to the associated occupational health and safety hazards including but not limited to the following:

- Injuries from falling objects, moving machine parts;
- Minor cuts and bruises on body;
- Accidental falls;
- Noise and dust disturbance and irritation respectively.

6.2.2.3. Dust impact on air quality

In the construction phase dust would be expected from excavation of soil and movement of vehicles. If generated in large quantities dust may present a respiratory hazard and also cause visual intrusion hence presenting accident risks. Dust is also a mechanical irritant to the eye.

Air emissions would also be expected from exhausts of vehicles delivering construction material. Stand-by generators that may be brought in to serve during power shortages are likely to release some emissions to the atmosphere. However, the emissions would not be toxic if the generators will be new or regularly serviced.

6.2.2.4. Noise

Noise is expected from movement of vehicles and construction equipment. Noise would also arise from construction activities at the site such loading and offloading of material, carpentry and masonry activities. However construction activities will be restricted to daytime only so as to reduce the impact of noise.

6.2.2.5. Solid waste

Large amounts of solid waste will be generated during construction phase of the project. This will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, plastic paper bags, empty paint containers among others.

6.2.2.6. Possible fire outbreaks

Flammable liquids such as fuels and lubricants may have to be kept within the site for use in vehicles and construction equipment. Accidental leakage or spillage of such substances may result into fires, which can cause considerable losses in terms of injury to persons and damage to property.

6.2.2.7. Increased traffic

This will occur as contractors' vehicles bring in deliveries at the site and as workers leave or come to the site.

6.2.2.8. Increased water demand

Construction projects utilize significant quantities of water for mixing and casting concrete. Water will also be required for human use including drinking and sanitary needs.

6.3. Operational phase

6.3.1. Positive Impacts

6.3.1.1. Income to the Proponent

The Proponent will accrue income from sale of goods and services at the facility

6.3.1.2. Employment creation

Employment opportunities will arise from the need for managers, mechanics, security officers, sales people among others. The Proponent will further source for services in waste management, pest control thus indirectly create employment for the services providers.

6.3.1.3. Supply of fuel and petrol station related services

Owing to its location, the petrol station will serve as a convenient supply of fuel both for the motorist and surrounding residents. Therefore the neighbors will be served by the proposed petrol which will be cheaper than the retailers and close to them.

6.3.1.4. Security enhancement

It is expected that the lighting at the petrol station will also illuminate the surrounding areas. Owing to the fact the petrol station will be operational throughout the night security within the area will be enhanced.

6.3.1.5. Revenue to the government

Operating the facility will require a number of legal licenses for which the statutory fees will be paid to the government. The goods to be supplied also attract tax payable to the government.

6.3.2. Negative impacts

6.3.2.1. Zoning and visual impacts

The facility is expected to alter the appearance of the area as new building will come up. Previously existing views may also be blocked by the new buildings.

6.3.2.2. Increased traffic

Due to the nature of activities of the facility it is expected that a lot of vehicles will be moving in and out of the facility thus increasing traffic along the access road.

6.3.2.3. Noise

The movements of vehicles, offloading and loading activities are expected to generate noise. However the noise levels are not expected to be significantly higher than those of the background environment, considering that the facility is near a busy highway.

6.3.2.4. Effluent generation

The facility is expected to generate waste water consisting of sanitation waste (from toilets) washout from wash bay and garage waste water from kitchen and general cleanliness. Ground water sources may be polluted if the effluent generated is not managed in an appropriate manner.

6.3.2.5. Waste oil

The services provided at the petrol station especially in the garage will generate waste oil that will need to be managed appropriately.

6.3.2.6. Occupational hazards

Occupational hazards associated with the operations of the facility in clued but are not

limited to the following:

- Injury to workers from moving machine parts in the garage;
- Accidental falls;
- General exhaustion due to long hours of standing;
- Motor accidents.

6.3.2.7. Increased water demand

The operation of the facility will exert an extra demand on water, as it would be required for sanitation purposes, in wash bays among other uses.

6.3.2.8. Increase in energy demand

Operations of the facility will require a significant amount of energy, mainly electricity for powering machine and equipment. Fossil fuel energy in form of gasoline for vehicles, LPG for cooking will also be used. Since all these forms of energy are obtained from the environment, an additional demand translates to additional pressure to the environmental resources from which the energy is obtained.

6.3.2.9. Possible collapse of the buildings

This could happen if construction works are carried out without supervision of qualified professional like Architects and Engineers. Unethical practices and lack of professionalism can also result to building collapsing. The impacts of this magnitude have far reaching implications. The consequences will be death, serious injuries and total financial loss to the Proponent. Another cause of building collapse is the use of poor quality construction materials.

6.3.2.10 Solid waste

Both organic and inorganic wastes are expected to be generated from the facility. Organic forms will include cafeteria waste, papers from administrative activities and garden waste from landscaping. Inorganic wastes will include plastic films, liquid substances containers, metal pieces, etc.

6.3.2.11. Fire hazards

Accidental leakage/spillage of substances, electrical faults are some of the possible causes of fire, which can cause considerable losses in terms of injury to persons and damage to property.

6.3.2.12. Accidental spills

Fuel and lubricants can accidentally spill during the course of their use. It is important that the station has a management strategy for both accidental and other spills. Such oils spills may occur due to leakages or negligence and have a high potential of causing soil and water contamination and hence having detrimental effects on the surrounding environment.

Further the oil and fuel spills can lead to downstream effects whereby the polluted water or soil finds its way in the storm water drain and eventually in large water body and pollutes the whole ecosystem downstream.

6.3.2.13. Hazardous substances

Some of the items to be used in the car wash and for general cleaning can be harmful. Exposure to them through use, accidental spillage or leaks, can cause respiratory problems, dermatitis or chemical burns.

6.4. Possible decommissioning phase

6.4.1. Positive impacts

6.4.1.1. Income to hired workers

Besides the consultants who would undertake a decommissioning audit, those hired to carry out the actual demolition will also earn an income.

6.4.1.2. Recovery of construction material

Upon demolition reusable construction materials will be recovered. These can be used in other constructions and thus reduce the pressure on environmental resources.

6.4.2. Negative impacts

6.4.2.1. Economic decline

The national economic gain got from the investment activities will be lost in the event of decommissioning of the development.

6.4.2.2. Insecurity

Insecurity may result from the site being abandoned following the decommissioning. Unoccupied structures within the site may act as a den for criminals, and the security boost that had been provided by residents living within the development would be lost.

6.4.2.3. Safety risks

Decommissioning of projects would normally be accompanied by safety risks from any

leftover electrical cables, uncovered manholes and structures that may collapse and injure passers-by if left on site for a long time. There may also be environmental hazards from exposed left over substances which may cause soil and water contamination or generate noxious odor.

7. IMPACT MITIGATION AND ENVIRONMENTAL MANAGEMENT PLAN

7.1. Introduction

This chapter deals with the plan for the mitigation of anticipated adverse environmental impacts while enhancing beneficial impacts of the proposed project. The project's environmental mitigation plan has been drawn in accordance with legislative and regulatory frameworks on environmental and socio-economic aspects. In addition possible treatment and prevention measures have been discussed in this chapter.

7.1.1. Construction Phase

7.1.1.1. Land preparation activities & impact on physical environment

The environmental impacts associated with land preparation activities will be mitigated in the following ways;

- Landscaping of disturbed areas - planting trees and suitable indigenous grasses around the building, during construction where possible and as soon as the construction is completed.
- Controlling of earthworks to prevent compacting the loose soils.

7.1.1.2. Occupational Health and Safety

To ensure the health and safety of workers at the site, the contractor and the proponent must establish an Occupational Health and Safety Management System (OHSMS) which will be managed and operated for the proposed construction activities. The system will basically contain the following features:

- Occupational Health and Safety Policy;
- Organizational Framework of the OHSMS;
    - Staffing of OHSMS
    - Competence requirements
    - Operating procedures

  - Training programmes
  - System documentation
  - Communication
- OHSMS objective;
  - Hazard prevention
  - Risk assessment
  - Prevention and control
  - Management of changes
  - Emergency preparedness and response
  - Procurement (tools, equipment, services, contractors)
- Performance monitoring and measurements;
  - Hazard prevention measures
  - Ambient working environment
  - Occurrence of work related injuries, ill health, disease and injuries
  - Record keeping with regard to occurrence of incidents and actions taken
- Evaluation.

7.1.1.3. Safety of workers at the construction site

The levels of implementation of occupational health and safety considerations at the workplace should begin with the deliberate effort by the contractor and the proponent to protect the employees at the construction site. In this regard this proposal makes the following recommendations:

- Provision of appropriate and adequate Personal Protective Equipment (PPE) to employees;
- Enforcement and proper use of PPE by all construction workers;
- Provision of appropriate tools, equipment and machinery in sound working conditions to employees;
- Develop clear policies on treatment of injured personnel;
- Provide insurance cover to workers on site;
- Reduce employees' exposure to dust and noise at the workplace.

7.1.1.4. Safety of visitors, neighbors and general public

The proponent and the contractor will have an obligation to put in place measures that will protect the construction site visitors, neighbors and the general public in the following ways:

- Visitors to the project site must be provided with protective clothing at all times;
- Inform all neighbors in writing on the commencement of the project at least two weeks in advance;
- Restrict access to the site by the public by fencing off the construction site;
- Limit construction work to daytime only to avoid unnecessary noise at night to neighbors;
- Heavy Commercial Vehicles accessing the site to deliver construction materials must observe speed limits;
- Placing notices and safety slogans at strategic points to inform and educate neighbors and the general public displayed at the entry of the construction site and around the perimeter fence informing general public of ongoing construction and safety requirements;
- Provide for security services at the site.

7.1.1.5. Tools, Equipment, Machinery Use and Electrical Safety

During construction work, it is expected that different machines, tools and equipment such as dumpers, cement mixers, elevators and excavators will be used. Most of this equipment will be powered internally by use of diesel. In regard to electrical safety, the following will have to be undertaken:

- Installation and fitting of proper electrical system to enable supply of electrical energy to utility point;
- All electrical installations and fittings are done according to electrical safety rules;
- All electrical wires must be safely insulated;
- Sockets and other electrical outlets must be securely fitted;
- When not in use all machines should be put off;
- Qualified and well-experienced electrician should be hired to carry out all electrical works in the building;
- Safety slogans should be strategically posted as a reminder to employees;

- All machine operating manuals should be clearly archived and availed for use when needed;
- Each machine operator should be conversant with the use of machine operating manuals.

7.1.1.6. First aid

- It will be the responsibility of the contractor to ensure that first-aid services are provided to employees at all times;
- An appropriately equipped first aid station to be easily accessible at the construction site;
- There shall be a well trained first aider on site at all times during construction;
- An eye-wash station and/or emergency shower shall be provided where the recommended first aid response is immediate flushing with water;
- The first aid station shall be equipped with gloves, gowns and masks for protection against direct contact with blood and other body fluids;
- A written emergency response plan will be in place and drills conducted to familiarize employees.

7.1.1.7. Ambient factors in the construction site

Noise levels

- Employees not to be exposed to noise levels greater than 85 dB (A) for a duration of 8 hours per day;
- No unprotected ear to be exposed to peak sound pressure level (instantaneously) of more than 140 dB (A); and the use of ear protectors must be actively enforced.

Respiratory hazards

Exposure to dust to be controlled by ensuring:

- dust accumulation at workplace is contained;
- Equipment to be selected for use, priority should be given to those with in-built dust extraction systems;
- Employees exposed to dust should be given disposable dust masks.

7.1.1.8. Dust management strategy

In the management of dust at the site, the contractor will ensure that the following mitigation measures are implemented:

- The contractor will secure the site using appropriate dust screens;
- Building materials that are likely to produce dust such as ballast should be sprinkled with water before use;
- - Access road and dust surfaces at the construction site should be sprinkled with water;
- Employees will be provided with appropriate dust masks.

7.1.1.9. Noise abatement

Moderate noise levels are expected in the area during the construction phase. In line with the Legal Notice No. 61 (Noise and Excessive vibration pollution control) Regulations, the following mitigation measures are proposed to deal with noise emanating from the site:

- Shielding the site from the surrounding areas;
- Restricting construction activities to day time only;
- Ensuring that noisy construction equipment are fitted with silencers where possible;
- Providing workers with PPE for noise impact reduction.

7.1.1.10. Workforce effluent

Procure a portable toilet facility to be emptied at appropriate intervals

7.1.2. Operational phase

7.1.2.1. Fire Hazards/ explosions mitigation

The risk of fire and explosions emerged to be of paramount concern to the neighbors of the proposed petrol station. The following measures will be put in place to reduce the likelihood of fires and explosions and to considerably manage such situations in case of occurrence:

- The fuel storage tanks to be installed have undergone thorough calibration, pressure checks, and leakage tests and have been passed as safe for use by an

accredited company;

- Installation of the storage tanks will also be done by an accredited company to the standards specified in the Petroleum Act Cap 116, Part III which highlights the methods of storage of petroleum products;
- Fire extinguishers, fire hydrants and fire alarms will be provided at convenient locations within the buildings. These will be regularly inspected and maintained by a reputable fire security company;
- Fire drills will be conducted at least biannually to ensure that workers are conversant with the action to take in the event of fire or explosions;
- Fire awareness materials will be placed in strategic locations within the petrol station to educate the workers and customers on what to do in the event of fire;
- An elaborate emergency response plan will be developed to address the risks associated with petrol station operations;
- Leak detection devices will also be installed at appropriate areas to warn on leakages that are likely to trigger fires. Workers will be trained on handling accidental spillage of flammable substances that may also trigger fires;
- 'No smoking' signs will be displayed as appropriate and measures taken against those not adhering to this order.

7.1.2.2. Solid waste & effluent management

It is expected there will be a generation of both solid and liquid wastes. Solid wastes are likely to consist of paper, plastic containers, tyres, metals and organic waste from the cafeterias. On the other hand liquid wastes shall mainly include waste oils, lubricants, and effluent from the sanitation facilities installed for use by the staff and customers. The proponent will address solid waste in the following ways:

- Sale of recyclables and reusable materials to minimize waste for disposal;
- Contracting a licensed waste handler to collect and dispose of the waste;
- Establishing a waste generation and collection register for tracking the disposal of waste;
- Installation of receptacles that enhance segregation of waste at source at

strategic places in the petrol station as provided for Legal Notice No 121 (Waste Management Regulations, 2006).

7.1.2.3. Hazardous substances

- All hazardous chemicals will be stored in original containers for ease of identification and handling;
- Information on use and handling of hazardous substances from the manufacturers' hazard data sheets will be obtained and communicated to concerned workers;
- Appropriate PPE will be provided, and usage at all times ensured, to the workers handling hazardous substances;
- An inventory register will be kept and updated as appropriate;

7.1.2.4. Occupational accidents and hazards

- Necessary health and safety rules shall be enforced by the site foreman to ensure that all staff members adhere to these standards and are thus safe;
- Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided;
- Covers for refuse containers and appropriate personal protective equipments to be used by workers shall also be provided by the proponent;
- First Aid kits will be provided and staff members trained in first aid administration;
- Clear signage will be posted alerting of possible danger situations;
- Provision of mechanical protection to vulnerable structures such as LPG storage areas.

7.1.2.5. Alternative source of water

There will be an increased demand of water for the facility and for car washing and general cleanliness. The landscaping will also require vast amount of water. Thus the proponent intends to harness rain water as an alternative source for such uses.

7.1.2.6. Alternative source of Energy

The petrol station canopy provides an ideal location for installation of solar panels to harness solar energy for use in lighting. This renewable source will reduce the demand on the electricity from the national grid.

The facility should also have stand-by generators to boost up power from the national grid and also to be used during power blackouts. These generators should be serviced regularly to avoid air pollution which will eventually lead to production of green house gases that cause global warming and ozone depletion.

7.1.2.7. Health and safety

- PPEs will be provided at all stages of project cycle to workers and office employees and it will be ensured they use them at all time;
- A policy on health and safety at the workplace will be developed;
- A health and safety audit will be conducted annually as required by the (DOHS) occupational health and safety department.

7.1.3. Decommissioning phase

The impacts that will result upon possible decommissioning phase of the project require proper handling by the proponent. The environmental management plan proposes that the management put certain mechanism in place to ensure that the resulting impacts have low significance. Such mechanism should include:

7.1.3.1. Due diligence survey

The proponent would undertake a due diligence safety and environmental audit to identify and mitigate any impacts that may arise from any left-over objects and substances that could be harmful to people and/or the environment.

7.1.3.2. Efficient solid waste management

Solid waste resulting from demolition or dismantling works will be managed as required in LN No. 121 (Waste Management Regulations).

7.1.3.3. Minimization of noise and vibrations

Similar to the construction phase, demolition activities will be limited to day time only and machines used fitted with silencers. Demolition will also be scheduled to take the least time practicable to prevent prolonged disturbance. Appropriate PPE will be provided to the workers.

7.1.3.4. Dust reduction

Dust impact will be reduced by use of PPE, sprinkling water on rubble and shielding the demolition site.

7.1.3.5. Site restoration

After demolition, the proponent will undertake to restore the site to a condition dependent on the intended future use of the site, but that which is not out of character with the surrounding. Restoration will there involve:

- Filling of the holes left after un-installation of the fuel storage tanks;
- Conditioning of the compacted soil;
- Re-vegetating the land.

7.2. Environmental Management Plan

The tables below outline the environmental management plan for the proposed development. The plan considers the development activity, predicted environmental impact, proposed mitigations, actors, timeframe and costs.

7.2.1. EMP Design and Construction Phase

Table 2 EMP for Entire Project Cycle

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
Impact of sourcing of raw materials from environment	• Obtain raw materials from sources that are compliant with NEMA Regulations. • Procure quantities that are sufficient for the intended works only to avoid wastage. • Recycle as far as practical to stem wastage. • Commit to extensive use of recycled raw materials as will be appropriate and in a manner that does not compromise the safety of the development.	Proponent, Project Manager & Contractor	Throughout construction period	200,000
Noise pollution	• Construction work and delivery of raw materials will be limited to day time hours only. • Delivery of raw materials will be done so as to exclude weekends to avoid disturbing people. • Locate concrete mixers as far as practical from neighboring properties • Inform neighbors in writing prior to commencement of the development so that they are prepared psychologically at least two week in advance. • Employees using equipment that produce peak sounds shall be provided with earmuffs • Endeavor to comply with Noise Regulations (Legal Notice No. 61 of 2009) • Register the site as a workplace with the Directorate of Occupational Health and Safety (DOHS).	Proponent, Project Manager & Contractor	Throughout construction period	100,000
Dust generation	• Secure the site using appropriate dust screens. • Sprinkle with water building materials that are likely to produce dust such as ballast before use.	Proponent, Project Manager & Contractor	Throughout construction period	120,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
	• Access road and dust surfaces at the construction site should be sprinkled with water twice a day. • Employees will be provided with appropriate dust masks • Use dust screens as appropriate on the site.			
Health and safety of employees at the workplace	• Provision of adequate and appropriate Personal Protective Equipment (PPE) including safety shoes, helmets, gloves and overalls • Give employees the correct tools and equipment for the jobs assigned • Train them in the use of all equipment that they will be required to operate. • Observe rest times and breaks as necessary. • Hire the right number of workers to avoid overworking them • First aid services and an emergency vehicle to be readily available on site • Securely protect moving parts of machines and sharp surfaces with guards to avoid unnecessary contacts and injuries during construction phase • There must be adequate provision for artificial or natural lighting in all parts the working areas. • Ensure that all chemicals used in construction are appropriately labeled • The contractor to implement the provisions of the Occupational Safety and Health Act, No. 15 of 2007.	Proponent, Project Manager & Contractor	Throughout construction period	350,000
Safety of visitors, neighbours and general public	• Visitors to the project site must be provided with protective clothing at all time. • Inform all neighbors in writing on the commencement of the project at least two	Proponent, Project Manager & Contractor	Throughout construction period	50,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
	weeks in advance • Restrict access to the site by the public by fencing off the construction site, • Limit construction work to daytime only • Heavy Commercial Vehicles accessing the site to deliver construction materials must observe speed limits • Placing notices and safety slogans at strategic points to inform and educate neighbors and the general public displayed at the entry of the construction site and around the perimeter fence informing general public of ongoing construction and safety requirements • Provide for security services at the site.			
Tools, equipment, machinery use and electrical safety.	• Installation and fitting of proper electrical system to enable supply of electrical energy to utility point, • All electrical installations and fittings are done according to electrical safety rules, • All electrical wires must be safely insulated, • Sockets and other electrical outlets must be securely fitted, • When not in use all machines should be put off, • Qualified and well-experienced electrician should be hired to carry out all electrical works in the building, • Safety slogans should be strategically posted as a reminder to employees,. • All machine operating manuals should be clearly archived and availed for use when needed, and • Each machine operator should be conversant with the	Proponent, Project Manager & Contractor	Throughout construction period	200,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
	use of machine operating manuals.			
Solid waste management	• Use of an integrated solid waste management system i.e. through a hierarchy of options: source reduction, Recycling, Reuse before Disposal • Through estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large • Quantities of residual materials. • Dispose waste at the designated City Council dumpsites. • Transportation of wastes from the site to be done by a NEMA registered solid waste handler who will use appropriate vehicles for conveyance of wastes from site to designated City Council sites.	Proponent, Project Manager & Contractor	Throughout construction period	150,000
Effluent from workforce	• Procure a portable toilet facility to be emptied at appropriate intervals.	Proponent, Project Manager & Contractor	Throughout construction period	60,000
Traffic management	• Heavy commercial vehicles delivering raw materials shall observe designated speed limits for the area. • Personnel at entries to direct traffic in and out of the site • Proper signage and warnings to be placed on the access route to forewarn other motorists on the use of the road by heavy commercial vehicles	Proponent, Project Manager & Contractor	Throughout construction period	10,000
Physical environment restoration	• Landscaping and planting of sediment binding, grasses and gardening. • Consider replacing the indigenous trees that will have been felled during the construction process	Proponent, Project Manager & Contractor	After construction period	120,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
	• Ensure that any compacted areas are ripped to reduce run-off.			

7.2.2. The Operational Phase Environmental Management plan

Table 3 EMP Operational Phase

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Zoning and visual impacts	• To mitigate the potential for visual impacts, the facility is designed to have non storied buildings to avoid blocking views	Proponent, property manager	Throughout operational phase	
Fire hazards/ explosions	• The fuel storage tanks to be installed will undergo calibration, pressure checks, and leakage tests and have been passed as safe for use by an accredited company. • Installation of the storage tanks will also be done by an accredited company to the standards specified in the Petroleum Act Cap 116, Part III which highlights the methods of storage of petroleum products. • Fire extinguishers, fire hydrants and fire alarms will be provided at convenient locations within the buildings. These will be regularly inspected and maintained by a reputable fire security company. • Fire drills will be conducted at least biannually to ensure that workers are conversant with the action to take in the event of fire or explosions. • - Fire awareness materials will be placed in strategic locations within the petrol station to educate the workers and customers on what to do in the event of fire.	Proponent, property manager	Throughout operational phase	300,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	• An elaborate emergency response plan will be developed to address the risks associated with petrol station operations. • Leak detection devices will also be installed at appropriate areas to warn on leakages that are likely to trigger fires. Workers will be trained on handling accidental spillage of flammable substances that may also trigger fires. • 'No smoking' signs will be displayed as appropriate and measures taken against those not adhering to this order.			
Occupational Health and safety	• Workers hired will be trained on how to undertake petrol station operations • All machines will be maintained in good working order, and have instruction manuals. • The manager will formulate reasonable working schedules for his employee • Appropriate PPE will be provided to the workers. • All work stations will be adequately lit and ventilated. • Appropriate warning signs will be put up including emergency exit routes.	Proponent, property manager	Throughout operational phase	200,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	• All chemicals and hazardous substances will be labeled as such.			
Traffic management	• Have traffic directions signs installed at appropriate places leading to and within the site • All HCVs drivers must comply with Traffic rules and codes. • Adequate parking, loading and offloading areas within the site are provided. • Allow only vehicles that can be accommodated at the site at a time to avoid HCVs parking beside the road.	Proponent, property manager	Throughout operational phase	60,000
Solid waste	• Provide each section of the facility with sufficient trash bins that promote separation at source. • Contract a private waste handler who is registered with both NEMA and the City Council of Kilifi and proper records kept for collection and disposal. • Encourage staff to handle waste through the hierarchy of options that including reduction at source, separation of wastes to make it easier to undertake recycling / reusing. • Generally solid waste will be managed in line with Legal Notice No. 121 of 2006.	Proponent, property manager, occupants	Throughout operational phase	180,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Effluent generation	• Consider using technological options that promote usage of less water within the facility (e.g. through installing cisterns that are smaller in capacity) to reduce waste water generation at source. • Regular monitoring of the quality of water discharged to the soak pit to ensure that it meets the standards specified under Schedule V (discharge to municipal sewer line) of Legal Notice No. 120 of 2006 • Conduct regular inspections for sewage pipe blockages or damages and fix appropriately	Proponent, property manager	Throughout operational phase	220,000
Impact on energy usage	• The project design includes ventilation systems that allow for sufficient air circulation and lighting to lower the energy demand for the facility. • Proponent should consider installation of solar lighting systems complement electricity supply from the national grid. • Procurement of energy saving systems such as bulbs, air conditioners, and cookers etc that have a low energy use rate. • Provide energy saving tips for each of the sections of	Proponent and Property manager	Throughout operational phase	400,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	the facility so that occupants are aware of their obligations to conserve energy			
Impact on water resources usage	• Ensure sources of water for use at the facility meets the standards specified under schedule I of Legal Notice No. 120 of 2006 (standards for domestic supply) • Install self regulating water taps for sinks and basins within the facility • Create awareness among occupants on the importance of conservation of water resources • All water for use shall be metered to determine consumption levels and yields of the underground water sources • Rain and storm water harvesting is recommended as a measure to provide for water for gardening and landscaping and/or supplement groundwater resources	Proponent and Property manager	Throughout operational phase	300,000
Possible structural safety and security risks	• The buildings and perimeter wall will be constructed strictly to engineers' details and prescriptions in terms of materials quality and time frame to ensure stability. • Contract security firms and install alarms on all floors of the buildings. • A perimeter wall laced with electric fence will	Proponent and property manager	Throughout operational phase	200,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	be built to boost security for occupants and the property. • Parking space will be provided within the premises			

7.2.3. Possible decommissioning phase Environmental Management Plan

Table 4 EMP Decommissioning Phase

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
1. Demolition waste management				
Demolition waste	Use of an integrated solid waste management system i.e. through a hierarchy of options: Source reduction, Recycling, Composting and reuse, Combustion, Sanitary Land filling.	Proponent & Contractor	Once-off	250,000
	All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible	Proponent & Contractor	Once-off	
	All foundations must be removed and recycled, reused or disposed of at a licensed disposal site	Proponent & Contractor	Once-off	
	Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be	Proponent & Contractor	Once-off	

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility	Time Frame	Cost (Ksh)
	taken to a licensed waste disposal site			
	Donate reusable demolition waste to charitable organizations, individuals and institutions	Proponent & Contractor	Once-off	
2. Rehabilitation of project site				
Vegetation disturbance	Implement an appropriate re-vegetation programme to restore the site to its original status	Proponent & Contractor	Once-off	600,000
	Consider use of indigenous plant species in re-vegetation	Proponent & Contractor	Once-off	
	Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development.	Proponent & Contractor	Once-off	

8. ENVIRONMENTAL MONITORING PROGRAMME

8.1. Introduction

Throughout the operation phase, regular monitoring intended for proper safety and protection of the environment will be undertaken. The monitoring system will assist in observation, evaluation, assessment and reporting on the performance of different/various variables with regard to the environment.

8.2. Environmental Management System

An environmental management system (EMS) is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of development management. An EMS ensures environmental considerations are a priority with other concerns such as costs, product quality, investments, productivity and strategic planning.

The proposed development will require that a comprehensive safety, occupational health and environmental (SHE) system be formulated and maintained in accordance with the relevant legislative and regulatory requirements.

8.3. Environmental Management Organization (EMO)

The project proponent will work with EIA/EA experts in identifying ways for the property to improve its environmental performance, setting objectives and targets and monitoring and evaluating implementation.

Monitoring schedule

The proponent or property manager will follow the monitoring schedule that will assist in observation, evaluation assessment and reporting on the performance of different/various variables. The following table summarizes the suggested monitoring schedule of the facility.

Table 5 Summary of monitoring schedule

Aspect	Performance Criteria	Frequency
Water and energy use and consumption	Water to be tested for compliance with NEMA standards for drinking water	Quarterly
	Monitor electricity and water consumption from all sources	Monthly
	Monitor diesel consumption by the stand by generators (if provided)	Monthly
Air Emissions	Sample and analyze generator emissions	Annually
Solid waste generation	Keep records of solid waste transported and dumped at the County Council designated dumpsite	Review Annually
Effluent discharge	Monitor the quality of the waste water before discharge	Quarterly
Neighborhood issues	Keep record of complains or compliments coming from third parties and action taken	Review annually
Aesthetic value	Ensure and maintain proper landscaping	Review annually
	Regularly monitor the leak detection system and act accordingly	Bi-annually
Emergency preparedness	Servicing Fire Extinguishers	Quarterly
	Review records of accidents and incidents and document action taken to prevent recurrence	Twice a year
	Ensure fire alarm systems working	Weekly
	Conduct fire drills and awareness	Quarterly
	Test back-up generator to ensure it in working order	Weekly

8. CONCLUSION AND RECOMMENDATIONS

There are positive impacts of the proposed petrol station relating mainly to economic benefits to the proponent and the employees. However the project raises environmental, social, health and safety concerns which are manageable through implementation of the environmental management plan, organization, scheduled monitoring and review of the same. Continuous environmental monitoring of the project shall be implemented during the entire project cycle in liaison with NEMA and the project proponent to ensure that environmental, health and safety considerations are incorporated at all stages of project implementation.

It is therefore the recommendation of this study that the project be allowed to proceed on strict condition that the environmental management plan is implemented and follow-up is made to ensure compliance as may be directed by NEMA.

10. REFERENCES

1. Eco-region Visioning Workshop, 21st -24th April 2001, Mombasa, Kenya
2. Gakahu, C., 1997. Tourism and Development along the Kenyan Coast, University of Nairobi.
3. Gazette Notice No. 1821 (The Water Act No. 8 0f 2002) of 7th March 2006
4. Government of Kenya, 1996.Environmental Impact Assessment (EIA) (Guidelines and Administrative Procedures) Draft report, National Environment Action Plan (NEAP) Secretariat. Ministry of Environment and Natural Resources, Nairobi, Kenya.
5. Horril, C. and Kamau, I. (Eds) 2001. Proceedings of the Eastern African Marine
6. Ledgerwood, G., 1994. Implementing an Environmental Audit : How to Gain Competitive Advantage Using Quality and Environmental Responsibility (Financial Times Series)
7. Legal Notice No. 120: Kenya Gazette Supplement No. 68-Environmental
8. Legal notice No. 101 published by the NEMA in 2003. Environmental (Impact and Audit) regulations
9. Legal Notice No.121: Kenya Gazette Supplement No. 69 - Environmental Management and Coordination Act (Waste Management) Regulations, 2006
10. Lelo, F. 2000. Participatory Rural Appraisal Techniques. A Handbook. 114pp.
11. Management and Coordination Act(Water quality) regulations ,2006.
12. Mwaguni, S. 2002. Public Health Problems in Mombasa County. A case study on sewage management. MSc. Thesis, University of Nairobi, 88 pp
13. NEMA, 2004. State of the Environment Report Kenya 2004, Land use and Environment
14. Nzuki, S., 2008: Initial Environmental Audit Repot for Kipevu/west mainland Sewage Treatment works and Sewer System. 180pp.
15. Republic of Kenya Statutes:
16. The Building Code 2000
17. The Constitution of Kenya (2010)
18. The Energy Act and the Energy Regulatory Commission
19. The Environmental Management and Coordination Act (EMCA), 1999 and Legal Notices – 61, 101, 120, and 121.
20. The Food, Drugs and Chemical Substances Act (Cap 154)
21. The Local Authority Government Act (Cap. 265).
22. The Occupational Safety and Health Act, 2007
23. The Pest Control Products Act (Cap. 346)
24. The Petroleum Act
25. The Physical Planning Act, (Cap. 286)
26. The Public Health Act (Cap 242)
27. The Water Act 2002
28. The National Water Services Strategy (NWSS) 2007-2015, May 2007
29. UNEP, 1998: Environmental Impact Assessment – Basic Procedures for Developing Countries

APPENDICES

1. Project budget endorsed by a quantity surveyor.
2. Site layout plan.
3. Copy of proponent's PIN certificate
4. Copy of ID
5. Copy of Certificate of Title deed or lease to the plot
6. Evidence of public consultations
7. Copy of practicing licenses of the lead experts
8. Copy of building plans
9. Soil test results
10. Water test results